AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI

&

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM

(Constituent Colleges of Vinayaka Mission's Research Foundation, Deemed to be University, Salem, Tamil Nadu, India)

(AICTE APPROVED AND NAAC ACCREDITED)

VINAYAKA MISSION'S
KIRUPANANDA VARIYAR
ENGINEERING COLLEGE

Faculty of Engineering and Technology

REGULATIONS 2017

DEPARTMENT OF CIVIL ENGINEERING

Programme:

B.E / B.Tech. CIVIL ENGINEERING

Part Time Studies

STRUCTURED CHOICE BASED CREDIT SYSTEM (SCBCS)

CURRICULUM AND SYLLABUS

PROGRAM OUTCOMES (POs) OR GRADUATE ATTRIBUTES

On completion of program of engineering, graduates will be able to:

Sl. No.	Outcome	Level of Outcome	Description
PO 1	**Engineering knowledge**	Apply	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**	Apply	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**	Apply	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**	Apply	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**	Create	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**	Evaluate	Apply reasoning informed by the contextual knowledgeto assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**	Analyze	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**	Evaluate	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**	Analyze	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**	Evaluate	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**	Create	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‟s own work, as a member and leader in a team, to

			manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**	Create	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2. PROGRAM SPECIFIC OUTCOMES (PSOs)

On completion of B.E/B.Tech. Aeronautical Engineering program, graduates will be able to:

Sl. No.	Outcome	Level of Outcome	Description
PSO 1	**Multi-Dimensional Approach**	Evaluate	Solve complex engineering problems in the field of aerospace engineering by using available resources and tools for an optimised and desired output.
PSO 2	**Develop/Design/Modify/Involve**	Create	Identify the thrust areas of major concern in aerospace engineering affecting man and material in broad aspects, design and modify the systems to create a comfortable zone for men and machinery.
PSO 3	**Entrepreneurial Skills**	Create	Design components or processes for meeting the demands of quality standards with environmental considerations.

Credit Requirement for Course Categories

CATEGORY	CONTENT	CREDITS TO BE OBTAINED	EARNED CREDIT
A	**FOUNDATION COURSES (FC)**	**54-63**	**62**
	(i). Humanities and Sciences (English, Management Subjects)	12-21	15
	(ii). Basic Sciences (Maths, Physics, Chemistry Subjects)	24-33	24
	(iii). Engineering Sciences (Basic Engineering Courses)	18-27	23
B	**CORE COURSES (CC)**	**81**	**81**
C	**ELECTIVE COURSES (EC)**	**18-27**	**21**
	(**i). Programme Specific** (Classroom or online)	12-15	15
	(ii). Open Electives (Classroom or online)	6-9	6
D	**PROJECT+INTERNSHIP+INDUSTRY ELECTIVES (PII)**	**18**	**18**
	(i). Project	9	9
	(ii). Internship / Mini project / Industry supported courses	9	9
E	**EMPLOYABILITY ENHANCEMENT COURSES+ CO-CURRICULAR COURSES+ EXTRA CURRICULAR COURSES (EEC)****	**9-18**	

Minimum Credits to be Obtained	**:**	**180**
Total Earned Credit	**:**	**182**

**- Mandatory, credit would be mentioned in mark sheets but not included for CGPA calculations.

CURRICULUM

B.E / B.TECH.– CIVIL ENGINEERING - SEMESTER I TO VIII

CATEGORY A – FOUNDATION COURSES - HS, BS AND ES COURSES - CREDITS (54-63)

B.E / B.TECH. –CIVIL ENGINEERING - SEMESTER I TO VIII									
CATEGORY A – FOUNDATION COURSES - HSS, BS AND ES COURSES - CREDITS (54-63)									
(i) HUMANITIES AND SCIENCES (ENGLISH AND MANAGEMENT SUBJECTS) - CREDITS (12 - 21)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	**17EGHS01**	TECHNICAL ENGLISH	ENGLISH	FC (HSS)	3	0	0	3	NIL
2.	**17EGHS81**	ENGLISH LANGUAGE LAB	ENGLISH	FC (HSS)	0	0	4	2	NIL
3.	**17YMHS82**	YOGA AND MEDITATION	PHYSICAL EDUCATION	FC (HSS)	0	0	4	2	NIL
4.	**17EGHS82**	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	ENGLISH	FC (HSS)	0	0	4	2	NIL
5.	**17EGHS02**	BUSINESS ENGLISH	ENGLISH	FC (HSS)	3	0	0	3	NIL
6.	**17MBHS04**	TOTAL QUALITY MANAGEMENT	MANAGEMENT	FC (HSS)	3	0	0	3	NIL
7.	**17MBHS03**	ENGINEERING MANAGEMENT AND ETHICS	MANAGEMENT	FC (HSS)	3	0	0	3	NIL
8.	**17MBHS07**	PROFESSIONAL ETHICS AND HUMAN VALUES	MANAGEMENT	FC (HSS)	3	0	0	3	NIL

CATEGORY A – FOUNDATION COURSES - HS, BS AND ES COURSES - CREDITS (54-63)

(ii) BASIC SCIENCES (MATHS, PHYSICS AND CHEMISTRY SUBJECTS) - CREDITS (24 - 33)									
1.	**17MABS01**	ENGINEERING MATHEMATICS	MATHEMATICS	FC (BS)	2	2	0	3	NIL
2.	**17MABS08**	MATHEMATICS FOR CIVIL ENGINEERS	MATHEMATICS	FC (BS)	2	2	0	3	ENGINEERING MATHEMATICS
3.	**17MABS13**	PDE APPLICATION AND COMPLEX ANALYSIS	MATHEMATICS	FC (BS)	2	2	0	3	MATHEMATICS FOR CIVIL ENGINEERING
4.	**17MABS16**	NUMERICAL METHODS	MATHEMATICS	FC (BS)	2	2	0	3	ENGINEERING MATHEMATICS
5.	**17PCBS02**	PHYSICAL SCIENCES	PHYSICS & CHEMISTRY	FC (BS)	4	0	0	4	NIL
6.	**17PCBS81**	PHYSICAL SCIENCES LAB	PHYSICS & CHEMISTRY	FC (BS)	0	0	4	2	NIL
7.	**17PHBS05**	SMART MATERIALS	PHYSICS	FC (BS)	3	0	0	3	NIL
8.	**17CHBS01**	ENVIRONMENTAL SCIENCE AND ENGINEERING	CHEMISTRY	FC (BS)	3	0	0	3	NIL
9.	**17CHBS06**	GREEN BUILDING MATERIALS	CHEMISTRY	FC (BS)	3	0	0	3	NIL
10.	**17CHBS07**	CHEMISTRY OF WATER	CHEMISTRY	FC (BS)	3	0	0	3	NIL
11.	**17CHBS08**	SOIL CHEMICALS IN CIVIL ENGINEERING	CHEMISTRY	FC (BS)	3	0	0	3	NIL
12.	**17PHBS01**	NON-DESTRUCTIVE TESTING OF MATERIALS	PHYSICS	FC (BS)	3	0	0	3	NIL
13.	**17PHBS09**	NANOSCIENCE & TECHONOLOGY	PHYSICS	FC (BS)	3	0	0	3	NIL

CATEGORY A – FOUNDATION COURSES - HS, BS AND ES COURSES - CREDITS (54-63)

(iii) ENGINEERING SCIENCES (BASIC ENGINEERING COURSES) - CREDITS (18 - 27)									
1.	**17CSES01**	ESSENTIALS OF COMPUTING (THEORY + PRACTICE)	CSE	FC(ES)	2	0	2	3	NIL
2.	**17CSES05**	PROGRAMMING IN PYTHON	CSE	FC(ES)	3	0	0	3	NIL
3.	**17CSES83**	PROGRAMMING IN PYTHON LAB	CSE	FC(ES)	0	0	4	2	NIL
4.	**17CMES02**	BASICS OF CIVIL AND MECHANICAL ENGINEERING	CIVIL & MECHANICAL	FC(ES)	4	0	0	4	NIL
5.	**17CMES81**	ENGINEERING SKILLS PRACTICE LAB A. BASIC CIVIL ENGINEERING B. BASIC MECHANICAL ENGINEERING	CIVIL & MECHANICAL	FC(ES)	0	0	4	2	NIL
6.	**17EEES03**	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	EEE & ECE	FC(ES)	4	0	0	4	NIL
7.	**17MEES84**	ENGINEERING GRAPHICS (THEORY + PRACTICE)	MECHANICAL	FC(ES)	1	0	4	3	NIL
8.	**17EEES82**	ENGINEERING SKILL PRACTICE LAB A. BASIC ELECTRICAL ENGINEERING B. BASIC ELECTRONICS ENGINEERING	EEE & ECE	FC(ES)	0	0	4	2	NIL

CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME - CREDITS (81)

B.E. / B.TECH. – CIVIL ENGINEERING - SEMESTER I TO VIII									
CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME - CREDITS (81)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1	**17CVCC01**	CONSTRUCTION MATERIALS	CIVIL	CC	3	0	0	3	NIL
2	**17CVCC02**	MECHANICS OF SOLIDS -I	CIVIL	CC	2	1	0	3	NIL
3	**17CVCC03**	MECHANICS OF FLUIDS	CIVIL	CC	2	1	0	3	NIL
4	**17CVCC04**	SURVEYING I	CIVIL	CC	3	0	0	3	NIL
5	**17CVCC05**	CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES	CIVIL	CC	3	0	0	3	NIL
6	**17CVCC06**	MECHANICS OF SOLIDS -II	CIVIL	CC	2	1	0	3	MECHANICS OF SOLIDS- I
7	**17CVCC07**	APPLIED HYDRAULIC ENGINEERING	CIVIL	CC	2	1	0	3	MECHANICS OF FLUIDS
8	**17CVCC08**	SURVEYING -II	CIVIL	CC	3	0	0	3	SURVEYING -I
9	**17CVCC09**	ENVIRONMENTAL ENGINEERING	CIVIL	CC	3	0	0	3	NIL
10	**17CVCC10**	DESIGN OF REINFORCED CONCRETE ELEMENTS	CIVIL	CC	2	1	0	3	MECHANICS OF SOLIDS -II
11	**17CVCC11**	STRUCTURAL ANALYSIS	CIVIL	CC	2	1	0	3	MECHANICS OF SOLIDS -II
12	**17CVCC12**	MECHANICS OF SOILS	CIVIL	CC	2	1	0	3	NIL
13	**17CVCC13**	DESIGN OF STEEL STRUCTURES	CIVIL	CC	2	1	0	3	MECHANICS OF SOLIDS- II
14	**17CVCC14**	HIGHWAY ENGINEERING	CIVIL	CC	3	0	0	3	NIL
15	**17CVCC15**	RAILWAY , AIRPORT AND HARBOUR ENGINEERING	CIVIL	CC	3	0	0	3	HIGHWAY ENGINEERING
16	**17CVCC16**	DESIGN OF REINFORCED CONCRETE STRUCTURES	CIVIL	CC	2	1	0	3	DESIGN OF REINFORCED CONCRETE ELEMENTS
17	**17CVCC17**	MODERN METHODS OF STRUCTURAL ANALYSIS	CIVIL	CC	2	1	0	3	STRUCTURAL ANALYSIS
18	**17CVCC18**	FOUNDATION ENGINEERING	CIVIL	CC	2	1	0	3	MECHANICS OF SOILS
19	**17CVCC19**	ESTIMATION AND QUANTITY SURVEYING	CIVIL	CC	2	1	0	3	NIL
20	**17CVCC20**	CONSTRUCTION PLANNING AND SCHEDULING	CIVIL	CC	3	0	0	3	NIL
21	**17CVCC81**	COMPUTER AIDED BUILDING DRAWING LAB	CIVIL	CC	0	0	4	2	NIL
22	**17CVCC82**	STRENGTH OF MATERIALS LAB	CIVIL	CC	0	0	4	2	NIL
23	**17CVCC83**	SURVEY PRACTICAL -I LAB	CIVIL	CC	0	0	4	2	NIL
24	**17CVCC84**	HYDRAULIC ENGINEERING LAB	CIVIL	CC	0	0	4	2	MECHANICS OF FLUIDS
25	**17CVCC85**	SURVEY PRACTICAL -II LAB	CIVIL	CC	0	0	4	2	SURVEY PRACTICAL -I LAB
26	**17CVCC86**	SOIL MECHANICS LAB	CIVIL	CC	0	0	4	2	NIL
27	**17CVCC87**	ENVIRONMENTAL ENGINEERING LAB	CIVIL	CC	0	0	4	2	NIL
28	**17CVCC88**	COMPUTER AIDED DESIGN AND DRAWING LAB	CIVIL	CC	0	0	4	2	DESIGN OF REINFORCED CONCRETE ELEMENTS
29	**17CVCC89**	CONCRETE AND CONSTRUCTION TECHNOLOGY LAB	CIVIL	CC	0	0	4	2	CONSTRUCTION MATERIALS
30	**17CVCC90**	SURVEY CAMP	CIVIL	CC	0	0	2	1	SURVEY PRACTICAL -II LAB
31	**17CVCC91**	COMPREHENSION LAB	CIVIL	CC	1	1	0	2	NIL

CATEGORY C – ELECTIVE COURSES - CREDITS (18 - 27)

B.E / B.TECH. – CIVIL ENGINEERING - SEMESTER I TO VIII
DETAILS OF ELECTIVE COURSES FOR DEGREE WITH SPECIALISATION

CATEGORY C – ELECTIVE COURSES - CREDITS (18 - 27)

(i) PROGRAMME SPECIFIC (CLASS ROOM OR ONLINE) - CREDITS (12 - 15)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1	**17CVEC01**	ENGINEERING GEOLOGY	CIVIL	EC	3	0	0	3	NIL
2	**17CVEC02**	IRRIGATION ENGINEERING	CIVIL	EC	3	0	0	3	ENVIRONMENTAL ENGINEERING
3	**17CVEC03**	GEOGRAPHICAL INFORMATION SYSTEM	CIVIL	EC	3	0	0	3	NIL
4	**17CVEC04**	REPAIR AND REHABILITATION OF STRUCTURES	CIVIL	EC	3	0	0	3	CONSTRUCTION TECHNIQUES, EQUIPMENTS AND PRACTICES
5	**17CVEC05**	TRAFFIC ENGINEERING AND MANAGEMENT	CIVIL	EC	3	0	0	3	HIGHWAY ENGINERING
6	**17CVEC06**	HYDROLOGY	CIVIL	EC	3	0	0	3	NIL
7	**17CVEC07**	DISASTER MITIGATION AND MANAGEMENT	CIVIL	EC	3	0	0	3	NIL
8	**17CVEC08**	REMOTE SENSING TECHNIQUES AND APPLICATIONS	CIVIL	EC	3	0	0	3	NIL
9	**17CVEC09**	HOUSING PLANNING AND MANAGEMENT	CIVIL	EC	3	0	0	3	NIL
10	**17CVEC10**	MANAGEMENT OF IRRIGATION SYSTEMS	CIVIL	EC	3	0	0	3	IRRIGATION ENGINEERING
11	**17CVEC11**	GROUND IMPROVEMENT TECHNIQUES	CIVIL	EC	3	0	0	3	MECHANICS OF SOILS
12	**17CVEC12**	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS	CIVIL	EC	3	0	0	3	MECHANICS OF SOILS
13	**17CVEC13**	ELECTRONIC SURVEYING	CIVIL	EC	3	0	0	3	SURVEYING 1
14	**17CVEC14**	AIR POLLUTION MANAGEMENT	CIVIL	EC	3	0	0	3	ENVIRONMENTAL ENGINEERING
15	**17CVEC15**	BRIDGE STRUCTURES	CIVIL	EC	3	0	0	3	DESIGN OF STEEL STRUCTURES
16	**17CVEC16**	TALL BUILDINGS	CIVIL	EC	3	0	0	3	DESIGN OF STEEL STRUCTURES
17	**17CVEC17**	STRUCTURAL DYNAMICS	CIVIL	EC	3	0	0	3	STRUCTURAL ANALYSIS
18	**17CVEC18**	WIND ENGINEERING	CIVIL	EC	3	0	0	3	NIL
19	**17CVEC19**	COMPUTER AIDED DESIGN OF STRUCTURES	CIVIL	EC	2	0	1	3	DESIGN OF REINFORCED CONCRETE ELEMENTS
20	**17CVEC20**	INDUSTRIAL STRUCTURES	CIVIL	EC	3	0	0	3	DESIGN OF STEEL STRUCTURE
21	**17CVEC21**	SMART STRUCTURES AND SMART MATERIALS	CIVIL	EC	3	0	0	3	SMART MATERIALS
22	**17CVEC22**	FINITE ELEMENT TECHNIQUES	CIVIL	EC	2	1	0	3	STRUCTURAL ANALYSIS
23	**17CVEC23**	DESIGN OF PLATE AND SHELL STRUCTURES	CIVIL	EC	3	0	0	3	DESIGN OF STEEL STRUCTURES
24	**17CVEC24**	GROUND WATER ENGINEERING	CIVIL	EC	3	0	0	3	ENVIRONMENTAL ENGINEERING
25	**17CVEC25**	PRINCIPLES OF STRUCTURAL DYNAMICS AND SEISMIC DESIGN	CIVIL	EC	3	0	0	3	FOUNDATION ENGINEERING
26	**17CVEC26**	CONTRACT LAWS AND REGULATIONS	CIVIL	EC	3	0	0	3	NIL
27	**17CVEC27**	TRANSPORT ECONOMICS	CIVIL	EC	3	0	0	3	HIGHWAY ENGINEERING
28	**17CVEC28**	MASS TRANSPORT MANAGEMENT	CIVIL	EC	3	0	0	3	HIGHWAY ENGINEERING
29	**17CVEC29**	WATER RESOURCES SYSTEMS ANALYSIS	CIVIL	EC	3	0	0	3	ENVIRONMENTAL ENGINEERING
30	**17CVEC30**	ARCHITECTURE	CIVIL	EC	3	0	0	3	NIL
31	**17CVEC31**	PAVEMENT ENGINEERING	CIVIL	EC	3	0	0	3	HIGHWAY ENGINEERING
32	**17CVEC32**	STORAGE STRUCTURES	CIVIL	EC	3	0	0	3	DESIGN OF REINFORCED

									CONCRETE ELEMENTS
33	**17CVEC33**	EXPERIMENTAL ANALYSIS OF STRESS	CIVIL	EC	2	1	0	3	STRUCTURAL ANALYSIS
34	**17CVEC34**	SHORING, SCAFFOLDING AND FORM WORK	CIVIL	EC	3	0	0	3	CONSTRUCTION MATERIALS
35	**17CVEC35**	MUNICIPAL SOLID AND WASTE MANAGEMENT	CIVIL	EC	3	0	0	3	NIL
36	**17CVEC36**	WASTE WATER ENGINEERING	CIVIL	EC	3	0	0	3	NIL

CATEGORY C – ELECTIVE COURSES - CREDITS (18 - 27)

(ii) OPEN ELECTIVES (CLASS ROOM OR ONLINE) - CREDITS (6 - 9)									
1.	**17BTEC02**	OCEAN SCIENCE	BTE	OE	3	0	0	3	NIL
2.	**17BTEC26**	ECO-FRIENDLY MULTI-STOREY BUILDING	BTE	OE	3	0	0	3	NIL
3.	**17BTEC27**	RENEWABLE ENERGY AND CONSTRUCTION METHODS	BTE	OE	3	0	0	3	NIL
4.	**17BTEC28**	ENVIRONMENT FRIENDLY PRACTICES IN CIVIL ENGINEERING	BTE	OE	3	0	0	3	NIL
5.	**17BTEC25**	BIOLOGY FOR NON BIOLOGISTS	BTE	OE	3	0	0	3	NIL
6.	**17CSEC06**	CRYPTOGRAPHY AND NETWORK SECURITY	CSE	OE	3	0	0	3	NIL
7.	**17CSCC19**	INTRERNET OF THINGS	CSE	OE	3	0	0	3	NIL
8.	**17CSCC17**	CYBER SECURITY	CSE	OE	3	0	0	3	NIL
9.	**17CSEC11**	GREEN COMPUTING	CSE	OE	3	0	0	3	NIL
10.	**17CSEC34**	WEB DESIGN AND MANAGEMENT	CSE	OE	3	0	0	3	NIL
11.	**17BMEC04**	MEMS AND ITS BIOMEDICAL APPLICATIONS	BME	OE	3	0	0	3	NIL
12.	**17BMEC12**	HOSPITAL MANAGEMENT	BME	OE	3	0	0	3	NIL
13.	**17BMEC20**	HOSPITAL INFORMATION SYSTEM	BME	OE	3	0	0	3	NIL
14.	**17BMEC05**	HOME MEDICARE TECHNOLOGY	BME	OE	3	0	0	3	NIL
15.	**17BMEC10**	BODY AREA NETWORKS AND MOBILE HEALTHCARE	BME	OE	3	0	0	3	NIL
16.	**17ATEC04**	SPECIAL TYPES OF VEHICLES	AUTOMOBILE	OE	3	0	0	3	NIL
17.	**17ATEC06**	AUTOMOTIVE SAFETY	AUTOMOBILE	OE	3	0	0	3	NIL
18.	**17ATEC10**	ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES	AUTOMOBILE	OE	3	0	0	3	NIL
19.	**17ATEC15**	VEHICLE TRANSPORT MANAGEMENT	AUTOMOBILE	OE	3	0	0	3	NIL
20.	**17ATEC17**	VEHICLE AIR-CONDITIONING	AUTOMOBILE	OE	3	0	0	3	NIL
21.	**17EEEC10**	POWER QUALITY	EEE	OE	3	0	0	3	NIL
22.	**17EEEC11**	POWER SYSTEM PLANNING AND RELIABILITY	EEE	OE	3	0	0	3	NIL
23.	**17EEEC16**	ELECTRIC VEHICLES	EEE	OE	3	0	0	3	NIL
24.	**17EEEC18**	RENEWABLE ENERGY TECHNOLOGY	EEE	OE	3	0	0	3	NIL
25.	**17EEEC21**	NON CONVENTIONAL ENERGY SOURCES	EEE	OE	3	0	0	3	NIL
26.	**17MESE12**	PRODUCT LIFE CYCLE MANAGEMENT	MECH	OE	3	0	0	3	NIL
27.	**17MESE21**	IRON AND STEEL MAKING	MECH	OE	3	0	0	3	NIL
28.	**17MESE25**	COMPUTATIONAL FLUID DYNAMICS	MECH	OE	3	0	0	3	NIL
29.	**17MESE34**	FAILURE ANALYSIS OF MATERIALS	MECH	OE	3	0	0	3	NIL
30.	**17MESE27**	POWER PLANT ENGINEERING	MECH	OE	3	0	0	3	NIL
31.	**17ECEC04**	DSP WITH FPGA	ECE	OE	3	0	0	3	NIL
32.	**17ECEC06**	MEMS AND SENSORS	ECE	OE	3	0	0	3	NIL
33.	**17ECEC21**	ADVANCED ROBOTICS	ECE	OE	3	0	0	3	NIL

34.	**17ECEC22**	INNOVATIVE PROJECT	ECE	OE	3	0	0	3	NIL
35.	**17ECEC23**	INTRODUCTION TO MACHINE VISION	ECE	OE	3	0	0	3	NIL
36.	**17MBHS06**	LEAN START-UP MANAGEMENT	MBA	OE	3	0	0	3	NIL

CATEGORY D
PROJECT + INTERNSHIP + INDUSTRY ELECTIVES (P + I + I)
CREDITS (18)

B.E. / B.TECH. – CIVIL ENGINEERING - SEMESTER I TO VIII									
CATEGORY D – PROJECT + INTERNSHIP + INDUSTRY ELECTIVES (P + I + I)- CREDITS (18)									
(i) PROJECT - CREDITS (9)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	**17CVPI01**	PROJECT WORK AND VIVA VOCE	CIVIL	PI	0	0	18	9	NIL
(ii) INTERNSHIP / MINI PROJECT / INDUSTRY SUPPORTED COURSES - CREDITS (9)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	**17CVPI02**	INTERNSHIP TRAINING	CIVIL	PI	0	0	6	3	NIL
2.	**17CVPI03**	MINI PROJECT	CIVIL	PI	0	0	6	3	NIL
3.	**17CVPI04**	UNIT OPERATIONS AND PROCESS IN WATER AND WASTE WATER	CIVIL	PI	3	0	0	3	NIL
4.	**17CVPI05**	CONSTRUCTION PROJECT MANAGEMENT	CIVIL	PI	3	0	0	3	NIL
5.	**17CVPI06**	PREFABRICATED STRUCTURES	CIVIL	PI	3	0	0	3	NIL
6.	**17CVPI07**	INDUSTRIAL WASTE MANAGEMENT	CIVIL	PI	3	0	0	3	NIL

CATEGORY E

EMPLOYABILITY ENHANCEMENT COURSES, CO - CURRICULAR COURSES AND EXTRA CURRICULAR COURSES (EEC)** - CREDITS (9 - 18)
(** - MANDATORY, CREDITS WOULD BE MENTIONED IN MARK SHEETS BUT NOT INCLUDED FOR CGPA CALCULATIONS.)

B.E / B.TECH. – CIVIL ENGINEERING - SEMESTER I TO VIII									
CATEGORY E – EMPLOYABILITY ENHANCEMENT COURSES, CO - CURRICULAR COURSES AND EXTRA CURRICULAR COURSES (EEC) - CREDITS (9 - 18) (** - MANDATORY, CREDITS WOULD BE MENTIONED IN MARK SHEETS BUT NOT INCLUDED FOR CGPA CALCULATIONS.)**									
S.NO.	**CODE**	**COURSE TITLE**	**OFFERING DEPT**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE - REQUIST**
i	**EMPLOYABILITY ENHANCEMENT COURSES (EEC)**								
1	**17APEE01**	PERSONALITY SKILLS DEVELOPMENT - I	MATHS	EE	2 WEEKS OF TRAINING			1	NIL
2	**17APEE02**	PERSONALITY SKILLS DEVELOPMENT - II	ENGLISH & MANAGEMENT	EE	2 WEEKS OF TRAINING			1	NIL
3	**17CVEE01**	ADVANCED BUILDING DRAWING	CIVIL	EE	0	0	4	2	NIL
4	**17CVEE02**	QUANTITY SURVEYING	CIVIL	EE	0	0	4	2	NIL
5	**17CVEE03**	MUNICIPALITY BUILDING DESIGN BY LAWS	CIVIL	EE	0	0	4	2	NIL
6	**17CVEE04**	STRUCTURAL DETAILING WITH THE USE OF SOFTWARES	CIVIL	EE	0	0	4	2	NIL
7	**17CVEE05**	QUALITY CONTROL IN CONSTRUCTION	CIVIL	EE	0	0	4	2	NIL
8	**17CVEE06**	ADVANCED LAND SURVEYING TECHNIQUES	CIVIL	EE	0	0	4	2	NIL
9	**17CVEE07**	ADVANCED BUILDING MATERIALS AND CONSTRUCTION CHEMICALS	CIVIL	EE	0	0	4	2	NIL
CO - CURRICULAR COURSES									
1	**17APEE03**	NCC	NCC CELL	EE	2 WEEKS OF TRAINING IN NCC CAMP			1	NIL
2	**17APEE04**	NSS	NSS CELL	EE	2 WEEKS OF SOCIAL SERVICE IN NSS CAMP			1	NIL
3	**17APEE05**	SPORTS AND GAMES (INTER – UNIVERSITY LEVEL)	PHYSICAL EDUCATION	EE				1	NIL
4	**17APEE06**	SPORTS AND GAMES (INTRA-UNIVERSITY LEVEL)	PHYSICAL EDUCATION	EE				2	NIL
5	**17APEE07**	SPORTS AND GAMES (STATE AND NATIONAL LEVELS)	PHYSICAL EDUCATION	EE				2	NIL
EXTRA CURRICULAR COURSES									
1	**17CVEE08**	EXTRA CURRICULAR COURSE - I	CIVIL	EE	15 HOURS			1	NIL
2	**17CVEE09**	EXTRA CURRICULAR COURSE - II	CIVIL	EE	15 HOURS			1	NIL
3	**17CVEE10**	EXTRA CURRICULAR COURSE - III	CIVIL	EE	15 HOURS			1	NIL
4	**17CVEE11**	EXTRA CURRICULAR COURSE - IV	CIVIL	EE	15 HOURS			1	NIL
5	**17CVEE12**	EXTRA CURRICULAR COURSE - V	CIVIL	EE	15 HOURS			1	NIL
6	**17CVEE13**	EXTRA CURRICULAR COURSE -VI	CIVIL	EE	15 HOURS			1	NIL

FOR DEGREE WITH

SPECIALISATION

CATEGORY C – PROGRAMME SPECIFIC ELECTIVE COURSES - CREDITS (12 - 15)

SPECIALISATION - ERP IN CONSTRUCTION

SPECIALISATION – ERP IN CONSTRUCTION									
1.	**17CVSE01**	APPLICATION OF STATISTICAL METHODS IN CONSTRUCTION	MATHS	EC - PS	3	0	0	3	ENGINEERING MATHEMATICS
2.	**17CVSE02**	ENTERPRISE WIDE INFORMATION SYSTEMS	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE03**	MANAGEMENT AND PROJECT PLANNING IN CONSTRUCTION	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE04**	CONSTRUCTION CONTRACTS AND ADMINISTRATION	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE05**	TQM IN CONSTRUCTION	CIVIL	EC - PS	3	0	0	3	TOTAL QUALITY MANAGEMENT
6.	**17CVSE06**	HUMAN RESOURCE MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE07**	ENTERPRISE RESOURCE PLANNING SYSTEM	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - IRRIGATION ENGINEERING

SPECIALISATION – IRRIGATION ENGINEERING									
1.	**17CVSE08**	SURFACE AND GROUND WATER HYDROLOGY	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE09**	ENVIRONMENTAL IMPACT ASSESSMENT OF IRRIGATION PROJECTS	CIVIL	EC - PS	3	0	0	3	IRRIGATION ENGINEERING
3.	**17CVSE10**	WATERSHED CONSERVATION AND MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE11**	IRRIGATION SYSTEMS MANAGEMENT	CIVIL	EC - PS	3	0	0	3	IRRIGATION ENGINEERING
5.	**17CVSE12**	COMPUTATIONAL METHODS IN IRRIGATION MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE13**	AGRICULTURAL ECONOMICS	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE14**	MODERNIZATION OF IRRIGATION SYSTEMS	CIVIL	EC - PS	3	0	0	3	IRRIGATION ENGINEERING

SPECIALISATION - DISASTER MITIGATION AND RECOVERY

SPECIALISATION – DISASTER MITIGATION AND RECOVERY									
1.	**17CVSE15**	TYPOLOGY OF NATURAL AND MANMADE DISASTERS	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE16**	CRISIS COMMUNICATION & MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE17**	DISASTER PREPAREDNESS AND DECISION MAKING	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE18**	VULNERABILITY MAPPING TECHNIQUES FOR DISASTERS	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE19**	INDUSTRIAL HAZARDS PREVENTIVE MANAGEMENT.	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE20**	APPLICATION OF GIS&RS IN DISASTER MANAGEMENT.	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE21**	FINANCE AND INSURANCE IN DISASTER MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - MASS TRANSPORT SYSTEMS

SPECIALISATION – MASS TRANSPORT SYSTEMS									
1.	**17CVSE22**	ADVANCED SYSTEM DYNAMICS MODELING IN TRANSPORTATION ENGINEERING	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE23**	ENVIRONMENTAL IMPACT ASSESSMENT OF TRANSPORTATION PROJECTS	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE24**	INTELLIGENT TRANSPORTATION SYSTEMS	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE25**	LOGISTICS IN TRANSPORTATION ENGINEERING	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE26**	PAVEMENT MANAGEMENT SYSTEM	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE27**	REMOTE SENSING AND GIS IN TRANSPORTATION DEVELOPMENT	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE28**	URBAN TRANSPORTATION INFRASTRUCTURE– PLANNING AND DESIGN	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - REAL ESTATE AND VALUATION

SPECIALISATION – REAL ESTATE AND VALUATION								
1.	PRINCIPLES OF VALUATION	CIVIL	EC - PS	3	0	0	3	NIL
2.	REAL ESTATE MANAGEMENT & ECONOMICS	CIVIL	EC - PS	3	0	0	3	NIL
3.	REAL ESTATE HUMAN RESOURCE MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
4.	LAWS FOR ACQUISITION AND CONTRACT	CIVIL	EC - PS	3	0	0	3	NIL
5.	REAL ESTATE FINANCE& MARKETING	CIVIL	EC - PS	3	0	0	3	NIL
6.	VALUATION & DOCUMENTATION WRITING	CIVIL	EC - PS	3	0	0	3	NIL
7.	QUALITY CONTROL AND ASSURANCE IN REAL ESTATE	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - SUSTAINABLE CONSTRUCTION TECHNOLOGY

SPECIALISATION – SUSTAINABLE CONSTRUCTION TECHNOLOGY									
1.	**17CVSE36**	RENEWABLE ENERGY SYSTEMS	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE37**	THERMAL INSULATION INSTALLATION	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE38**	SUSTAINABLE URBAN SYSTEMS	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE39**	ENERGY AUDITING IN SPECIAL STRUCTURES	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE40**	LIFE CYCLE ASSESSMENT FOR COMPLEX SYSTEMS	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE41**	INFRASTRUCTURE PROJECT DEVELOPMENT	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE42**	GREEN AND ENERGY EFFICIENT BUILDING	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - URBAN INFRASTRUCTURE

SPECIALISATION – URBAN INFRASTRUCTURE									
1.	**17CVSE43**	INFRASTRUCTURE PLANNING AND URBANIZATION PROCESS	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE44**	URBAN ENVIRONMENTAL MANAGEMENT AND LAW	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE45**	SUSTAINABILITY IN BUILT ENVIRONMENT	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE46**	CONSTRUCTION & CONTRACT SAFETY MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE47**	ICT BASED CITY AND INFRASTRUCTURE PLANNING	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE48**	URBAN FINANCE	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE49**	URBAN DESIGN PROJECT	CIVIL	EC - PS	3	0	0	3	NIL

SPECIALISATION - ENVIRONMENTAL ENGINEERING

SPECIALISATION – ENVIRONMENTAL ENGINEERING									
1.	**17CVSE50**	ENVIRONMENTAL IMPACT ASSESSMENT	CIVIL	EC - PS	3	0	0	3	NIL
2.	**17CVSE51**	INSTRUMENTAL MONITORING OF ENVIRONMENT	CIVIL	EC - PS	3	0	0	3	NIL
3.	**17CVSE52**	INDOOR AIR QUALITY	CIVIL	EC - PS	3	0	0	3	NIL
4.	**17CVSE53**	ENVIRONMENTAL POLICIES AND LEGISLATIONS	CIVIL	EC - PS	3	0	0	3	NIL
5.	**17CVSE54**	SUSTAINABLE DEVELOPMENT AND ENVIRONMENT	CIVIL	EC - PS	3	0	0	3	NIL
6.	**17CVSE55**	REMOTE SENSING AND GIS FOR ENVIRONMENTAL APPLICATION	CIVIL	EC - PS	3	0	0	3	NIL
7.	**17CVSE56**	WASTE WATER MANAGEMENT	CIVIL	EC - PS	3	0	0	3	NIL

COURSES OFFERED TO OTHER DEPARTMENTS

B.E. / B.TECH. – CIVIL ENGINEERING - SEMESTER I TO VIII									
COURSES OFFERED TO OTHER DEPARTMENTS									
S.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE-REQUISITE**	**OFFERED TO**
1	**17CMES02**	BASICS OF CIVIL ENGINEERING	ES	2	0	0	2	NIL	MECHANICAL, AUTOMOBILE, AERONAUTICAL, CIVIL, CSE, ECE, EEE, MECHATRONICS & SAE
2	**17CMES81**	ENGINEERING SKILLS PRACTICE LAB B. BASIC CIVIL ENGINEERING	ES	0	0	2	1	NIL	MECHANICAL, AUTOMOBILE, AERONAUTICAL, CIVIL, CSE, ECE, EEE, MECHATRONICS & SAE
3	**17CVCC32**	FLUID MECHANICS AND STRENGTH OF MATERIALS	CC	3	0	0	3	NIL	AUTOMOBILE & MECHATRONICS
4	**17CVCC33**	STRENGTH OF MATERIALS	CC	3	0	0	3	NIL	MECHANICAL & AERONAUTICAL
5	**17CVCC34**	FLUID MECHANICS AND MACHINERY	CC	3	0	0	3	NIL	MECHANICAL , AERONAUTICAL
6	**17CVCC92**	FLUID MECHANICS AND STRENGTH OF MATERIALS LAB	CC	0	0	4	2	NIL	AUTOMOBILE, AERONAUTICAL & MECHATRONICS
7	**17CVCC93**	HYDRAULICS AND STRENGTH OF MATERIALS LAB	CC	0	0	4	2	NIL	MECHANICAL
8	**17CVCC35**	FLUID AND SOLID MECHANICS	CC	3	0	0	3	NIL	SAE
9	**17CVCC94**	FLUID AND SOLID MECHANICS LAB	CC	0	0	4	2	NIL	SAE
10	**17CVEC07**	DISASTER MITIGATION AND MANAGEMENT	EC	3	0	0	3	NIL	BME, EEE, CSE, CSE-CLOUD, IT & MECHANICAL

SYLLABUS

SEMESTERS I TO VIII

(i) HUMANITIES AND SCIENCES (ENGLISH AND MANAGEMENT SUBJECTS)

Subject Code	Subject Title	Category	L	T	P	Credit
17EGHS01	**TECHNICAL ENGLISH**	**HSS**	**3**	**0**	**0**	**3**

PREAMBLE

Technical English is a life skill course necessary for all students of Engineering and Technology. It aims at developing communication skills in English, essential for understanding and expressing the ideas of different professional context. The outcome of the course is to help the students acquire the language skills of Listening, Speaking, Reading and Writing competency in English language and thereby making the students competent and employable in the globalised scenario.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To enable students to develop LSRW skills in English. (Listening, Speaking, Reading, Writing.)
2	To make them to become effective communicators in English
3	To ensure that learners use Electronic media materials for developing language skills
4	To aid the students with employability skills.
5	To motivate students continuously use English language.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Listen, understand and respond to others in different situations	Understand and Apply
CO2. Speak fluently and correctly with correct pronunciation in different situation	Apply
CO3. To make the students experts in professional writing	Apply
CO4. To make the students recognize the role of technical writing in their careers in business, technical and scientific field	Apply
CO5. To make the students good communicators at the work place and to be theoretically strong.	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	M	M	M	L	S	S	S	M	-	-	-
CO2	S	-	L	M	S	S	M	L	M	S	M	S	-	-	-
CO3	L	L	-	L	S	M	-	L	M	S	-	L	-	-	-
CO4	L	M	-	-	M	M	S	M	M	M	S	S	-	-	-
CO5	S	M	L	-	L	-	S	M	S	S	L	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT – I: Self introduction - Simulations using E Materials - Whatsapp, Face book, Hiker, Twitter- Effective Communication with Minimum Words - Interpretation of Images and Films - Identify the different Parts of Speech- Word formation with Prefixes and suffixes -Common Errors in English -Scientific Vocabulary (definition and meaning) - Listening Skills- Passive and Active listening, Listening to Native Speakers - Characteristics of a good listener.

UNIT – II: Articles - Phonetics (Vowels, Consonants and Diphthongs) - Pronunciation Guidelines -Listening to Indian speakers from different regions, intrusion of mother tongue - Homophones – Homonyms - Note taking and Note making - Difference between Spoken and Written English- Use of appropriate language - Listening and Responding to Video Lectures (Green India, environment, social talks) - Extempore.

UNIT – III Tense forms- Verbal and Non verbal Communication - Describing objects - Process Description- Speaking Practice - Paragraph Writing on any given topic (My favourite place, games / Hobbies / School life, etc.) -Types of paragraphs - Telephone Etiquettes - Telephonic conversation with dialogue.

UNIT – IV Impersonal Passive Voice - Conditional Sentences - Technical and Non technical Report Writing (Attend a technical seminar and submit a report) - News Letters and Editing - Skimming- Scanning - How to Improve Reading Speed - Designing Invitations and Poster Preparation.

UNIT – V Sentence Pattern (SVOCA) - Statement of Comparison - Transcoding (Flow Chart, Bar Chart and Pie Chart) - Informal letters - Resume Writing- Difference between Bio data, Resume and Curriculum Vitae.

TEXTBOOK

1. English for Engineers- Faculty of English – VMKV Engineering College, Salem and AVIT, Chennai

REFERENCES

1. English for Effective Communication, Department of English, VMKV & AVIT, SCM Publishers, 2009.
2. Practical English Usage- Michael Swan (III edition), Oxford University Press
3. Grammar Builder- I, II, III, and Cambridge University Press.
4. 4 Pickett and Laster. Technical English: Writing, Reading and Speaking, New York: Harper and Row Publications, 2002.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.P.Saradha	Associate Professor-Head - English	VMKVEC	saradha@vmkvec.edu.in

17EGHS81	ENGLISH LANGUAGE LAB	Category	L	T	P	Credit
		HSS	0	0	4	2

PREAMBLE

English Language Laboratory provides technological support to students. It acts as a platform for learning, practicing and producing language skills through interactive lessons and communicative mode of teaching.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand communication nuisances in the corporate sector.
2	To understand the role of mother tongue in second language learning and to avoid interference of mother tongue.
3	To communicate effectively through different activities
4	To understand and apply the telephone etiquette
5	Case study to understand the practical aspects of communication

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Better performance in Group Discussion and Interview	Understand and Apply
CO2. Better performance in the art of conversation and discussion.	Apply
CO3. Better job opportunities in corporate companies	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	S	M	S	-	L	-	-	S	S	M	-	-	-	-
CO2	M	-	-	-	-	-	-	-	M	S	-	M	-	-	-
CO3	M	-	-	-	-	-	-	-	-	S	-	M	-	-	

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I: Ice Breaker, Grouping, Listening- (Hearing and listening)- Active Listening- Passive Listening – Listening to a song and understanding- (fill in the blanks) Telephone Conversation

UNIT -II: Influence of mother tongue, videos, understanding nuances of English language (video) puzzle to solve, Activity.

UNIT -III: Why is English important, Communication skills, TED (video) Communication in different scenario – a case study, ingredients of success, Activity – chart, speak the design, feedback on progress, Group wise, Individual.

UNIT -IV: Telephone Etiquette, Dining Etiquette, Meeting Etiquette.

UNIT -V: Case study of Etiquette in different scenario.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.P.Saradha	Associate Professor-Head – English	VMKVEC	saradha@vmkvec.edu.in
2	Dr. Jennifer G Joseph	Associate Professor	AVIT	Jennifer@avit.ac.in

17EGHS82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOENT	Category	L	T	P	Credit
		HS	0	0	2	1

To develop students with good presentation and writing skills (Professionally & technically). Articulate and enunciate words and sentences clearly and effectively. Develop proper listening skills. Understand different writing techniques and styles based on the communication being used.

PREREQUISITE- NIL

COURSE OBJECTIVES

1	To develop communication and personality skills.
2	To improve Aptitude skills, train to improve self-learning / researching abilities, presentation skills & technical writing.
3	To improve students employability skills.
4	To develop communication and problem solving skills.
5	To develop professional with idealistic, practical and moral values.
6	To produce cover letters, resumes and job application strategies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Improve communication and personality skills.	Apply
CO2. Demonstrate effective use of team work skills to complete given tasks.	Apply
CO3. Speaking with clarity and confidence thereby enhancing employability skills of the students.	Apply
CO4. Train the students in organized and professional writing	Apply
CO5. Develop students reading skills that could be adopted while reading text	Apply
CO6. Improve students their vocabulary and use them in appropriate situation	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**M**	**M**	-	-	-	**M**	**M**	-	**M**	**S**	-	-			
CO2	**M**	-	-	-	-	-	-	-	**S**	**M**	-	-			
CO3	-	-	-	-	-	-	**M**	-	**S**	**S**	-	-			
CO4	**S**	-	-	-	-	-	-	-	-	-	-	**M**			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO6	**S**	-	-	-	-	-	-	-	**M**	**S**	-	**M**			

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT – I: COMMUNICATION AND SELF DEVELOPMENT: Basic Concepts of Communication; Barriers in Communication; How to Overcome Barriers to Communication.

UNIT – II: GRAMMAR & SYNTAX: Subject verb concord, tenses, Homophones, Homonyms, Spotting errors.

UNIT – III. READING AND WRITING SKILLS: Reading Comprehension; and suggesting title for given passage Back office job for organizing a conference / seminar (member of organizing committee and submit a report); Jumbled sentences, respond to real time advertisement and prepare a covering letter with CV.

UNIT IV. SPEAKING SKILLS: Hard and soft Skills; Feedback Skills; Skills of Effective Speaking; Component of an effective Talk; how to make an effective oral presentation

UNIT V TECHNICAL REPORT, RESEARCH CASE STUDY & REPORTING: Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports. Research Case Study and reporting, how to make an effective power point presentation

TEXTBOOK

1. The Functional Aspects of Communication Skills, Prajapati Prasad and RajendraK.Sharma, S. K Kataria& Sons, New Delhi, Rep""nt 2007

REFERENCES

1. Business Communication, Sinha K. K. S. Chand, New Delhi.
2. Business Communication, AshaKaul, Prentice Hall of India
3. Business Correspondence and Report Writing A Practical Approach to Business and Technical Communication, Sharma, R.C.and Krishna Mohan, Tata McGraw – Hill.

Course Designers:

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr. P.Saradha/Associate Professor – Head- English	saradha@vmkvec.edu.in

17EGHS02	BUSINESS ENGLISH	Category	L	T	P	Credit
		HSS	3	0	0	3

Language is one of the most valued possessions of men. It acts as a repository of wisdom. Among all other languages English, the international language plays a vital role as a propeller for the advancement of knowledge in different fields and as a telescope to view the dream of the future.

PRER**EQUISITE- NIL**

COURSE OBJECTIVES

1	To impart and enhance corporate communication.
2	To enable learners to develop presentation skills
3	To build confidence in learners to use English in Business contex
4	To make them experts in professional writing
5	To assist students understand the role of thinking in all forms of communication
6	To equip students with employability and job searching skills

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Communicate with a range of formal and informal context	Understand
CO2. Students will undergo in activities, demonstrating interaction skills and consider how own communication is adjusted in different scenario	Apply
CO3. Strengthening of oral and written skills in the business context	Apply
CO4. Create interest among the students about a topic by exploring thoughts and ideas	Understand
CO5. Make the students to start with pleasing note and make them to give different ideas	Apply
CO6. Make them in better performance in the art of communication	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	**M**	-	-	**L**	-	-	**M**	**S**	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	**S**	**M**	-	-	-	-
CO3	-	-	**M**	-	-	-	-	-	**M**	**S**	-	-	-	-	-
CO4	**M**	**M**	-	-	**L**	**S**	-	**M**	**S**	**S**	-	**L**	-	-	-
CO5	**M**	-	-	-	-	**M**	-	**M**	**M**	**S**	-	-	-	-	-
CO6	**S**	**M**	**M**	-	-	**S**	**M**	-	-	**S**	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT – I: Subject and Verb Agreement (concord) - Preposition and Relative Pronoun - Cause and effect - Phrasal Verbs-Idioms and phrases-Listening Comprehension -Listening to Audio Files and Answering Questions-Framing Questions-Negotiation Skills-Presentation Skills and Debating Skills.

UNIT – II: Stress (Word Stress and Sentence Stress) Intonation- Difference between British and American English Vocabulary-Indianism-Compound Words (including Technical Terminology).

UNIT – III Reading Skills-Understanding Ideas and making Inferences-Group Discussion-Types of Interviews – FAQs – E - Mail Netiquette - Sample E – mails - Watching Documentary Films and Responding to Questions.

UNIT IV - Corporate Communication -Recommendation-Instruction-Check List- Circulars-Inter Office Memo- Minutes of Meeting and Writing Agenda - Discourse Markers - Rearranging Jumbled Sentences - Technical Articles - Project Proposals-Making Presentations on given Topics -Preparing Power Point Presentations

UNIT V - Critical Reading-Book Review-Finding Key Information and Shifting Facts from Opinions-Business Letters (Calling for Quotation, Placing Orders and Complaint Letters) - Expansion of an Idea-Creative Writing.

TEXTBOOK

1. English for Effective Communication - Faculty of English – VMKV Engineering College, Salem and AVIT, Chennai

REFERENCES

1. Grammar Builder – I, II, III – Cambridge University Press.

2. Technical English – Writing, Reading and Speaking – Pickett and Lester, Harper and Row

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr. P.Saradha/Associate Professor – Head- English	saradha@vmkvec.edu.in

17MBHS04	TOTAL QUALITY MANAGEMENT	Category	L	T	P	Credit
		HSS	3	0	0	3

Quality means Degree of Excellence a Product or Service provides. Quality Management refer that the standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer"s requirements, and that quality is consistently improved. **Total Quality Management** (**TQM**) describes a management approach to long–term success through customer satisfaction and, is an integrative philosophy of management for continuously improving the quality of products and processes. Its function includes that quality of products and processes is the responsibility of everyone who is involved with the creation or consumption of the products or services offered by an organization. It becomes essential to survive and grow in global markets, organizations will be required to develop customer focus and involve employees to continually improve Quality and keep sustainable growth.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the introduction about Total Quality Management.
2	To understand the TQM principles.
3	To understand the statistical process control
4	To impart the various TQM tools
5	To understand the quality systems.
6	To understand the introduction about Total Quality Management.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the importance of quality and TQM at managerial level.	Understand
CO2. Explain the required tools to implement TQM.	Apply
CO3. Analyse various TQM parameters with help of statistical tools.	Analysing
CO4. Evaluating various TQM Techniques	Evaluate
CO5. Propose the Quality Management Systems in a different organization environment	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	M	L	L	L	L	L	L	L	L	M	L	L			
CO2.	S	S	M	L	M	L	L	M	M	L	L	L			
CO3.	S	S	S	M	S	M	L	M	M	L	L	M			
CO4.	M	S	S	L	M	L	L	M	M	L	L	M			
CO5.	S	S	S	L	M	M	S	M	M	S	M	S			

S- Strong; M-Medium; L-Low

SYLLABUS

I INTRODUCTION **9**

Quality: Definition - Dimensions - Planning- costs – Analysis Techniques for Quality Costs- Basic concepts of Total Quality Management- Historical Review- Principles - Leadership – Concepts- Role of Top Management- Council- Statements- Strategic Planning- Deming Philosophy- TQM Implementation – Barriers.

TQM PRINCIPLES **9**

Customer satisfaction – Perception of Quality- Complaints- Service Quality- Customer Retention- Employee

Involvement – Motivation- Empowerment- Teams- Recognition and Reward- Performance Appraisal- Benefits- Continuous Process Improvement – Juran Trilogy- PDSA Cycle- 5S- Kaizen-Basic Concepts- Strategy- Performance Measure.

STATISTICAL PROCESS CONTROL (SPC) 9

The Seven tools of Quality- Statistical Fundamentals – Measures of central Tendency & Dispersion- Population and Sample- Normal Curve- Control Charts for variables and attributes- Process capability- Concept of six sigma- New seven Management tools.

TQM TOOLS 9

Benchmarking – Reasons - Process- Quality Function Deployment (QFD) – House of Quality- QFD Process- Benefits- Taguchi Quality Loss Function- Total Productive Maintenance (TPM) – Concept- Improvement Needs- FMEA – Stages of FMEA.

QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems- ISO 9000:2000 Quality System – Elements- Implementation of Quality System- Documentation- Quality Auditing- QS 9000- ISO 14000 – Concept- Requirements and Benefits.

TEXT BOOKS

1. Dale H.Besterfiled- et at. - Total Quality Management- PHI-1999. (Indian reprint 2002).
2. Feigenbaum.A.V. "Total Quality Management- McGraw-Hill- 1991.

REFERENCES

1. James R.Evans & William M.Lidsay - The Management and Control of Quality- (5th Edition) - South-Western (Thomson Learning) - 2002 (ISBN 0-324-06680-5).
2. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd - Oxford. 1989.
   Narayana V and Sreenivasan - N.S. Quality Management – Concepts and Tasks- New Age International 1996.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr.A.Mani	asmanimba@gmail.com

17MBHS03	ENGINEERING MANAGEMENT AND ETHICS	Category	L	T	P	Credit
		HSS	3	0	0	3

"Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.".

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To understand the Fundamentals of planning.
2	To evaluate the various organisation and staffing functions.
3	To understand the motivation and controlling methods
4	To understand the code of ethics
5	To impart the need of ethics for engineers.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the importance of management decision making and planning	Understand
CO2. Evaluating the various organisation and staffing functions.	Apply
CO3. Analyse various the various motivation and controlling methods.	Analysing
CO4. Understand the morale dilemma and code of ethics	Evaluate
CO5. Evaluating the various ethical conduct and professional responsibilities	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO6.	L	S	L	L	L	M	L	L	L	L	L	L			
CO7.	S	S	M	L	M	L	L	M	M	L	L	L			
CO8.	S	S	S	M	S	M	L	M	M	L	L	M			
CO9.	M	S	S	L	M	L	M	M	M	L	L	M			
CO10.	S	S	S	L	M	M	S	M	M	M	M	S			

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING **9**

Management – Nature & Scope – Functions of Management – Levels of Management – Role of Managers - Nature and purpose of planning - Planning process - Types of plans – Objectives Managing by objective (MBO) - Decision Making - Types of decision - Decision Making Process - Decision Making under different conditions.

ORGANIZING & STAFFING **9**

Nature and purpose of organizing - Organization structure - Formal and informal Organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training Methods - Performance Appraisal.

]DIRECTING & CONTROLLING **9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Communication - Barriers to effective Communication – Controlling – Controlling Techniques - Organization

Culture - Elements and types of culture – Managing cultural diversity..

INTRODUCTION TO ETHICS **9**

Moral dilemmas -Uses of Ethical Theories- Engineering As Social Experimentation- Engineer‟s Responsibility For Safety-Codes of Ethics-Challenger Case Study

ETHICS IN ENGINEERING **9**

Employed Engineers Rights and Duties- Collective Bargaining-Occupational Crime- Global Issues-Multinational Corporation- Technology transfer-Engineers as managers-Consulting Engineers-Expert Witness-Moral Leadership

TEXT BOOKS

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York (2005).

REFERENCES

1. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, (1999).
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi (2004)
5. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, (2003).

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr.A.Mani	asmanimba@gmail.com

17MBHS07	PROFESSIONAL ETHICS & HUMAN VALUES	Category	L	T	P	Credit
		HSS	3	0	0	3

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2	To help students initiate a process of dialog within themselves to know what they „really want to be" in their life and profession.
3	To help students understand the meaning of happiness and prosperity for a human being
4	To facilitate the students to understand harmony at all the levels of human living, and live accordingly
5	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the significance of value inputs in a classroom and start applying them in their life and profession	Analysing
CO2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc..	Create
CO3. Understand the value of harmonious relationship based on trust and respect in their life and profession.	Understand
CO4. Understand the role of a human being in ensuring harmony in society and nature.	Evaluate
CO5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	L	M	L	L	L	M	L	L	L	M	L	L	L	M	L
CO2.	S	S	M	L	M	L	L	M	M	L	L	L	S	S	M
CO3.	S	S	S	M	S	M	S	M	M	L	L	M	S	S	S
CO4.	S	S	S	L	S	L	M	M	M	L	L	M	S	S	S
CO5.	S	S	S	L	M	M	S	M	M	S	M	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

HUMAN VALUES **9**

Introduction to Human Values. Morals, Values and Ethics, Culture and importance for Professionals – Integrity in workplace – Work Ethic – Honesty – Courage –Empathy – Self-Confidence –Discrimination- Character..

ENGINEERING ETHICS **9**

Moral Dilemmas- moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy Senses

of 'Engineering Ethics' - variety of moral issued - types of inquiry -– Models of Professional Roles - theories about right action - Self-interest –Professional Ideals and Virtues - Uses of ethical theories. Valuing Time – Co-operation – Commitment.

ENGINEERING AS SOCIALEXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics –Importance of Industrial Standards - A balanced outlook on law – anticorruption- occupational crime -the challenger case study.

ENGINEER'S RIGHTS AND CONSCIENTIOUSNESS ON SAFET 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest. Occupational Crime – Professional Rights – IPR- Safety and risk - Assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island, Bhopal Gas plant and Chernobyl as case studies.

GLOBAL ISSUES 9

Transnational and MNC corporations - Environmental ethics - Computer ethics - Weapons development and Ethical stand for Engineers in creation - Engineers as managers-Consulting engineers-Engineers as expert witnesses and advisors Ethical Responsibilities of a Professional Engineer as an Expert Witness moral leadership- Sample code of conduct- Case studies.

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2005.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics –Concepts and Cases", W Thompson Leatning, United States, 2000
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi,

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford Press , 2000
5. R.Subramanian , "Professional Ethics ",Oxford University Press ,Reprint ,2015.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr.A.Mani	asmanimba@gmail.com

(ii) BASIC SCIENCES (MATHS, PHYSICS AND CHEMISTRY SUBJECTS)

Subject Code	Subject Title	Category	L	T	P	Credit
17MABS01	**ENGINEERING MATHEMATICS**	BS	2	2	0	3

PREAMBLE

The driving force in Engineering Mathematics is the rapid growth of technology and the sciences. Matrices have been found to be of great utility in many branches of engineering applications such as theory of electric circuits, aerodynamics, and mechanics and so on. Many physical laws and relations can be expressed mathematically in the form of differential equations. Based on this we provide a course in matrices, calculus and differential equations. Vector calculus is a form of mathematics that is focused on the integration of vector fields. An Engineer should know the Transformations of the Integrals, as Transformation of Line Integral to surface and then to volume integrals.

PREREQUISITE

Elementary Matrices, Differentiation, Integration and Elementary calculus

COURSE OBJECTIVES

1	To recall the advanced matrix knowledge to Engineering problems.
2	To equip themselves familiar with the functions of several variables.
3	To improve their ability in solving geometrical applications of differential calculus problems
4	To examine knowledge in multiple integrals.
5	To improve their ability in Vector calculus.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply the concept of orthogonal reduction to diagonalise the given matrix	Apply
CO2. Find the radius of curvature, circle of curvature and centre of curvature for a given curve.	Understand
CO3. Classify the maxima and minima for a given function with several variables, through by finding stationary points	Analyse
CO4. Find double integral over general areas and triple integral over general volumes	Understand
CO5. Apply Gauss Divergence theorem for evaluating the surface integral.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO2	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO3	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO4	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO5	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

MATRICES: Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

DIFFERENTIAL CALCULUS: Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature – Evolute.

FUNCTIONS OF SEVERAL VARIABLES: Partial Derivatives – Total Differentiation – Maxima and Minima constrained Maxima and Minima by Lagrangian Multiplier Method.

MULTIPLE INTEGRALS: Double integration – change of order of integration – Cartesian and polar coordinates – Area as a double integral – Triple integration.

VECTOR CALCULUS: Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal – vector fields – vector integration – Green‟s theorem, Gauss divergence theorem and Stoke‟s theorem (excluding proof).

TEXT BOOKS:

1. "Engineering Mathematics I & II", Department of Mathematics, VMKVEC (Salem) & AVIT (Chennai), (2017).
2. Dr.A.Singaravelu, "Engineering Mathematics I & II", 23rd Edition, Meenakshi Agency, Chennai (2016).

REFERENCES:

1. Veerarajan T., "Engineering Mathematics", Tata McGraw Hill Education Pvt, New Delhi (2011).
2. Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi (2012).
3. Kreyszig E., "Advanced Engineering Mathematics", 8th Edition, John Wiley and Sons (Asia) Pvt. Ltd., Singapore (2012).
4. Kandasamy P, Thilagavathy K, and Gunavathy K., "Engineering Mathematics", Volumes I & II (10th Edition).

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.G.Selvam	Asso.Prof	VMKVEC	selvam@vmkvec.edu.in
2	Dr. M.Vijayarakavan	Asso.Prof	VMKVEC	vijayarakavan@vmkvec.edu.in

Subject Code	Subject Title	Category	L	T	P	Credit
17MABS08	**MATHEMATICS FOR CIVIL ENGINEERS**	BS	2	2	0	3

PREAMBLE

An engineering student needs to have some basic mathematical tools and techniques to apply in diverse applications in Engineering. This emphasizes the development of rigorous logical thinking and analytical skills of the student and appraises him the complete procedure for solving different kinds of problems that occur in engineering. Based on this, the course aims at giving adequate exposure in Ordinary differential equations, Laplace transforms, Applications of Laplace transforms, Fourier transforms and Z-transforms.

PREREQUISITE

Engineering Mathematics

COURSE OBJECTIVES

1	To familiarize with the applications of differential equations.
2	To equip themselves familiar with Laplace transform.
3	To gain good knowledge in the application of Laplace transforms
4	Fourier transforms has the wide application in the field of heat diffusion, wave propagation and in signal and systems analysis.
5	To learn about Z- transforms and its applications.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Predict the suitable method to solve second and higher orderdifferential equations	Apply
CO2. Apply Laplace transform technique to solve the given ordinary differential equation.	Apply
CO3. Apply Applications of Laplace transform technique to solve the given ordinary differential equation.	Apply
CO4.Apply Fourier transform technique to evaluate the given integral	Apply
CO5. Solve the given difference equations using Z-transform.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO2	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO3	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO4	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO5	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

ORDINARY DIFFERENTIAL EQUATIONS: Solutions of second and third order linear ordinary differential equation with constant coefficients – Method of variation of parameters – Cauchy‟s and Legendre‟s linear equations – Simultaneous first order linear equations with constant coefficients.

LAPLACE TRANSFORMS: Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems –Transform of periodic functions

INVERSE LAPLACE TRANSFORMS AND APPLICATIONS: Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

FOURIER TRANSFORMS: Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of

simple functions - Convolution theorem - Parseval's identity.

Z – TRANSFORMS: Z-Transform – Elementary Properties – Inverse Z-Transform – Convolution Theorem – Formation of Difference Equations – Solution of first and second order Difference Equations using Z-Transform.

TEXT BOOKS:

1. "Engineering Mathematics I & II ", by Department of Mathematics, VMKVEC (Salem) & AVIT (Chennai), (2017).
2. Dr.A.Singaravelu, "Engineering Mathematics I & II", 23rd Edition, Meenakshi Agency, Chennai (2016).
3. Dr.A.Singaravelu , "Transforms and Partial differential Equations", 18th Edition, Meenakshi Agency, Chennai (2013).

REFERENCES:

1. Veerarajan, T., "Engineering Mathematics I, II and III", Tata McGraw Hill Publishing Co., New Delhi (2011).
2. Grewal, B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi (2012)
3. Kreyszig, E., "Advanced Engineering Mathematics", 8th Edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore (2012).
4. Kandasamy .P, Thilagavathy. K. and Gunavathy. K., "Engineering Mathematics", Volumes I & II (10th Edition), S. Chand & Co., New Delhi (2014).

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.G.Selvam	Asso.Prof	VMKVEC	selvam@vmkvec.edu.in
2	Mrs.V.T.Lakshmi	Asso.Prof	VMKVEC	lakshmi@vmkvec.edu.in

17MABS13	PDE APPLICATIONS AND COMPLEX ANALYSIS	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

Partial differential equation is a differential equation that contains unknown multivariable functions and their partial derivatives. Its generally arise from the mathematical formulation of physical problems. Subject to certain given conditions, called boundary conditions, solving such equation is known as a boundary value problem. It is applied in the field of Hydraulics, conservation of mass equations(example waste water and water treatment), air, pollution models, design of reactor vessels, predicting quantities of materials necessary for construction, design of foundation(soil consolidation),computational solid.

Complex analysis is one of the classical branches in mathematics. Complex analysis traditionally known as the theory of functions of complex variable is the branch of mathematical analysis that investigates functions of complex numbers. It is useful in the branches of hydrodynamics, thermodynamics and particularly quantum mechanics. The concept of complex geometry and Argand plane is very useful in constructing buildings. This concept is used in 2-D designing of buildings. It is also very useful in cutting of tools. Another possibility to use complex numbers in simple mechanics might be to use them to represent equations. Purely analytical methods where mathematical functions are chosen to produce the sort of shapes that are desired.

PREREQUISITE

Engineering Mathematics

COURSE OBJECTIVES

1	To formulate and solve partial differential equation.
2	To have thorough knowledge in Fourier Series
3	To be familiar with this applications of partial differential equations.
4	To expose the concept of Analytical function.
5	To familiarize with Complex Integration.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the PDE concept in most of the engineering discipline when the number of independent variable in the given problem under discussion is two or more.	Understand
CO2. Demonstrate periodic functions arising in the study of engineering Problems as Fourier series of sine and cosines.	Apply
CO3. Solve PDE arising in engineering problems like wave equations Heat flow equation by Fourier series.	Apply
CO4. Predict an analytic function, when its real or imaginary part is known	Apply
CO5. Find the singularities and its corresponding residues for the given function.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO2	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO3	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO4	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO5	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

PARTIAL DIFFERENTIAL EQUATIONS: Formation - Solutions of standard types f(p,q)=0, clairauts form, f(z,p,q)=0,f(p,x)=g(q,y) of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

FOURIER SERIES: Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity – Harmonic Analysis.

BOUNDARY VALUE PROBLEMS: Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

ANALYTIC FUNCTIONS: Function of a complex variable – Analytic function – Necessary conditions - Cauchy Riemann equations – Sufficient conditions (excluding proof) – Harmonic conjugate–Constructions of analytic functions-conformal mapping $\left(w = z + c,\ w = z^2,\ w = \frac{1}{z}\right)$ bilinear transformations.

COMPLEX ANALYSIS: Statement and applications of Cauchy‟s integral theorem and integral formula – Taylor‟s and Laurent‟s expansions –Residues – Cauchy‟s residue theorem-contour integration over unit circle.

TEXT BOOKS:

1. Kreyszig, E., “Advanced Engineering Mathematics” (8th Edition), John Wiley and Sons,(Asia) Pte Ltd., Singapore, 2000.
2. Kandasamy .P.,Thilagavathy. K., and Gunavathy. K., “Engineering Mathematics”, Volumes I & II (4th edition), S.Chand& Co., New Delhi.
3. Grewal, B.S., “Higher Engineering Mathematics” (35th Edition), Khanna Publishers, Delhi 2000.

REFERENCES:

1. T. Veerarajan, “Engineering Mathematics” (for semester III), Third Edition Tata McGraw- Hill Publishing Company limited, 2006.

2.A.Singaravelu,”Transforms and Partial Differential Equations”, MeenakshiAgencies,Chennai

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.G.Selvam	Asso.Prof	VMKVEC	selvam@vmkvec.edu.in
2	Dr. M.Vijayarakavan	Asso.Prof	VMKVEC	vijayarakavan@vmkvec.edu.in

Subject Code	Subject Title	Category	L	T	P	Credit
17PCBS02	**PHYSICAL SCIENCES PART A - ENGINEERING PHYSICS (Common to All Branches)**	**BS**	**2**	**0**	**0**	**2**

PREAMBLE

Engineering Physics gives an outlook about various Important Technological Applications of Physical Concepts. In particular, Students learn about the concepts of laser, types of lasers and their applications. They also get a clear picture about the propagation of light through fibers, types of fibers and their applications in Communication. In additions, Students get an exposure about different types of Non-Destructive Techniques.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To impart the basic concepts of Physics and their applications in technology.
2	To understand the significance of laser and its applications in technology
3	To understand the basic principles of fibre optics and applications
4	To understand various techniques used in Non-destructive testing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students will understand the basic concepts in Engineering Physics	Understand
CO2. Students will gain the basic knowledge of laser and its applications	Apply
CO3. Students will understand the principles of light propagation in optical fibers and their applications	Apply
CO4. Students will get an exposure about different types of Non-Destructive Techniques	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	-	-	--	--	--	--	--	--	--
CO2	S	S	S	L	-	-	-	-	--	--	--	--	--	--	--
CO3	S	S	S	L	-	-	-	-	--	--	--	--	--	--	--
CO4	S	S	S	L	-	-	-	-	--	--	--	--	--	--	--
CO5	S	-	-	-	-	-	-	-	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

LASERS: Laser characteristics - Stimulated Emission – Population Inversion - Einstein coefficients – Lasing action – Types of Laser – Nd:YAG laser, CO2 laser, GaAs laser – Applications of Laser – Holography – construction and reconstruction of a hologram.

FIBRE OPTICS: Principle and propagation of light in optical fibres – numerical aperture and acceptance angle – types of optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system – fibre optic displacement sensor and pressure sensor.

NON-DESTRUCTIVE TESTING: Introduction – Types of NDT - Liquid penetrant method – characteristics of penetrant and developer - ultrasonic flaw detector – X-ray Radiography: displacement method – X-ray Fluoroscopy.

TEXT BOOKS:

1.Engineering Physics, compiled by Department of Physics, Vinayaka Missions University, Salem.

REFERENCES:

1. Beiser, Arthur, Concepts of Modern Physics, 5th Ed., McGraw-Hill, 2009.

2. Halliday.D, Resnick.R, Walker.J, Fundamentals of Physics, Wiley & sons, 2013.
3. Gaur R. K. and Gupta S. L., Engineering Physics, DhanpatRai publishers, New Delhi, 2001.
4. Avanadhanulu.M.N.,ArunMurthy.T.V.S, Engineering Physics Vol. I, S.Chand, 2014.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr. C. Senthil Kumar	Asso.Prof	VMKVEC	senthilbdu@gmail.com
2	Dr. R. Sethupathi	Asso.Prof	VMKVEC	sethupathivmkv@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17PCBS02	**PHYSICAL SCIENCES PART B - ENGINEERING CHEMISTRY (Common to All Branches)**	**BS**	**2**	**0**	**0**	**2**

PREAMBLE

Engineering Chemistry explains the fundamentals of Engineering Chemistry and helps the learners to understand the applications of Engineering Chemistry. The electrodes, Cell and batteries study gives a clear idea about electrochemistry. Water technology study gives the initiative about softening of water, desalination and corrosion. Conventional and Non-conventional energy field is essential for the current scenario and the advanced engineering materials are needed for our fast growing life style.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To impart fundamental knowledge in Chemistry so that the student will understand the engineering concept and can face the forthcoming years as well as the industry effectively.
2	To have a clear knowledge of electrochemistry, cells and electrodes.
3	To familiarizes the type of batteries and fuel cell.
4	To lay foundation for practical applications of water softening and desalination in engineering aspects.
5	To inculcate the knowledge of fuel, this is essential for current scenario.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the vital knowledge in Engineering Chemistry helps the learners in future studies	Understand
CO2. Employ the basic knowledge of cells and electrodes	Apply
CO3..Demonstrate the applications of water softening	Apply
CO4..Apply desalination process with engineering aspects	Apply
CO5. Discuss about conventional and non-conventional fuel for the current scenario.	Understand
CO6 Generalize polymers and smart materials	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	-	-	M	M	-	-	-	-	M			
CO2	M	M	M	-	-	M	M	-	-	-	-	S			
CO3	M	S	M	-	-	S	M	-	-	-	-	S			
CO4	M	M	M	-	-	M	M	-	-	-	-	S			
CO5	M	M	L	-	-	M	S	-	-	-	-	S			
CO6	M	M	M	-	-	M	M	-	-	-	-	S			

S- Strong; M-Medium; L-Low

SYLLABUS

ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS:

Electrode potential - Nernst equation – Electrodes (SHE, Calomel and Glass) - cells - EMF measurement. Primary battery (Daniel and dry cell) – secondary battery (lead Acid storage battery and Nickel-Cadmium battery) – Fuel cell (H2-O2 fuel cell)

WATER TECHNOLOGY AND CORROSION :

Sources of water – impurities – Hardness and its determination (problems to be avoided) – boiler troubles – water softening (Zeolite &Demineralisation) – Domestic water treatment – Desalination (Electrodialysis&ReverseOsmosis).

FUELS AND CHEMISTRY OF ADVANCED MATERIALS:

Classification of Fuels (Solid, Liquid, Gaseous, Nuclear and Bio fuels) – Calorific Value of a fuel –Non Petroleum Fuels –Non conventional sources of Energy – combustion.Basics and Applications:-Organic electronic material, shape memory alloys, polymers (PVC, Teflon, Bakelite).

TEXT BOOKS:

Engineering Chemistry piled by Department of Chemistry, Vinayaka Missions University, Salem.

REFERENCES:

1. A text book of Engineering Chemistry by S.S. Dara, S.Chand& company Ltd., New Delhi
2. Engineering Chemistry by Jain & Jain, 15th edition Dhanpatrai Publishing Company (P) Ltd., New Delhi
3. A text book of Engineering Chemistry by ShashiChawla, Edition 2012 Dhanpatrai& Co., New Delhi.
4. Engineering Chemistry by Dr. A. Ravikrishnan, Sri Krishna Publications, Chennai.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.T.Shanthi	Professor and Head	VMKVEC	Shantht@vmkvec.edu.in

17PCBS81	PHYSICAL SCIENCES LAB PART A – REAL AND VIRTUAL LAB IN PHYSICS (Common to All Branches)	Category	L	T	P	Credit
		BS	0	0	2	1

PREAMBLE

Real and Virtual Lab in Physics trains the students to take readings with precision. The experiments involve the calculation of physical parameters. In addition, the students have the exposure of doing experiments through virtual laboratory.

PREREQUISITE - Nil

COURSE OBJECTIVES

1	To impart basic skills in taking reading with precision of physics experiments
2	To inculcate the knowledge of handling equipments appropriately
3	To gain knowledge of practicing experiments through virtual laboratory.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students will understand to take readings with accuracy &precision	Apply
CO2.Students will learn to perform experiments through virtual laboratory	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	-	-	-	-	-	-	-	-	-	M	-	-	-
CO2	S	S	-	-	-	-	-	-	-	-	-	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Young's modulus of a bar - Non-uniform bending
2. Rigidity modulus of a wire - Torsional Pendulum
3. Viscosity of a liquid - Poiseuille's method
4. Velocity of ultrasonic waves in liquids - Ultrasonic Interferometer
5. Particle size determination using Laser
6. Wavelength of spectral lines – grating - Spectrometer
7. Thickness of a wire - Air wedge Method
8. Thermal conductivity of a bad conductor - Lee's disc
9. Band gap determination of a thermistor - Post Office Box
10. Specific resistance of a wire – Potentiometer

TEXT BOOK

Real and Virtual Lab in Physics Manual prepared by VMRF.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr. C. Senthil Kumar	Asso.Prof	VMKVEC	senthilbdu@gmail.com
2	Dr. R. Sethupathi	Asso.Prof	VMKVEC	sethupathivmkv@gmail.com

17PCBS81	PHYSICAL SCIENCES LAB PART B - ENGINEERING CHEMISTRY LAB (Common to All Branches)	Category	L	T	P	Credit
		BS	**0**	**0**	**2**	**1**

PREAMBLE

Engineering Chemistry Lab experiments explains the basics and essentials of Engineering Chemistry. It also helps the students to understand the applications of Engineering Chemistry. The electrodes, Cell and batteries study gives clear basic application oriented knowledge about electrochemistry. Water technology study gives the idea about hardness and its disadvantages.. Now-a-days the practical and handling of equipments are needed for our fast growing life style.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To impart basic skills in Chemistry so that the student will understand the engineering concept.
2	To inculcate the knowledge of water and electrochemistry.
3	To lay foundation for practical applications of chemistry in engineering aspects.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basic skills for his/her future studies.	Apply
CO2.Analyze the water comprehensively.	Apply
CO3. Apply the practical knowledge in engineering aspects	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	L	M	M	S	-	-	-	M	-	-	-
CO2	S	M	M	-	L	M	M	L	-	-	-	M	-	-	-
CO3	S	S	M	-	L	M	M	M	-	-	-	M			

S- Strong; M-Medium; L-Low

SYLLABUS

1. Determination of Hardness by EDTA method
2. Estimation of Hydrochloric acid by conductometric method
3. Acid Base titration by pH method
4. Estimation of Ferrous ion by Potentiometric method
5. Determination of Dissolved oxygen by Winkler‟s method
6. Estimation of Sodium by Flame photometer
7. Estimation of Copper from Copper Ore Solution
8. Estimation of Iron by Spectrophotometer

TEXT BOOK

1. Engineering Chemistry Lab Manual by VMU.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.T.Shanthi	Professor and Head	VMKVEC	Shantht@vmkvec.edu.in

17PHBS 05	SMART MATERIALS	Category	L	T	P	Credit
		Basic Sciences	3	0	0	3

PREAMBLE

Smart Materials gives an outlook about various types of materials having potential application in Engineering and Technology. In particular, Students learn about Smart Materials and their applications, Properties of Crystalline Materials &Nanomaterials, Characteristics of Magnetic materials. They also get a clear picture about superconducting materials.

PRERQUISITE

NIL

COURSE OBJECTIVES

1	To explain the properties of smart materials
2	To demonstrate the structure of crystalline materials
3	To examine the synthesis of Nano materials
4	To explain the properties and classification of magnetic materials
5	To outline the concept of superconducting materials and their properties

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Utilize the smart materials for designing equipments	Apply
CO2. Interpret the structure of crystalline materials	Apply
CO3. Develop equipments using nanomaterials	Analyze
CO4. Use the properties of magnetic materials in designing equipments	Apply
CO5. Develop the efficiency of superconducting materials	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	M	S				M			M			
CO2	S	M	S	M	S				M			M			
CO3	S	S	S	S	S				S			M			
CO4	S	M	S	M	S				M			M			
CO5	S	S	S	S	S				S			M			

S- Strong; M-Medium; L-Low

SYLLABUS

SMART MATERIALS: Shape Memory Alloys (SMA) – Characteristics and properties of SMA, Application, advantages and disadvantages of SMA. Metallic glasses – Preparation, properties and applications.

CRYSTALLINE MATERIALS: Unit cell – Bravais lattice – Miller indices – Calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC, HCP structures.

NANO MATERIALS: Nanophase materials – Top-down approach - Mechanical Grinding - Lithography - Bottom-up approach – Sol-gel method – Carbon nanotubes – Fabrication – applications.

MAGNETIC MATERIALS: Basic concepts – Classification of magnetic materials – Domain theory – Hysteresis – Soft and Hard magnetic materials.

SUPERCONDUCTING MATERIALS: Superconducting phenomena – properties of superconductors – Meissner effect – isotope effect – Type I and Type II superconductors – High Tc Superconductors –

Applications of superconductors.

TEXT BOOK:

Mani P, Engineering Physics II, Dhanam Publications, 2011.

REFERENCES:

1. Pillai S.O., Solid State Physics, New Age International (P) Ltd., publishers, 2009.

2. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1	Dr. C. Senthil Kumar	senthilbdu@gmail.com
2	Dr. R. Sethupathi	sethupathivmkv@gmail.com

17CHBS01	ENVIRONMENTAL SCIENCE & ENGINEERING (COMMON TO ALL BRANCHES)	Category	L	T	P	Credit
		BS	3	0	0	3

Environmental science is an interdisciplinary field that integrates physical, chemical, biological, information an atmospheric sciences. Environmental studies also incorporate the social sciences for understanding human relationships and a solution to the environmental and social related problems.. Environmental engineering focu on sustainable development for improving environmental quality in every aspect.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To create the awareness of environment studies and its scope
2	To inculcate the knowledge of significance and conserving the natural resources.
3	To helps the learners to know the value of ecosystem and food chain and to assess the importance of biodiversity
4	To familiarizes the different pollution sources, consequences and its control measures and to educate the ways and means to manage natural calamities..
5	To help the learners to know the urban energy related problems and social issues.
6	To impart the fundamental knowledge on human welfare measures this includes child welfare and women education.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1.Discuss and appreciate the unity of life in all its forms, the implications of life style on the environment.	Understand
CO2.Initiate the awareness and recognize the social responsibility in environmental issues.	Apply
CO3Illustrate the importance of ecosystem and biodiversity	Apply
CO4. Interpret the society on the various pollutions and their impact,disaster management	Apply
CO5 Recognize the issues of environment and sustainable development	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	S	S	S	-	-	-	S			
CO2	S	M	M	-	-	S	S	S	-	-	-	S			
CO3	S	L	M	-	-	S	S	S	-	-	-	S			
CO4	S	S	S	L	-	S	S	S	-	-	-	S			
CO5	S	S	S	M	-	S	S	S	-	-	-	S			

S- Strong; M-Medium; L-Low

SYLLABUS

ENVIRONMENT AND NATURAL RESOURCES : Environment - Definition, scope & importance - Public awareness- Forest resources, mineral resources , water resources, food resources , energy resources (uses, over - exploitation & adverse effects in each case) - Scope & role of environmental engineers in conservation of natural resources - Sustainability development

ECOSYSTEMS AND BIO – DIVERSITY: Ecosystem - Definition, structure and function - Energy flow - Ecological succession - food chain, food web, ecological pyramids- Introduction, types, characteristics, structure and function of forest, grassland, desert and Aquatic ecosystems - Bio - Diversity :values and uses, hotspots, threats and conservation.

ENVIRONMENTAL POLLUTION: Pollution - Definition , manmade impacts and control measures of air, water and land pollution - Water quality standards & characterization - Importance of sanitation -Nuclear hazards – Hazardous waste management : Solid waste, waste water and biomedical waste - Prevention of

pollution and role of individual – Disasters management : Floods, earthquake, cyclone and landslides - Clean technology options

SOCIAL ISSUES AND ENVIRONMENT: Urban problems related to energy - Water conservation – Resettlement and rehabilitation of people - Environmental ethics - Climate change - Global warming - Acid rain - Ozone depletion-Waste land reclamation, Environment Protection Act for air, water, wild life and forests - Pollution Control Board

HUMAN POPULATION AND ENVIRONMENT: Population growth - Population explosion - Family welfare programme - Environment & human health - Human rights – Value education - Women and child welfare, Role of information technology in environment and human health.

TEXT BOOK

1. Environmental Science and Engineering by Dr.A. Ravikrishnan, Sri Krishna Publications, Chennai.

REFERENCES:

1.Wager K.D. "Environmental Management", W.B. Saunders Co. Philadelphia, USA, 1998.
2.BharuchaErach "The Biodiversity of India" Mapin Publishing Pvt Ltd, Ahmedabad, India.
3. Trivedi R.K. "Handbook of Environmental Laws", Rules, Guidelines,Compliances and Standards Vol I & II, Enviro media.
4. Environmental Science and Engineering by Dr. J. Meenambal ,MJP Publication , Chennai Gilbert M. Masters : Introduction to Environmental Engineering and Science , Pearson EducationPvtLtd., II Edition, ISBN 81-297-0277-0,2004.
5.Miller T.G. Jr Environmental Science Wadsworth Publishing Co.
6. Townsend C. Harper J. and Michael Begon, Essentials of Ecology,Blackwell Science.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr.T.Shanthi	Shanthi.thiruvengadam130@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CHBS06	**GREEN BUILDING MATERIALS**	BS	3	0	0	3

PREAMBLE

This course is designed to enlighten students to the current greenbuilding trend, and to help them realize the impact and applications of green materials as a practice.

PREREQUISITE - Nil

COURSE OBJECTIVES

1	To understand the concept of green building and its characteristics
2	To understand the design of green buildings
3	To emphasize the role of green materials in civil engineering

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1- Gain knowledge in green buildings	Understand
CO2- Investigate the rating system of green buildings and life cycle of sustainable buildings.	Analyse
CO3- Understanding of green building design	Understand
CO4- Knowledge about green materials	Understand
CO5- Learn the various types of green building materials and its engineering application	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	M	-	M	-	-	-	-	-	-	-
CO2	L	-	-	-	-	-	-	-	-	-	-	-	-	M	-
CO3	-	M	-	-	M	L	-	-	-	-	-	-	-	M	-
CO4	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-
CO5	S	-	M	-	-	M	-	-	-	-	-	-	-	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

CONCEPT OF GREEN BUILDINGS : Green building initiatives, characteristics of a green building, certification of green buildings rating systems (BREEAM,USGBC,LEED,IGBC) criteria for rating, sustainability.

DESIGN OF GREEN BUILDINGS : Sustainable sites, life cycle assessment. considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design.

GREEN BUILDING MATERIALS : Green materials - introduction, Depleting natural resources of building materials, renewable and recyclable resources, energy efficient materials - green cement, biomaterials, biopolymers, bioplastics, smart materials and composites

GREEN MATERIALS FOR INTERIOR Natural clay plaster, Natural fiber flooring, Low/no-VOC (volatile organic compound) paints, stains, and coatings, Paperless drywall-Heating and Air Conditioning, Solar hot water, Focus on high efficiency and proper sizing.

NANOMATERIALS FOR GREEN SYSTEMS : Windows, Skylights, and Lighting - Paints, Roofs, Walls, and Cooling - Multifunctional Gas Sensors, Biomimetic Sensors, Optical Interference Sensors

TEXT BOOKS:

1.Green building materials by Ross Spiegel and Dru Meadows

REFERENCES:

1. 1. Understanding Green building materials by Traci Rose Rider, Stacy Glass and Jessica McNaughton.

Green building materials, Energy & Civil Engineering by Jimmy C.M. Kao, Wen-Pei Sung, Ran Chen

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S.WKrishnaraj	Asst..Prof	VMKVEC	Srajkrishna85@gmail.com

(iii) ENGINEERING SCIENCES (BASIC ENGINEERING COURSES)

Subject Code	Subject Title	Category	L	T	P	Credit
17CSES01	**ESSENTIALS OF COMPUTING**	**ES**	**2**	**0**	**2**	**3**

PREAMBLE

This course aims to provide the fundamental concepts of Computer operations like hardware and software installation, and emphasizing principles application packages. Studying the fundamentals concepts of Algorithms, to resolve the real world application.

PRERQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge of hardware and software components of computers.
2	To introduce and demonstrate various software application packages.
3	To study Problem solving Techniques and program development cycle.
4	To learn about various algorithm and identifying the algorithm efficiency.
5	To learn different algorithm for various application

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Basic knowledge on hardware and software terminologies.	Remember and Understand
CO2. Demonstration about various Application Packages like MS-word, MS- Excel etc.	Apply
CO3. Understand Program Devolvement Cycle and apply various Problem Solving Techniques.	Understand, Apply.
CO4. Identifying and analyzing the efficiency of Algorithms.	Understand.
CO5. Implementation of Algorithms for various concepts.	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	S	M	
CO2	S	M	-	-	-	-	-	-	-	-	-	-	S	M	L
CO3	S	S	S	-	M	-	-	-	-	-	-	-	S	L	
CO4	S	S	S	-	S		-	-	-	-	-	-	S	M	
CO5	S	M	M	-	M	-	-	-	-	-	-	-	S	M	

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF COMPUTER AND INFORMATION TECHNOLOGY: Computer – Generations, Types of Computers, Block diagram of a computer – Components of a computer system –Hardware and software definitions – Categories of software – Booting – Installing and Uninstalling a Software –Software piracy – Software terminologies – Applications of Computer – Role of Information Technology – History of Internet – Internet Services.

SOFTWARE APPLICATIONS: Office Automation: Application Packages – Word processing (MS Word) – Spread sheet (MS Excel) – Presentation (MS PowerPoint).

PROBLEM SOLVING METHODOLOGIES: Problems Solving Techniques - Program Development Cycle – Algorithm Development – Flow chart generation –Programming Constructs (Sequential, Decision-Making, Iteration) – Types and generation of programming Languages.

INTRODUCTION TO ALGORITHMS: Implementation of Algorithms – program verification – The efficiency of algorithms – The analysis of algorithms.

IMPLEMENTATION OF ALGORITHMS: Fundamental Algorithms: Introduction – Exchanging the values of two variables – Counting – Summation of a set of Numbers – factorial computation – Generation of the Fibonacci sequence – Reversing the digits of an integer.

TEXT BOOKS:

1. Essentials of Computer Science and Engineering", Department of Computer Sciences, VMKVEC, Salem, Anuradha Publishers, 2017.
2. Dromey.R.G, "How to Solve it by Computer", Prentice-Hall of India, 1996.

REFERENCES:

1. Aho.A.V., Hopcroft.J.E and Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson Education, 2004.

2. Knuth,D.E., "The Art of computer programming Vol 1:Fundamental Algorithms", 3rd Edition, Addison Wesley,1997.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.V.Amirthalingam	Associate Professor	Computer science and engineering	amirthalingam@vmkvec.edu.in
2	Mrs.T.Geetha	Assistant Professor	Computer science and engineering	geetha@vmkvec.edu.in

17CSES05	PROGRAMMING IN PYTHON	CATEGORY	L	T	P	CREDIT
		FC(ES)	3	0	0	3

PREAMBLE

The purpose of this course is to introduce Python, a remarkably powerful dynamic programming language to write code for different operating systems along with application domain. Python has evolved on more popular and powerful open source programming tool

PRERQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge on Python programming concepts.
2	To introduce different methods in list, string, tuple, dictionary and sets.
3	To compute different programs using python control statements.
4	To learn about different functions in python.
5	To compute the exception handling functions, file concepts and CSV and JSON.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learn python statements, comments and indentation, tokens, input and output methods using various example programs.	Remember and Understand
CO2. Learn the different methods involved in List, String, Tuples and Dictionary.	Apply
CO3. Design solutions for complex programs using decision making and looping statements.	Understand and Apply.
CO4. Develop the function programs with all the concepts like lambda, decorators and generators.	Understand, Apply and analyze.
CO5. Compute the exception handling programs, file concept programs and understand the concepts of CSV and JSON.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	L	-	-	L	M	M	S	S	L	
CO2	S	M	L	-	-	L	-	-	L	M	M	S	S	M	L
CO3	S	S	S	S	M	L	-	-	L	M	M	S	S	L	
CO4	S	S	S	S	-	L	-	-	S	M	M	S	S	M	
CO5	S	M	M	-	-	L	-	-	S	M	M	S	S	M	

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to python-Advantages of python programming-Tokens-Variables-Input/output methods-Data types-Operators

DATA STRUCTURES

Strings-Lists-Tuples-Dictionaries-Sets

CONTROL STATEMENTS

Flow Control-Selection control Structure-if-if-else-if-elif-else-Nested if iterative control structures-while loop, for loop and range.

FUNCTIONS

Declaration-Types of Arguments-Fixed arguments, variable arguments, keyword arguments and keyword variable arguments-Recursions-Anonymous functions: lambda- Decorators and Generators.

EXCEPTION HANDLING

Exception Handling-Regular Expression-Calendars and clock files:File input/output operations-Dictionary operations-Reading and writing in structured files:CSV and JSON.

TEXT BOOKS:

1. Bill Lubanovic, "Introducing Python Modern Computing in Simple Packages", 1st Edition, O'Reilly Media, 2014.
2. Programming With Python Book „Himalaya Publishing House Pvt Ltd
3. "Dive Into Python" by Mark Pilgrim

REFERENCES:

1. Mark Lutz, "Learning Python", 6th Edition, O'Reilly Media, 2014.
2. David Beazley, Brian K. Jones, "Python Cookbook", 3rd Edition, O'Reilly Media, 2015.
3. Mark Lutz, "Python Pocket Reference", 6th Edition, O'Reilly Media, 2015.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.T.Geetha	Assistant Professor	Computer science and engineering	geetha@vmkvec.edu.in
2	Mrs. T .Narmadha	Assistant Professor	Computer science and engineering	narmadha@vmkvec.edu.in

17CSES83	PROGRAMMING IN PYTHON LAB	Category	L	T	P	Credit
		FC(ES)	0	0	4	2

PREAMBLE

This laboratory enables the students clearly understand the basic concepts of python, control statements and file commands in python.

PRERQUISITE - NIL

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1.Learn python statements, comments and indentation, tokens, input and output methods using various example programs.	Remember and Understand
CO2. Learn the different methods involved in List, String, Tuples and Dictionary.	Remember and Understand
CO3. Design solutions for complex programs using decision making and looping statements.	Understand, Apply, analyze and evaluate
CO4. Develop the function programs with all the concepts like lambda, decorators and generators.	Understand, Apply, analyze and evaluate
CO5. Compute the exception handling programs, file concept programs and understand the concepts of CSV and JSON.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	S	M	L	-	-	-	-	-	-	-	-	-	S	L	L
CO2	S	M	L	-	-	-	-	-	-	-	-	-	S	M	
CO3	S	M	M	-	-	-	-	-	-	-	-	-	S	L	L
CO4	S	M	M	-	-	-	-	-	-	-	-	-	S	M	
CO5	S	M	M	-	-	-	-	-	-	--	-	-	S	M	

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a program to sum of series of N natural numbers
2. Write a program to calculate simple interest.
3. Write a program to generate Fibonacci series using for loop
4. Write a program to calculate factorial using while loop
5. Write a program to find the greatest of three numbers using if condition
6. Write a program for finding the roots of a given quadratic equation using conditional control statements
7. Write a program to find the greatest of three numbers using conditional operator
8. Write a program to compute matrix multiplication using the concept of arrays
9. Write a program to implement recursive function
10. Write a program to read and write data using file concepts

REFERENCES:

1. Mark Lutz, “Learning Python”, 5th Edition, O'Reilly Media, 2013.
2. David Beazley, Brian K. Jones, "Python Cookbook", 3rd Edition, O'Reilly Media, 2013.
3. Mark Lutz, “Python Pocket Reference”, 5th Edition, O'Reilly Media, 2014.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.T.Geetha	Assistant Professor	Computer science and Engineering	geetha@vmkvec.edu.in
2	Mrs. T .Narmadha	Assistant Professor	Computer science and Engineering	narmadha@vmkvec.edu.in

17CMES02	BASICS OF CIVIL AND MECHANICAL ENGINEERING PART -A BASICS OF CIVIL ENGINEERING (Common to All Branches)	Category	L	T	P	Credit
		ES	2	0	0	2

PREAMBLE

The aim of the subject is to provide a fundamental knowledge of basic Civil Engineering

PREREQUISITE- NIL

COURSE OBJECTIVES

1	To understand the basic concepts of surveying and construction materials.
2	To impart basic knowledge about building components.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. An ability to apply knowledge of mathematics, science, and engineering.	Apply
CO2. An ability to design and conduct experiments, as well as to analyze and interpret data .	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	S	-	-	-	-	-	-	M	-	-
CO2	S	M	L	S	M	S	-	-	M	-	-	-	-	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

SURVEYING AND CIVIL ENGINEERING MATERIALS

SURVEYING: Objects – types – classification – principles – measurements of distances – angles – levelling – determination of areas – illustrative examples.

CIVIL ENGINEERING MATERIALS: Bricks – stones – sand – cement – concrete – steel sections.

BUILDING COMPONENTS AND STRUCTURES :

FOUNDATIONS: Types, Bearing capacity – Requirement of good foundations.

SUPERSTRUCTURE: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

TEXT BOOKS:

1. “Basic Civil and Mechanical Engineering”, VMU, (2017). Company Ltd., New Delhi,2009

REFERENCES:

1. Ramamrutham S., “Basic Civil Engineering”, Dhanpatrai Publishing Co. (P) Ltd., 2009.
2. Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Supriya	Assist. Professor	CIVIL	jansupriyanair@gmail.com
2	C. Kathirvel	Assist. Professor	CIVIL	geologykathir@gmail.com

17CMES02	BASICS OF CIVIL AND MECHANICAL ENGINEERING PART - B BASICS OF MECHANICAL ENGINEERING (Common to All Branches)	Category	L	T	P	Credit
		ES	2	0	0	2

PREAMBLE

Basic Mechanical Engineering gives the fundamental ideas in the areas of engineering design, manufacturing and Automobile engineering. An engineer needs to understand, the basic manufacturing techniques and working principle of an Automobile Engineering Components.

PREREQUISITE

NIL

COURSE OBJECTIVE

1	To demonstrate the principles of casting and metal joining processes in manufacturing.
2	To describe and to apply the in depth knowledge in automotive engines and important components.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1. Illustrate the application of casting and metal joining processes in manufacturing	Apply
CO2. Demonstrate the operation of automotive engines and important components	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	L	M	-	-	-	-	-	M	L	-	-
CO2	S	M	L	L	L	M	-	-	-	-	-	M	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

FOUNDRY AND WELDING

Foundry: Introduction to Casting - Types, Pattern- Definition, Function. Foundry tools. Green Sand Moulding application.

Welding: Introduction to welding, Classification – Gas welding, Arc Welding, TIG, MIG, Plasma – Definitions. Arc Welding - Methods and Mechanisms – Applications.

AUTOMOTIVE ENGINES AND COMPONENTS

Introduction, Two stroke and four stroke cycle – Petrol and Diesel Engines - Construction and working, Fundamentals of automotive components - Brakes, Clutches, Governor, Flywheel, Axles, Drives etc., Fuel supply systems, Exhaust emission and control.

TEXT BOOKS

1	Basic Civil and Mechanical Engineering, School of Mechanical Engineering Sciences, VMU, Salem

REFERENCE BOOKS

1	K.Venugopal, Basic Mechanical Engineering, Anuradha Publications, Chennai
2	NR. Banapurmath, Basic Mechanical Engineering, Vikas Publications, Noida
3	TJ.Prabu, Basic Mechanical Engineering, SCITECH Publications, Chennai

COURSE DESIGNERS

S.No	Faculty Name	Designation	Dept / College	Email id

1	S. Duraithilagar	Associate Professor	Mech / VMKVEC	sduraithilagar@vmkvec.edu.in
2	T.Raja	Assistant Professor	Mech / VMKVEC	rajat@vmkvec.edu.in

17CMES81	ENGINEERING SKILLS PRACTICE LAB PART A - BASIC CIVIL ENGINEERING (Common to All Branches)	Category	L	T	P	Credit
		ES	0	0	2	2

PREAMBLE

Engineering Skills Practice is a hands-on training practice to Mechanical, Civil and Mechatronics Engineering students. It deals with fitting, carpentry, sheet metal and related exercises. Also, it will induce the habit of selecting right tools, planning the job and its execution

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand the basic concepts of surveying and construction materials.
2	To impart basic knowledge about building components.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Prepare the different types of fitting.	Apply
CO2.Prepare the different types of joints using wooden material	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	L	L	L	L	L	L		-	-
CO2	S	S	S	L	L	L	L	L	L	L	L	L		-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Buildings:

1. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects.

Plumbing Works:

2. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
3. Study of pipe connections requirements for pumps and turbines.
4. Preparation of plumbing line sketches for water supply and sewage works.
5. Hands-on-exercise: Mixed pipe material connection – Pipe connections with different joining components.
6. Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

7. Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

TEXT BOOK

1. Basic civil engineering Lab Manual by Department of Civil Engineering,VMRF.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	M.Senthilkumar	Asst.Professor	VMKVEC	senthilkumar@vmkvec.edu.in

17CMES81	ENGINEERING SKILLS PRACTICE LAB PART- B BASIC MECHANICAL ENGINEERING (Common to All Branches)	Category	L	T	P	Credit
		ES	0	0	2	1

PREAMBLE

Workshop is a hands-on training practice to Mechanical Engineering students. It deals with fitting, carpentry, foundry and welding related exercises. Also, it will induce the habit of selecting right tools, planning the job and its execution.

PREREQUISITE

NIL

COURSE OBJECTIVE

1	To perform the practice in different types of fitting processes.
2	To executive joints using wooden materials.
3	To apply in depth knowledge in metal joining processes.
4	To demonstrate the pattern using foundry processes

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1.	Perform the different types of fitting using MS plate.	Apply
CO2.	Practice the different types of joints using wooden material	Apply
CO3.	Demonstrate the different types of joints in metal by Arc Welding	Apply
CO4.	Utilize the different types of green sand mould	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-
CO2	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-
CO3	S	-	-	-	-	-	-	-	-	-	-	-	L	-	-
CO4	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS

Tee – Fitting
Vee – Fitting
Preparation of a mould for a single piece pattern
Preparation of a mould for a split piece pattern
Half- Lap Joint in Carpentry
Dove Tail Joint in Carpentry
Lap Joint – Welding
Butt Joint – Welding

Text Books

1. Basic mechanical engineering, lab manual

Reference Books

1. K.Venugopal, Basic Mechanical Engineering, Anuradha Publications, Chennai
2. NR. Banapurmath, Basic Mechanical Engineering, Vikas Publications, Noida

Course Designers

S.No	Faculty Name	Designation	Dept / College	Email id
1	V K Krishnan	Associate Professor	Mech / VMKVEC	vkkrishnan@vmkvec.edu.in
2	S. Duraithilagar	Associate Professor	Mech / VMKVEC	sduraithilagar@vmkvec.edu.in

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17EEES03	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING A. BASIC ELECTRICAL ENGINEERING	Category	L	T	P	Credit
		ES	2	0	0	2

PREAMBLE

It is a preliminary course which highlights the basic concepts and outline of Electrical engineering. The concepts discussed herein are projected to deliver explanation on basic electrical engineering for beginners of all engineering graduates.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand the electrical inventions, basic concepts of AC and dc circuit and basic laws of electrical engineering.
2	To gain knowledge about the working principle, construction, application of DC and AC machines and measuring instruments.
3	To understand the fundamentals of safety procedures, Earthing and Power system.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1: Explain the evolution of electricity, name the inventors, electrical quantities and basic laws of electrical engineering.	Remember
CO 2: Demonstrate Ohm‟s and Faraday‟s Law.	Apply
CO 3: Understand the basic concepts of measuring instruments, electrical machineries and its applications.	Understand
CO 4: Analyze the various types of electrical loads, power rating of electrical machineries and energy efficient equipment.	Analyze
CO 5: Explain the electrical safety and protective devices.	Understand
CO 6: Compare the various types electrical power generation systems by application of conventional and non-conventional sources.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	S	-	-	-	-	-	-	L	-	-	-
CO2	S	M	S	S	-	-	-	-	M	-	-	M	-	-	-
CO3	L	S	L	-	S	-	-	-	-	L	-	L	-	-	-
CO4	S	M	S	L	L	S	S	-	-	S	-	L	-	-	-
CO5	L	M	S	M	-	S	M	M	-	S	-	L	-	-	-
CO6	S	L	S	L	M	S	S	-	-	M	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

HISTORY OF ELECTRICITY, QUANTITIES AND CIRCUITS

Evolution of Electricity and Electrical inventions, Electrical quantities- Charge, Electric potential, voltage, current– DC & AC, power, energy, time period, frequency, phase, flux, flux density, RMS, Average, Peak, phasor& vector diagram. Electric Circuits - Passive components (RLC), Ohm‟s law, KCL, KVL, Faraday‟s law, Lenz‟s law. Electrical materials – Conducting and insulating materials.

MEASURING INSTRUMENT AND ENERGY CALCULATION

Measuring Instruments – Analog and Digital meters – Types and usage. AC and DC Machines & Equipment- Types, Specifications and applications.

Loads – Types of Loads- Power rating and Energy calculation – for a domesticloads. Energy Efficient equipments – star ratings.

ELECTRICALSAFETY AND INTRODUCTIONTOPOWERSYSTEM

Protection & Safety - Hazards of electricity - shock, burns, arc-blast, Thermal Radiation, explosions, fires, effects of electricity on the human body. Electrical safety practices, Protection devices.

Electric Power- Generation resources, Transmission types & Distribution system (levels of voltage, power ratings and statistics)-Simple layout of generation, transmission and distribution of power.

TEXT BOOKS:

1. Metha.V.K,RohitMetha,"*BasicElectricalEngineering*",Fifthedition,Chand.S&Co,2012
2. Kothari.D.PandNagrath.I.J,"*BasicElectricalEngineering*",Secondedition,TataMcGraw-Hill,2009
3. R.K.Rajput , "Basic Electrical and Electronics engineering", Second Edition, Laxmi Publication, 2012

REFERENCE BOOKS:

1.SmarajtGhosh,"*FundamentalsofElectrical&ElectronicsEngineering*",Secondedition,PHILearning,2007

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in
2	Mr. R. Sathish	Assistant Professor	EEE	sathish@vmkvec.edu.in

17EEES03	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING B. BASIC ELECTRONICS ENGINEERING	Category	L	T	P	Credit
		ES	2	0	0	2

PREAMBLE

The course aims to impart fundamental knowledge on electronics components, digital logics and communication engineering concepts. The course begins with classification of various active and passive components, diodes and transistors. It enables the student to design small digital logics like multiplexer, demultiplexer, encoder, decoder circuits, etc. It crafts the students to get expertise in modern communication systems.

PRERQUISITE - NIL

COURSE OBJECTIVES

1	To learn and identify various active and passive components and their working principles.
2	To understand the number conversion systems.
3	To learn the digital logic principles and realize adders, multiplexer, etc.,
4	To understand the application oriented concepts in the communication systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Classify the electronic components and make out the working principle of diodes and transistors	Understand
CO2. Explore the working principle of rectifiers, regulators and transistors.	Analyze
CO3. Execute number system conversions and digital logic operations.	Apply
CO4. Realize the design of adders, Multiplexer, De-Multiplexer, Encoder, Decoder circuits.	Analyze
CO5. Familiarize with application oriented concepts in the communication systems.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	-	-	-	-	-	-	-	-	-	-	M	-	-
CO2	S	M	M	L	-	-	-	-	-	-	-	-	S	L	-
CO3	S	M	L	-	-	-	-	-	-	-	-	-	S	-	-
CO4	S	M	M	L	-	-	-	-	-	-	-	-	S	L	-
CO5	M	L	-	-	-	-	-	-	-	-	-	L	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

SEMICONDUCTOR DEVICES

Passive and Active Components - Resistors, Inductors, Capacitors, Characteristics of PN Junction Diode - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor, JFET, MOSFET & UJT.

DIGITAL FUNDAMENTALS

Number Systems – Binary, Octal, Decimal and Hexa-Decimal – Conversion from one to another – Logic Gates – AND, OR, NOT, XOR, Universal Gates – Adders, Multiplexer, De Multiplexer, Encoder, Decoder – Memories

COMMUNICATION AND ADVANCED GADGETS

Modulation and Demodulation – AM, FM, PM – RADAR – Satellite Communication – Mobile Communication, LED, HD, UHD, OLED, HDR & Beyond, Smart Phones – Block diagrams Only.

TEXT BOOKS:

1. R.K. Rajput, "Basic Electrical and Electronics Engineering", Laxmi Publications, Second Edition, 2012.
2. "Basic Electrical and Electronics Engineering", Department of EEE & ECE, Faculty of Engineering & Technology, VMRFDU, Anuradha Agencies, 2017.
3. Edward Hughes, "Electrical and Electronics Technology", Pearson Education Limited, Ninth Edition, 2005.

REFERENCES:

1. John G.Proakis and DimitrisG.Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Prentice-Hall of India, Fourth Edition, 2006.
2. VinayK.Ingle and John G.Proakis, "Digital Signal Processing using MATLAB" CL Engineering, Third Edition, 2011
3. Sophocles J.Orfanidis "Introduction to Signal Processing", Prentice Hall, 1996.
4. John G.Proakis and MasoudSalehi, "Communication Systems Engineering" Prentice Hall, Second Edition, 2002.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.T.Sheela	Associate Professor	ECE	sheela@vmkvec.edu.in
2	Mrs.A.Malarvizhi	Assistant Professor	ECE	malarvizhi@vmkvec.edu.in

17MEES84	ENGINEERING GRAPHICS (Theory + Practice)	Category	L	T	P	Credit
		FC(ES)	1	0	4	3

Preamble

Engineering Graphics is referred as language of engineers. An engineer needs to understand the physicalgeometry of any object through its orthographic or pictorial projections. The knowledge on engineering graphicsis essential in proposing new product through drawings and interpreting data from existing drawings. This course deals with orthographic and pictorial projections, sectional views and development of surfaces.

Prerequisite

NIL

Course Objective

1	To implement the orthographic projections of points, straight lines, plane surfaces and solids.
2	To construct the orthographic projections of sectioned solids and true shape of the sections.
3	To develop lateral surfaces of the uncut and cut solids.
4	To draw the pictorial projections (isometric and perspective) of simple solids.
5	To sketch by free hand the orthographic views from the given pictorial view.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Execute in the form of drawing of the orthographic projections of points, straight lines, plane surfaces and solids.	Apply
CO2.	Demonstrate in the form of drawing of the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO3.	Develop lateral surfaces of the solid section and cut section of solids.	Apply
CO4.	Draw the pictorial projections (isometric and perspective) of simple solids.	Apply
CO5.	Implement the free hand sketch of the orthographic views from the given pictorial view.	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	S	L								L		
CO2	S	S	L	S	L								L		
CO3	S	S	L	S	L								L		
CO4	S	M	L	S	S								L		
CO5	S	S	L	S	L								L		

S- Strong; M-Medium; L-Low

Syllabus

PLANE CURVES AND FREE HAND SKETCHING

Conics – Construction of ellipse– First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

PROJECTION OF POINTS, LINES

Projection of points, Projection of straight lines located in the first quadrant: inclined to both planes – Determination of true lengths and true inclinations – rotating line method only.

PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to any one reference plane by change of position method.				
SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES				
Sectioning of above solids in simple vertical position by cutting planes inclined to any one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids like Prisms, pyramids, cylinders and cones.				
ISOMETRIC VIEW AND PERSPECTIVE PROJECTION				
Principles of isometric View – isometric scale – isometric view of simple solids- Introduction to Perspective projection				
Text Books				
1	Natarajan K V, "Engineering Graphics", Tata McGraw-Hill Publishing Company Ltd. New Delhi.			
2	K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Private Limited.			
3	K.R.Gopalakrishna"Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.			
Reference Books				
1	N.D. Bhat and V.M. Panchal, Engineering Graphics, Charotar Publishers 2013			
2	E. Finkelstein, "AutoCAD 2007 Bible", Wiley Publishing Inc., 2007			
3	R.K. Dhawan, "A text book of Engineering Drawing", S. Chand Publishers, Delhi,2010.			
4	DhananjayA.Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, 2008.			
5	G.S. Phull and H.S.Sandhu, "Engineering Graphics", Wiley Publications, 2014.			
Course Designers				
S.No	**Faculty Name**	**Designation**	**Dept / College**	**Email id**
1	Dr. S.VENKATESAN	Professor	Mech / VMKVEC	venkatesan@vmkvec.edu.in
2	Prof. N.Rajan	Associate Professor	Mech / VMKVEC	rajan@vmkvec.edu.in

17EEES81	ENGINEERING SKILLS PRACTICE LAB A. BASIC ELECTRICAL ENGINEERING LAB	Category	L	T	P	Credit
		ES	0	0	2	2

PREAMBLE

It is a laboratory course which familiarizes the basic electrical wiring, measurement of electrical quantities and various types of earthing methods.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To learn the residential wiring and various types of electrical wiring.
2	To measure the various electrical quantities.
3	To know the necessity and types of earthingand measurement of earth resistance.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1: Implement various types of electrical wiring.	Apply
CO 2: Measure fundamental parameters of AC circuits.	Analyze
CO 3: Measure the earth resistance of various electrical machineries.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	S	-	-	-	-	-	-	L	-	-	-
CO2	S	M	S	S	-	-	-	-	M	-	-	M	-	-	-
CO3	L	S	L	-	S	-	-	-	-	L	-	L	-	-	-

S- Strong; M-Medium; L-Low

List of Experiments

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

REFERENCES

1. Laboratory Reference Manual

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in
2	Mr. R. Sathish	Assistant Professor	EEE	sathish@vmkvec.edu.in

17EEES82	ENGINEERING SKILLS PRACTICES LAB PART B - BASIC ELECTRONICS ENGINEERING LAB	Category	L	T	P	Credit
		ES	0	0	2	1

PREAMBLE

This course is to provide a practical knowledge in Basic Electronics Engineering. It starts with familiarization of electronic components and electronic equipments. It enables the students to construct and test simple electronic projects.

PRERQUISITENIL

COURSE OBJECTIVES

1	To familiarize the electronic components, basic electronic equipments and soldering techniques.
2	To study the characteristics of Diodes, BJT and FET.
3	To understand the principles of various digital logic gates.
4	To understand the concept of basic modulation techniques.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basics of various electronic components and equipments and their working principles.	Understand
CO2. Understand the fundamentals of soldering techniques for active and passive components	Understand
CO3. Know the characteristics of Diodes, BJT and FET.	Understand
CO4. Verify the truth tables of logic gates (AND, OR, NOT, NAND, NOR, XOR).	Understand
CO5. Distinguish between amplitude and frequency modulation techniques.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	-	-	-	-	M	-	L	-	M	-	M	-	-
CO2	M	L	-	-	-	-	M	-	L	-	M	-	M	-	-
CO3	M	L	-	-	-	-	M	-	M	-	M	-	M	-	-
CO4	M	L	-	-	-	-	M	-	M	-	M	-	M	-	-
CO5	M	L	-	-	-	-	M	-	M	-	M	-	M	-	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Identifying Electronics Components.
2. Practicing of Soldering and Desoldering.
3. Characteristics of PN junction Diode.
4. Characteristics of Zener diode.
5. Input & Output characteristics of BJT.
6. Transfer characteristics of JFET.
7. Verification of Logic Gates.
8. Study of Amplitude Modulation.
9. Study of Frequency Modulation.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.T.Sheela	Associate Professor	ECE	sheela@vmkvec.edu.in
2	Ms.A.Malarvizhi	Assistant Professor	ECE	malarvizhi@vmkvec.edu.in

CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME

17CVCC01	CONSTRUCTION MATERIALS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The aim of the course is to know about the various materials, both conventional and modern, that are commonly used in civil engineering construction.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	He should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control.
2	The student will learn the use of the materials
3	The student will learn in detail the manufacturing process of all the materials
4	Special Materials used for architectural purposes also will be taught in detail
5	Glass and Composite materials used for architectural purposes also will be taught in detail.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Know about Bricks, Classification and Manufacturing of clay bricks, Tests on bricks.	Understand
Co2. Know about Lime and Preparation of lime mortar ,Cement, Manufacturing process of cement ,Types and Grades of cement	Understand
Co3. Know about Concrete and its Manufacture process, Compressive, Tensile and shear strength of concrete, Mix specification and Mix proportioning.	Understand
Co4. Know about Timber ,Plywood ,Steel ,Aluminum and Other Metallic Materials	Understand
CO5. Know about Glass ,Ceramics, Clay products ,Composite materials and its Types Geo membranes and Geo textiles for earth reinforcement	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	---	---	---	L	L	---	---	---	---	---	--	--	--
CO2	S	S	M	---	---	M	M	---	---	L	L	---	--	--	--
CO3	L	L	---	---	---	L	-	--	---	L	---	---	--	--	--
CO4	S	M	M	---	---	---	L	---	---	L	---	L	--	--	--
CO5	S	S	S	M	---	---	M	M	---	M	L	---	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

STONES – BRICKS – CONCRETE BLOCKS: Solutions of second and third order linear ordinary differential equation with constant coefficients – Method of variation of parameters – Cauchy‟s and Legendre‟s linear equations – Simultaneous first order linear equations with constant coefficients.

LAPLACE TRANSFORMS: Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Cement, Concrete blocks – Light weight concrete blocks

LIME – CEMENT – AGGREGATES – MORTAR: Lime – Preparation of lime mortar – Cement, Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Soundness and consistency – Setting time – Aggregates – Natural stone aggregates – Industrial by products – Crushing strength – Impact strength – Flakiness – Abrasion Resistance – Grading – Sand Bulking

CONCRETE: Concrete – Ingredients – Manufacture – Batching plants – Ready Mix Concrete – Properties of fresh concrete – Slump – Flow and compaction – Principles of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proport ioning – IS method – High Strength Concrete and High

Performance Concrete – Other types of Concrete.

TIMBER AND OTHER MATERIALS : Timber - Industrial timber – Plywood – Veneer – Thermocole –Bitumen – Market forms Panels of laminates – Steel – Aluminium and Other Metallic Materials – Composition – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers.

MODERN MATERIALS : Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geo membranes and Geotextiles for earth reinforcement.

TEXT BOOKS:

1. Rangwala, S.C., "Engineering Materials ", Charotar Publishing House, Anand, 2008
2. R.K.Rajput, "Engineering Matererials,S.Chand Publications,2008
3. Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd.,2008 2008

REFERENCES:

1 Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2012.
2 Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004
3 Duggal.S.K. "Building Materials", 4th Edition, New Age International , 2008.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	A.Fizoor Rahman	Asso.Prof	VMKVEC	fizoorr@gmail.com
2	M.Senthilkumar	Asso.Prof	VMKVEC	Senthilkumar@vmkvec.edu.in

17CVCC02	MECHANICS OF SOLIDS I	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The mechanics of deformable solids is more concerned with the internal forces and associated changes in the geometry of the components involved. Of particular importance are the properties of the materials used, the strength of which will determine whether the components fail by breaking in service, andthe stiffness of which will determine whether the amount of deformation they suffer is acceptable. Therefore, the subject of mechanics of materials or strength of materials is central to the whole activity of engineering design. Usually the objectives in analysis here will be the determination of the stresses, strains, and deflections produced by loads. Theoretical analyses and experimental results have equal roles in this field.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behavior of members subjected to various types of forces.
2	To study the basics of stress and strain in two dimension
3	Analysis of trusses using various methods
4	To acquire knowledge about types of beam, loading conditions
5	The subject can be mastered best by solving numerous problems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Structural members subjected to tension, compression, torsion	Analyse
CO2. Structural bending and combined **stresses** using the fundamental concept of **stress**, strain and **elastic behavior** of materials	Analyze
CO3. Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.	Apply
CO4. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings	Apply
CO5. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	L	S	-	-	-	-	-	-	-	-	L	-	-
CO3	S	M	M	S	-	-	-	-	-	-	-	-	-	M	-
CO4	S	M	M	M	-	-	-	-	-	-	-	-	-	-	-
CO5	S	M	M	-	-	-	-	-	-	-	-	L	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

STRESS, STRAIN AND DEFORMATION OF SOLIDS: Rigid bodies and deformable solids - Stability, strength and stiffness - tension, compression and shear stresses - Deformation of simple and compound bars - Thermal Stresses - Elastic Constants.

ANALYSIS OF PLANE TRUSSES : Stability and equilibrium of plane frames - perfect frames - types of trusses - analysis of forces in truss members - Method of joints - Method of tension coefficients - Method of sections.

TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAMS: Beams - Types and transverse loading on beams - Shear force and bending moment in beams - Cantilevers - Simply supported beams and over- hanging beams.Theory of simple bending - analysis of stresses - Load carrying capacity - Proportioning sections - Leaf springs - Flitched beams - Shear stress distribution - shear flow

TORSION: Stresses and deformation in circular and hollow shafts - Stepped shafts - shafts fixed at the both ends - Stresses in helical springs - Deflection of springs.

ANALYSIS OF STATES OF STRESS (TWO DIMENSIONAL) AND DEFLECTION OF BEAMS: Biaxial state of stress - Thin cylinders and shells - Deformation of thin Cylinders and shells - Stresses at a point - Stress as tensor - Stresses on inclined planes - Principal stresses and principal planes - Mohr's circle of stress.Double integration method - Macaulay's method - Area moment theorems for computation of slopes and deflections in beams - Conjugate beam method.

TEXT BOOKS:

1. Er.R.K.Rajput,"Strength of Materials"S.Chand Publications,New Delhi,2006
2. Dr.R.K.Bansal,"A Textbook of Strength of Materials"Laxmi Publications,2010
3. Srinath L.N., " Advanced Mechanics of Solids ", Tata McGraw Hill Publishing Company Ltd., New Delhi,2009

REFERENCES:

1. Junarkar S.B., " Mechanics of Structures ", Vol. 1, 21st Edition,Charotar Publishing House, Anand, India, 2007
2. Kazimi S.M.A., " Solid Mechanics ", Tata McGrawHill Publishing Company, New Delhi, 1991
3. Raghunath H. M., "Strength of materials" , New Age International (P) Limitted Publishers.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Supriya	Asst. Professor	CIVIL	jansupriyanair@gmail.com
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC03	MECHANICS OF FLUIDS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Fluid Mechanics is a subject of engineering science deals with the behaviour of fluids at rest as well as in motion. It is an important subject with unlimited practical applications ranging from biological system systems to automobiles, airplanes and spacecraft propulsion. Thus this subject is given considerable importance in Civil, Mechanical and Chemical Engineering at core as well as at professional levels.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	The student is introduced to the definition and properties of fluid.
2	Principles of fluid statics, kinematics and dynamics are dealt with subsequently.
3	The application of similitude and model study is covered subsequently
4	After undergoing this course, the student would have learnt fluid properties
5	Application to real situations of fluid flow will be learned

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain the basic properties of fluids and their application in real world problems.	Understand
CO2. Distinguish between various types of flows and derive the continuity equation for compressible and incompressible flow	Apply
CO3. Understand the use and limitations of the Bernoulli‟s equation and apply it to solve a variety of fluid flow problems.	Apply
CO4. Determine the boundary layer thickness and other boundary layer properties	Apply
CO5. Estimate the Scale effect and distorted models. Understand the use and use the Dimensional analysis and Rayleigh's and apply it to solve a variety of fluid flow problems.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	M	L	-	-	L	-	M	-	-	L	-
CO2	S	M	M	L	L	L	-	-	-	-	-	-	-	-	-
CO3	S	S	S	M	L	L	-	L	-	-	-	-	M	-	-
CO4	S	S	S	M	M	-	-	-	-	-	S	-	-	-	-
CO5	S	S	S	M	L	L	-	-	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

FLUID PROPERTIES AND STATISTICS: Definitions - Fluid and Fluid Mechanics - Dimensions and units - Fluid properties - Continuum - Concept of system and control volume - Pascal's law and Hydrostatic equation - Forces on plane and curved surfaces - Buoyancy - Pressure measurement.

FLUID KINEMATICS : Classification of flows -stream, streak and path lines - Continuity equation - Stream and potential functions - Flow nets - Velocity measurement

FLUID DYNAMICS : Euler and Bernoulli's equations - Application of Bernoulli's equation - Discharge measurement- Momentum Principle - Laminar flows through pipes and between plates - Hagen Poiseuille equation - Darcy Weisbach formula - Moody diagram -Turbulent flow

BOUNDARY LAYER AND FLOW THROUGH PIPES: Definition of boundary layer - Thickness and classification - Displacement and momentum thick nesses - Development of Laminar and Turbulent flows in circular pipes - - Major and minor losses of flow in pipes - Pipes in series and in parallel - Pipe network

DIMENSIONAL ANALYSIS AND MODEL STUDIES: Dimensional analysis - Rayleigh's method -

Buckingham P -Theorem - similitude and models - Scale effect and distorted models.

TEXT BOOKS:

1. Kumar K.L., “Engineering Fluid Mechanics ", Eurasia Publishing House (P) Ltd., New Delhi, 2008
2. Dr.R.K.Bansal, “FluidMechanics”, LakshmiPublications, 2008

REFERENCES:

1. Streeter, Victor L. and Wylie, Benjamin E., " Fluid Mechanics ", McGraw-Hill Ltd., 1998.
2. Natarajan M.K., “Principles of Fluids Mechanics ", Anuradha Agencies, Vidayal Karuppur, Kumbakonam, 1995.
3. Jain A. K. "Fluid Mechanics", Khanna Publishers, 2010 4. Roberson J.A and Crowe C.T., "Engineering Fluid Mechanics", Jaico Books Mumbai, 2000.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC04	SURVEYING I	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Surveying is the process of determining by measurement, the relative positions of points on or near the earth surface. The data collected from a survey is used in the preparation of plans, maps, profiles, charts and diagrams. In addition survey may be used for the delineation of property boundaries, computation of areas and volumes also to set out the proposed work on the ground.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	At the end of the course the student will posses knowledge about Chain surveying
2	Students get knowledge about Compass surveying,
3	Principles of Plane table surveying, Levelling,
4	Basic knowledge about Theodolite surveying
5	The Students learn about Engineering surveys.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Study the linear and angular measurement using chain and Compass.	Understand
CO2. Study the importance of plane table surveying in preparation of plans	Apply
CO3. Know to fix the relative position of points on the ground using Levels.	Apply
CO4. Understand the measurement of distance and heights of objects using tachometric principle	Apply
CO5. Understand the importance of advanced techniques involved in surveying such as Total station and GPS	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	M	S	M	M	S	S	S	-	-	-	-	-
CO2	S	M	L	-	-	-	-	S	S	S	-	-	-	L	-
CO3	S	M	M	-	-	-	-	S	S	S	-	-	L	-	-
CO4	S	M	M	-	-	-	-	S	S	S	-	-	-	S	-
CO5	S	M	M	-	-	-	-	L	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION AND CHAIN SURVEYING : Definition - Principles - Classification - Fields and office work - Scales - Conventional signs- Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well-conditioned triangles - Traversing - Plotting - Enlarging and Reducing figures.

COMPASS SURVEYING AND PLANE TABLE SURVEYING: Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction – Magnetic declination - Dip - Traversing - Plotting - adjustment of error - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

LEVELLING AND APPLICATIONS : Level line - Horizontal line - Levels and Staves - Sprit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and Check leveling - Booking - reduction - Curvature and Refraction - reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods -Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs

THEODOLITE SURVEYING : Theodolite - Vernier and micro optic - Description and uses - temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and Distances -

Traversing - Closing error and distribution - Gales's tables - Omitted measurements

ENGINEERING SURVEYS : Reconnaissance, Preliminary and location surveys for engineering projects - Layout - Setting out works – Route Surveys for highways, railways and waterways - Mine Surveying - Instruments - Tunnels - Correlation of underground and surface surveys - Shafts - Audits

TEXT BOOKS:

1. Kanetkar T.P., " Surveying and Levelling ", Vols. I and II, United Book Corporation, Pune, 2006
2. Punmia B.C., " Surveying ", Vols. I , II and III, Laxmi Publications, 2005.

REFERENCES:

1. Clark D., " Plane and Geodetic Surveying ", Vols. I and II, C.B.S. Publishers and Distributors, New Delhi, Sixth Edition, 1991.
2. James M. Anderson and Edward M. Mikhail, " Introduction to Surveying ", McGraw Hill Book Company, 1995.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC05	CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

A construction technique focuses more on detailed understanding of concrete making materials and production process. Recent developments in concrete materials are also given adequate consideration. Going through the course. Student would develop adequate understanding on concrete production process and properties and use of concrete as a modern material of construction.

PREREQUISITE- NIL

COURSE OBJECTIVES

1	The basics of various construction techniques, practices
2	The equipment needed for different types of construction activities
3	The student shall have a reasonable knowledge about the various construction procedures for sub to super structure
4	The equipment needed for construction of various types of structures from foundation to super structure.
5	The students should know the Building services in a building.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain the properties and tests of various constituents present in Concrete	Understand
CO2. Explain the Construction Practices such as masonry – stone masonry – Bond in masonry	Apply
CO3. Understand various sub structure construction and Tunneling techniques	Understand
CO4. Explain the detailed about Super structure Construction	Apply
CO5. Explain the various construction Equipments and Earth moving operation	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	S	L	-	M	L	L	-	-	-
CO2	S	M	L	S	-	-	S	S	-	M	L	L	-	-	-
CO3	S	M	M	S	-	-	S	-	-	-	L	M	-	L	-
CO4	S	M	M	M	-	-	S	-	-	-	S	M	S	-	-
CO5	S	M	M	-	-	-	-	-	-	S	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

CONCRETE TECHNOLOGY Cements – Grade of cements - concrete chemicals and Applications – Grade of concrete - manufacturing of concrete – Batching – mixing – transporting – placing – compaction of concrete – curing and finishing - Testing of fresh and hardened concrete – quality of concrete – Extreme Weather Concreting - Ready Mix Concrete.

CONSTRUCTION PRACTICES: Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.

SUB STRUCTURE CONSTRUCTION: Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points - Dewatering and stand by Plant equipment for underground open excavation

SUPER STRUCTURE CONSTRUCTION: Launching girders, bridge decks, off shore platforms – special

forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks

CONSTRUCTION EQUIPMENT: Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling,

TEXT BOOKS:

1. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
2. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
3. Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, New Delhi, 2008.

REFERENCES:

1. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC06	**MECHANICS OF SOLIDS -II**	CC	2	1	0	3

PREAMBLE

The mechanics of deformable solids is more concerned with the internal forces and associated changes in the geometry of the components involved. Of particular importance are the properties of the materials used, the strength of which will determine whether the components fail by breaking in service, and the stiffness of which will determine whether the amount of deformation they suffer is acceptable. Therefore, the subject of mechanics of materials or strength of materials is central to the whole activity of engineering design. Usually the objectives in analysis here will be the determination of the stresses, strains, and deflections produced by loads. Theoretical analyses and experimental results have an equal role in this field.

PREREQUISITE

Mechanics of Solids – I

COURSE OBJECTIVES

1	This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition
2	This knowledge is very essential for an Engineer to enable him in designing all types of structures and machines
3	The student will study the causes of failure by various failure theories
4	The student will learn the state of stress in three dimensions with respect to various theories
5	To impart the knowledge of Unsymmetrical bending in beams

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Structural members subjected to tension, compression, torsion	Analyse
Co2. Structural bending and combined **stresses** using the fundamental concept of **stress**, strain and **elastic behavior** of materials	Analyze
Co3. Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.	Apply
Co4. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings	Apply
CO5. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	L	S	-	-	-	-	-	-	-	-	-	-	-
CO3	S	M	M	S	-	-	-	-	-	-	-	-	-	-	-
CO4	S	M	M	M	-	-	-	-	-	-	-	-	-	-	-
CO5	S	M	M	-	-	-	-	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

ENERGY PRINCIPLES : Strain energy and strain energy density - Strain energy in traction, shear, flexure and torsion - Castigliano's and Engessor's energy theorems - Principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorem.

INDETERMINATE BEAMS: Propped Cantilever and Fixed Beams - Fixed end moments and Reactions for standard cases ofloading - slopes and deflections in fixed beams - Continuous beams - Theorem of three moments - Analysis of continuous beams - S.F. and B.M. diagrams for continuous beams..

COLUMNS : Eccentrically loaded short columns middle third rule - core of section - Columns of unsymmetrical sections - Euler‟s theory of long columns - Critical loads for prismatic columns with different end conditions Rankine - Gordon Formula eccentrically loaded long columns.

STATE OF STRESS IN THREE DIMENSIONS : Determination of principal stresses and principal planes – Volumetric strain –Theories of failure – Principal stress - Principal strain – shear stress – Strain energy and distortion energy theories – application in analysis of stress, load carrying capacity

ADVANCED TOPICS IN BENDING OF BEAMS : Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach Formula – Thick Cylinders - Compound Cylinders

TEXT BOOKS:

1. Rajput , "Strength Of Materials" , Chand Publications,NewDelhi,2011
2. Dr.R.K.Bansal,"A Textbook of Strength of Materials",Laxmi ublications,NewDelhi,2010
3.Srinath N., "Advanced Mechanics of Solid ", Tata McGraw Hill Publishing Company, New Delhi, 2009

REFERENCES:

1. Junarkar S.B., "Mechanics of Structures ", Vol.1, 21st Edition, Charotar Publishing House, Anand, India, 1995.

2. Kazimi S.M.A. "Solid Mechanics ", Tata McGraw Hill Publishing Company, New Delhi, 1991.

3. Ghosh D,Dutta A. K. "A Textbook of Strength of Materials", New Age International (P) Limited Publishers.

4. Swaroop, Adarsh "Mechanics of Materials", New Age International (P) Limitted Publishers.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC07	**APPLIED HYDRAULIC ENGINEERING**	CC	2	1	0	3

PREAMBLE

This course aims at an experimental way of studying the fluid flow, which deals with measurement, design and behavior of flow in open channels. Further, it also involves Dimensional analysis, model testing and design of hydraulic machines at an optimum cost.

PREREQUISITE

Mechanics Of Fluids

COURSE OBJECTIVES

1	Student is introduced to open channel flow characteristics including hydraulic jump and surges.
2	Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught
3	Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel
4	Design hydraulic machines
5	All types of pumps, their working principle will be taught

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Explain the various types of open channels and their flows.	Understand
Co2. Design the various types of most efficient channel sections.	Apply
Co3. Describe the Dimensional Analysis and Model Analysis in hydraulic engineering problems.	Apply
Co4. Design and study the performance of various types hydraulic turbines.	Apply
Co5. Design and study the performance of various types pumps.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	M	-	-	-
CO2	S	S	S	M	M	M	M	-	-	L	-	M	-	-	-
CO3	S	S	S	M	M	-	L	-	-	-	-	L	-	-	-
CO4	S	S	S	M	M	L	L	-	-	-	-	L	-	-	-
CO5	S	S	S	M	M	L	L	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

OPEN CHANNEL FLOW : Open channel flow - types and regime of flow - Velocity distribution in open channel - wide open channel - specific energy - critical flow and its computation

UNIFORM FLOW : Uniform flow - Velocity measurement - Manning's and Chezy's formula - determination of roughness coefficients - determination of normal depth and velocity - most economical sections - minimum permissible velocity determination - non-erodible channels.

VARIED FLOW : Dynamic equation of gradually varied flow - assumptions - characteristics of flow profiles - drawdown and backwater curves - profile determination - graphical integration, direct step, standard step method-hydraulic jump - types - energy dissipation - surges - surge through channel transitions

TURBINESImpact of jets on plane and curved plates - turbines - classification - radial flow turbines - draft tube - axial flow turbines - performance of turbines - similarity laws - centrifugal pump - minimum speed to start the pump - multistage pumps – cavitations

PUMPS: Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels - indicator diagram and its variation - savings in work done - rotary pumps.

TEXT BOOKS:

1. Jain A.K., " Fluid Mechanics (including Hydraulic Machines) ", Khanna Publishers, 8th edition, 1995.

2. R.K.Bansal,"Fluid Mechanics and Hydraulic Machines",Laxmi Publications,2005
3. Applied Hydraulic Engineering by Dr.G.K.vijayaraghavan, N.aravind , AR Publishers

REFERENCES:

1. Subramanya K., " Flow in Open channels ", Tata McGraw Hill Publishing Company, 2001.
2. Ramamirtham S., "Fluid Mechanics, Hydraulics and Fluid Mechines ", Dhanpat Rai & Sons, Delhi, 1998.
3. John A. Roberson, "Hydraulic Engineering ", Jaico Publishing House, 1998.
4. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2002

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC08	**SURVEYING II**	CC	3	0	0	3

PREAMBLE

This course the student will possess knowledge about Tachometric surveying, Control surveying, Survey adjustments, Astronomical surveying and Photogrammetry.

PREREQUISITE - SURVEYING -I

COURSE OBJECTIVES

1	To get the basics knowledge about Tachometric systems
2	The basic concepts in control surveying
3	To calculate and adjust the errors in triangulation
4	The concepts of Electro-optical and Microwave system.
5	The concepts in Route Surveying

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To carry outTachometric surveying	Understand
CO2. To understand the basic concept in control surveying	Understand
Co3. To adjust the errors in triangulation	Analyze
Co4. Tounderstand the concepts of Electro-optical and Microwave system.	Understand
CO5. To carry out Route Surveying	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	M	L	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	M	L	-	-	-	-	L	-	L	-	-	-	-
CO3	S	S	M	M	M	-	-	-	-	-	-	-	-	-	-
CO4	S	-	M	S	L	-	-	-	-	-	L	L	-	-	-
CO5	S	-	M	S	L	-	-	-	-	-	M	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

TACHEOMETRIC SURVEYING: Tachometric systems - Tangential, Stadia and sub tense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Analectic lens - Subtense bar

CONTROL SURVEYING : Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trigonometric leveling – Single and reciprocal observations - Modern trends.

SURVEY ADJUSTMENTS : Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of Equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

TOTAL STATION SURVEYING: Basic Principle – Classifications -Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system, measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

ADVANCED TOPICS IN SURVEYING: Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - hydrographic surveying – Tides - MSL - Sounding methods - Strength of fix - Sextants and station pointer-

Astronomical Surveying – field observations and determination of Azimuth by altitude and hour angle methods – fundamentals of Photogrammetry and Remote Sensing basic concepts of GPS.

TEXT BOOKS:

1. Kanetkar T.P., “Surveying and Levelling " , Vols. I and II, United Book Corporation, Pune, 2006

2. Punmia B.C., “Surveying ", Vols. I, II and III, Laxmi Publications, 1999.

REFERENCES:

. 1. Alfred Leick, "GPS satellite surveying", John Wiley & Sons Inc., 3 rd Edition, 2004.

2. Guocheng Xu, " GPS Theory, Algorithms and Applications", Springer - Berlin, 2003.

3. SatheeshGopi, rasathishkumar, N. madhu, “Advanced Surveying, Total Station GPS and Remote Sensing" Pearson education , 2007

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC09	**ENVIRONMENTAL ENGINEERING**	CC	3	0	0	3

PREAMBLE

This course work aims at imparting the knowledge on various stages of works involved in planning, designing and execution of protected water supply system to a town / city. Starting from demand estimation, identification of sources, studying the quality aspects of water at these sources, evolving a suitable treatment method to bring the quality to the permissible standards and finally, distribution of this treated water to the individual dwelling units are well addressed.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	The student is expected to know about the design principles involved in treatment of municipal water,
2	The student is expected to know laying of joints and testing of pipes.
3	The student will study about the Design principles of water treatment and teach rural about basic water treatment method
4	The student will learn about the analysis of water distribution
5	The student will have a knowledge about how to supply water to a building

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1- Estimate the total water demand for a town/city	Understand
CO2- Identify suitable sources of water to meet the demand	Apply
CO3- Design the conduits for transportation of water from the source to treatment plant and to the city	Understand
CO4- Fix the physical, Chemical and biological characteristics different source of water	Understand/ Apply
CO5- Design an appropriate treatment system for the water available at the source	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	S	S	S	S	-	-	M	-	S	S	S	S
CO2	M	M	S	S	M	S	S	-	-	S	-	S	M	M	S
CO3	S	S	S	S	S	M	M	-	M	-	-	-	S	S	S
CO4	M	S	M	M	M	S	S	L	-	-	-	-	M	S	M
CO5	S	S	S	S	S	S	S	-	-	-	M	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING FOR WATER SUPPLY: Objectives of Public Water Supply – Design Period – Population Forecasting – Water Demand – Sources of Water – Source Selection – Water Quality – Characterisation – Water Quality Standards.

CONVEYANCE SYSTEM: Water Supply – Intake Structures – Pipe Materials – Hydraulics of Flow in Pipes – Transmission Main Design – Laying, Jointing & Testing of Pipes – Appurtenances – Pumps – Design of

pumping mains.

DESIGN PRINCIPLES OF WATER TREATMENT: Objectives – Selection of unit operations and processes – Principles of coagulation and flocculation, sedimentation, filtration, disinfection – Design principles of flash mixer, flocculator, clarifiers, filters – Disinfection devices – Softening – Demineralisation – Aeration – Iron removal – Defluoridation – Operation and Maintenance aspects - Residue Management

WATER DISTRIBUTION: Requirements of Water Distribution – Components – Service Reservoirs – Network Design – Economics – Computer Applications – Analysis of Distribution Networks – Appurtenances – Operations and Maintenance – Leak Detection.

WATER SUPPLY IN BUILDINGS: Principles of Design of Water Supply in Buildings – House Service Connection – Design of water distribution pipes in buildings - applications

TEXT BOOKS:

1.Garg, S.K., "Environmental Engineering I" , Khanna Publishers, New Delhi, 2005

2.Modi, P.N., "Environmental Engineering I", Standard Book House, Delhi – 6, 2006

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999

2. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987

3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005 COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC10	DESIGN OF REINFORCED CONCRETE ELEMENTS	CC	3	0	0	3

PREAMBLE

The primary concern of an engineer is design. Structural design consists conceptualization, idealization, analysis, design, construction and maintenance. Conceptualization is required to arrive at the final shape and size of the structure.

Idealization involves reducing the conceived structure into primary elements. By analysis internal forces like bending moments, shear, torsion, compression and tension in each and every element is determined. Design assigns every element a particular material and size. Construction involves putting all the elements together to perform like the originally conceived structure. Maintenance is needed to keep the performance of the structure without deterioration. In this course, designs of structural elements, like beam, walls and columns, made of specific materials like timber, masonry and steel are dealt with.

Further the elements are designed for internal forces like tension, compression, bending moment and shear.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	All the methods of design of Reinforced concrete structures will be studied
2	This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method.
3	The design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included.
4	At the end of course the student shall be in a position to design the basic elements of reinforced concrete structures.
5	Design of masonry wall will be taught

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1- Concept of elastic method ultimate load method and limit state method	Understand
CO2- Analysis and design of one way and two way slabs	Analyze
CO3- Understand the behaviour of RC beams in shear and torsion-shear and torsion reinforcement-limit state.	Understand
CO4- Design of columns	Apply
CO5 -Design and detail of wall footing	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	M	-	L	M	-	S	M	L	-	-	-	-	-
CO2	S	-	M	-	L	M	-	S	M	L	-	-	-	-	-
CO3	M	-	M	-	L	M	-	S	M	L	L	-	-	-	-
CO4	M	-	M	-	L	M	-	S	M	L	M	-	-	-	-
CO5	M	-	M	-	L	M	-	S	M	L	L	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

METHODS OF DESIGN OF CONCRETE STRUCTURES: Concept of elastic method ultimate load method and limit state method- advantages of limit state method over other methods-design codes and specification -Introduction to IS 456 -limit

state philosophy as detailed in current IS code.

LIMIT STATE DESIGN FOR FLEXURE: Analysis and design of one way and two way slabs – rectangular slab subjected to uniformly distributed and concentrated loads – boundary conditions and corner effects – singly and doubly reinforced rectangular and flanged beams - design aids for flexure-deflection.

LIMIT STATE DESIGN FOR SHEAR TORSION BOND AND ANCHORAGE : Behaviour of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of RC members for combined bending shear and torsion- use of design aids

LIMIT STATE DESIGN OF COLUMNS : Types of columns-analysis and design of short columns for axial, uniaxial and bi axial bending-design of long columns- use of design aids

LIMIT STATE DESIGN OF FOOTING : Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only

TEXT BOOKS:

1. Vargheese P C," Limit State Design of Reinforced Concrete", Prentice Hall of India, Private, Limited New Delhi, 2004

2. Unnikrishna Menon and Pillai,"Reinforced concrete Design",Tata Mc Graw hill,2007

3. Dayaratnam P," Brick and Reinforced Brick Structures", Oxford & IBH Publishing Company Private Limited 2008

REFERENCES:

. S. Ramamrutham, R. Narayan,"Design of Reinforced Concrete Structures (conforming to IS 456) Dhanpat Rai, 1993

2. Krishna, Raju N. Pranesh, R.N. Reinforced Concrete Design:IS:456-2000 Principles and Practice"new age publications,2003

3. Bhavikatti, S S, "Design of R.C.C. Structural Elements Vol. I new age Publications,2005

4. I S456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000 7.

5. SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi,

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C.Kathirvel	Asso.Prof	VMKVEC	geologykathir@gmail.com
2				

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC11	STRUCTURAL ANALYSIS	CC	2	1	0	3

PREAMBLE

This course offers the various methods of analysis for indeterminate beams and portal frames. It aims at determination of end moments and constructing shear force and bending moment diagrams for the beams and frames. Also, ILD for indeterminate beams will be dealt with.

PREREQUISITE

Mechanics of Solids -II

COURSE OBJECTIVES

1	The basics of a structure subjected to internal forces like axial forces, shearing forces, bending and torsional moments while transferring the loads acting on it will be taught
2	Analyzing the internal forces in the members of the structures.
3	To calculate deflection using slope deflection and moment distribution method
4	To analysis different types of arches
5	At the end of this course students will be conversant with classical method of analysis

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Calculate the Deflection of Determinate Structures	Apply
CO2. Analyse beams by Slope Deflection Method	Analyze
CO3. Analyse beams by Moment Distribution Method	Analyze
C04. Draw influence line for Moving Loads and Influence Lines (Determinate & Indeterminate Structures)	Apply
CO5. Analyse three hinged, two hinged and fixed arches	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	L	S	-	-	-	-	-	-	-	-	-	-	-
CO3	S	M	M	S	-	-	-	-	-	-	-	-	-	-	-
CO4	S	M	M	M	-	-	-	-	-	-	-	-	-	-	-
CO5	S	M	M	-	-	-	-	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

DEFLECTION OF DETERMINATE STRUCTURES : Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr‟s correction

SLOPE DEFLECTION METHOD: Continuous beams and rigid frames (with and without sway) – Simplification for hinged end – Support displacements.

MOMENT DISTRIBUTION METHOD: Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.

MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES): Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections.Muller Breslau‟s principle – Influence lines for continuous beams and single storey rigid frames

ARCHES: Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

TEXT BOOKS:

1 Vaidyanadhan, R and Perumal, P, “Comprehensive Structural Analysis – Vol. 1 & Vol. 2”, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
2 Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004
3 Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2013.
4 BhavaiKatti, S.S, "Structural Analysis – Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., New Delhi, 2008

REFERENCES:

1 Devadas Menon, “Structural Analysis”, Narosa Publishing House, 2008
2 Ghali.A., Nebille and Brown. T.G., "Structural Analysis - A unified classical and matrix approach" Sixth Edition, SPON press, New York, 2013.
3 Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.
4 L.S. Negi & R.S. Jangid, “Structural Analysis”, Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C.Kathirvel	Asso.Prof	VMKVEC	geologykathir@gmail.com
2	S. Sekar	Asso.Prof	VMKVEC	Sekar.gis@gmail.com

Subject Code	Subject Title	Category	L	T	P	Credit
17CVCC12	MECHANICS OF SOILS	CC	2	1	0	3

PREAMBLE

This course is a branch of Civil Engineering which deals with the application of law of Mechanics and Hydraulics to Engineering problems related with soils like Permeability, stresses within soils, Shear strength and compressibility of soils. These form the basis for the computation of discharge through earthen dams, shear strength parameters required for determining the bearing capacity of soils and calculating settlement of structures.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	Understand the principle of effective stress, and then calculate stresses that influence soil behaviour. .
2	Calculate water flow through ground, and understand the effects of seepage on the stability of structures
3	Determine soil deformation parameters, and calculate settlement magnitude and rate of settlement.
4	Appreciate the difference between total and effective stress approaches in soil strength determination, and discriminate between drained and undrained conditions.
5	Give an Engineering classification of a given soil.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 -Explain the basic properties of soils and classify the Soil according to AASHTO, USCS and IS Soil classification system.	Understand
CO2- Determine the Permeability of Cohesive and Cohesionless soils	Apply
CO3- Calculate Effective stress within soils and stress due to external loads	Apply
CO4-Compute the Shear Strength of soils based on the parameters obtained from shear tests	Apply
CO5- Compute the consolidation settlement of foundations and explain the Significance of soil compaction and slope stability analysis	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	L	-	-	-	-	-	M	-	-	-	-
CO2	M	M	M	M	L	-	-	-	-	-	M	-	-	-	-
CO3	S	S	M	M	L	-	-	-	-	-	M	-	-	-	-
CO4	M	M	M	M	L	-	-	-	-	-	M	-	-	-	-
CO5	M	M	M	M	L	-	-	-	-	-	M	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Nature of soil - Soil description and classification for engineering purposes - IS Classification system - Phase relationships - Soil compaction - Theory, comparison of laboratory and field compaction methods - Ground improvement by compaction

SOIL WATER AND WATER FLOW :Soil water - static pressure in water - Permeability measurement in the laboratory and field - Seepage - Introduction to flow nets - Simple problems.

STRESS DISTRIBUTION AND SETTLEMENT: Effective stress concepts in solids - Stress distribution in soil media - Use of influence charts - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory

SHEAR STRENGTH: Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - saturated soil mass - Measurement of shear strength, direct shear - Triaxial compression, UCC and Vane shear tests - Pore pressure parameters

SLOPE STABILITY: Slope failure mechanisms - Types - Infinite slopes - Finite slopes - Total stress analysis for saturated clay - Method of slicese - friction circle method - Use of stability number - Slope protection measures.

TEXT BOOKS:

1. Punmia P.C., Ashok Kumar Jain,Arun Kumar Jain, " Soil Mechanics and Foundations ", Laxmi Publications Pvt.Ltd,New Delhi,2005
2. Arora K.R., " Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, New Delhi, 1997.

REFERENCES:

1. Holtz R.D. and Kovacs W.D., “Introduction to Geotechnical Engineering ", Prentice-Hall, 2010
2. McCarthy D.F., “Essentials of Soil Mechanics and Foundations ", Prentice-Hall, 1997.
3. Sutten B.H.C., “Solving Problems in Soil Mechanics", Longman Group Scientific and Technical, U.K. England, 1994.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C.Kathirvel	Asso.Prof	VMKVEC	geologykathir@gmail.com
2		Asso.Prof	VMKVEC	

17CLCC13	**DESIGN OF STEEL STRUCTURES**	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The primary concern of an engineer is design. Structural design consist conceptualization, idealization, analysis, design, construction and maintenance. Conceptualization is required to arrive at the final shape and size of the structure. Idealization involves reducing the conceived structure into primary elements. By analysis internal forces like bending moments, shear, torsion, compression and tension in each and every element is determined. Design assigns every element a particular material and size. Construction involves putting all the elements together to perform like the originally conceived structure. Maintenance is needed to keep the performance of the structure without deterioration. In this course, designs of structural elements, like beam, walls and columns, made of specific materials like timber, masonry and steel are dealt with. Further the elements are designed for internal forces like tension, compression, bending moment and shear....

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.
2	Design of structural systems such as roof trusses, gantry girders as per provisions of current code (IS 800 - 2007) of practice.
3	To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO6. Infer concepts of basic Design	Understand
CO7. Design and detail of steel tension members	Apply
CO8. Design and detail of compression members and flexure members.	Apply
CO9. Design of laterally supported and unsupported beams	Apply
CO10. Design and detail the Roof Trusses and Industrial Structures	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	M	-	L	M	-	S	M	L	-	-	-	L	-
CO2	S	-	M	-	L	M	-	S	M	L	-	-	-	-	-
CO3	M	-	M	-	L	M	-	S	M	L	L	-	M	-	-
CO4	M	-	M	-	L	M	-	S	M	L	M	-	-	-	-
CO5	M	-	M	-	L	M	-	S	M	L	L	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints

TENSION MEMBERS: Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

COMPRESSION MEMBERS: Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base

BEAMS: Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices

ROOF TRUSSES AND INDUSTRIAL STRUCTURES: Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.

TEXT BOOKS:

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013

2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.

3. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.

REFERENCES:

1. Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002 .

2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005

3. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2009

4. Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007 Structures Publications, 2009.

5. IS800 :2007, General Construction In Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC14	HIGHWAY ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The course aims to make the students learn the principles of highways, their components and design of flexible and rigid pavements. Further, students will get acquainted with treatment for Failures and remedial measures during maintenance of pavements...

PREREQUISITE- NIL

COURSE OBJECTIVES

1	The objective of the course is to educate the students on the various components of Highway Engineering.
2	It exposes the students to highway planning, engineering surveys for highway alignment
3	Design of Geometric Elements of Highways and Urban roads, Rigid and Flexible pavements design
4	The students further learn the desirable properties of highway materials and various practices adopted for construction
5	This course enables the students to develop skill on evaluation of the pavements and to decide appropriate types of maintenance.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO6. Infer various components of Highway Engineering.	Apply
CO7. Infer concepts of highway planning and cross sectional elements of pavement	Understand
CO3.Make use of the concepts for determination of sight distance requirements and design of geometric elements, horizontal profile and vertical profile	Apply
CO4.Make use of the concepts for design of flexible pavement and rigid pavement structure	Understand
CO5. Infer material properties and procedure for construction of highways and explain appropriate maintenance for the distress	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	--	--	L	-	L	-	-	-	-	-	-	-	-	-
CO2	S	M	M	L	-	-	-	-	-	M	-	-	-	L	-
CO3	S	L	S	L	-	L	M	-	-	M	-	-	L	-	-
CO4	M	L	--	L	-	L	-	-	-	-	M	-	-	S	-
CO5	S	H	L	L	-	L	-	L	L	-	L	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

HIGHWAY PLANNING AND ALIGNMENT: Highway Development in India, Macadam‟s Method of Road Construction, Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment,

Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques)Classification and Cross Section of Urban and RuralRoads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards]

GEOMETRIC DESIGN OF HIGHWAYS: Design of Horizontal Alignments – Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] Geometric Design of Hill Roads [IRC Standards Only]**.**

DESIGN OF RIGID AND FLEXIBLE PAVEMENTS: Rigid and Flexible Pavements- Components and their Functions Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic Design Practice for Flexible Pavements [CBR method, IRC Recommendations- Problems] Design Practice for Rigid Pavements – [IRC Recommendations-Problems]

HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE: Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil – California Bearing Ratio Test, Field Density Test Aggregate - Crushing, Abrasion and Impact Tests- Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway Drainage [IRC Recommendations]

HIGHWAY MAINTENANCE: Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation Overlay Design by Benkleman Beam Method [Procedure only]

TEXT BOOKS:

1. Khanna K and Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2001.

2. Kadiyali L R," Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi, 2000

REFERENCES:

1. IRC Standards (IRC 37 - 2001 & IRC 58 -1998)

2. Bureau of Indian Standards (BIS) Publications on Highway Materials

3. MORTH Guidelines for Highway Engineering

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com
2	S.Sekar	Asst. Professor	CIVIL	Sekar.gis@gmail.com

17CVCC15	RAILWAY , AIRPORT AND HARBOUR ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The course aims to make the students learn the principles of railway, airport and harbour engineering, their components and design

PREREQUISITE - HIGHWAYENGINEERING

COURSE OBJECTIVES

1	This course imparts to the students knowledge of planning, design, construction and maintenance of railway tracks. .
2	The students acquire proficiency in the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering
3	The student develops skills on airport planning and design with the prime focus on runway and taxiway geometrics
4	Students become conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders.
5	The students acquire knowledge on site investigation for location and planning of harbours.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO6. Understand the Railway Planning and Design	Understand
CO7. Infer concepts of railway track construction, maintenance and Operation	Apply
CO8. Make use of the concepts for Airport Planning And Design	Apply
CO9. Make use of the concepts for harbour engineering & other modes of transport	Understand
CO10. Evaluation of Highway and Railway Projects	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	--	--	L	-	L	-	-	-	-	-	-	-	-	-
CO2	S	M	M	L	-	-	-	-	-	M	-	-	-	-	-
CO3	S	L	S	L	-	L	M	-	-	M	-	-	-	L	-
CO4	M	L	--	L	-	L	-	-	-	-	M	-	S	-	-
CO5	S	H	L	L	-	L	-	L	L	-	L	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

RAILWAY PLANNING AND DESIGN: Role of Indian Railways in National Development. Engineering Survey for Track Alignment. Permanent Way, its Components and Functions of Each Component, Gauges in Railway Tracks. Coning of Wheels. Geometric Design of Railway Tracks – Gradient, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Vertical Curves and Grade Compensation (Derivations of formulae and Problems)

RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION : Points and Crossings, Signaling, Interlocking and Track Circuiting, Construction and Maintenance – Conventional and Modern methods (Remote Sensing, GIS & GPS) for Railway Alignment, Track Construction, Maintenance and Materials - Track Drainage. Lay outs of Railway Stations and Yards

AIRPORT PLANNING AND DESIGN: Airport Planning, Components of Airports, Airport Site Selection

Runway Design- Orientation, Geometric Design and Correction for Gradients Terminal area, Airport Layout, Airport Buildings, Passenger Facilities, Parking Area and Airport Zoning.

HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT : Definition of Terms - Harbours, Ports, Docks, Tides and Waves. Harbours – Requirements, Classification – Site Investigation for Locations, Planning and Layouts Concept of Satellite Ports. Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter- modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways

ECONOMIC EVALUATION OF TRANSPORT PROJECTS: Evaluation of Highway and Railway Projects- Cost Benefit Analysis (Benefit Cost Ratio, Net Present Value, International Rate of Returns (Problems) Environmental Impact Assessment, Financial Appraisal Build, Operate and Transfer for Highway and Railway Projects (Basic Concepts only)

TEXT BOOKS:

1. 1S. P. Bindra," A Course in Docks and Harbour Engineering",Dhanput Rai, 1992
2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers,Roorkee, 1994.
3. S.P. Arora, S.C. Saxena,"A Textbook of Railway Engineering"Dhanpat Rai Publications, 2001

REFERENCES:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
3. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publication, Delhi, 1992

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com
2	S.Sekar	Asst. Professor	CIVIL	Sekar.gis@gmail.com

17CVCC16	DESIGN OF REINFORCED CONCRETE STRUCTURES	Category	L	T	P	Credit
		CC	2	1	0	3

PREAMBLE

The primary concern of an engineer is design. Structural design consist conceptualization, idealization, analysis, design, construction and maintenance. Conceptualization is required to arrive at the final shape and size of the structure. Idealization involves reducing the conceived structure into primary elements. By analysis internal forces like bending moments, shear, torsion, compression and tension in each and every element is determined. Design assigns every element a particular material and size. Construction involves putting all the elements together to perform like the originally conceived structure. Maintenance is needed to keep the performance of the structure without deterioration. In this course, designs of structural elements, like beam, walls and columns, made of specific materials like timber, masonry and steel are dealt with. Further the elements are designed for internal forces like tension, compression, bending moment and shear.

PREREQUISITE - DESIGN OF REINFORCED CONCRETE ELEMENTS

COURSE OBJECTIVES

1	This course covers the design of reinforced concrete structures such as retaining wall,
2	Student has a comprehensive design knowledge related to structures, systems that are likely to be encountered in professional practice.
3	To develop the knowledge about Principles of Prestressing will be studied
4	Application of virtual work theory for design of slabs
5	The design of reinforced concrete structures water tanks, staircases, flat slabs and bridges.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Classify the types & behaviour, arriving the dimensions and detailing of brick masonry wall & column and also its foundation	Understand
CO2. Design and detail the timber joists and columns.	Apply
CO3. Summarize the codal provisions in IS800:2007 for tension members, compression members and connections.	Analyze
CO4. Explain the force transferring mechanism, design and detail the connections as bolted and welded connections.	Analyze
CO5. Design and detail of steel tension members, compression members and flexure members.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**S**	**M**	**L**	**---**	**---**	**L**	**---**	**L**	**---**	**---**	**---**	**---**	-	-	-
CO2	**S**	**M**	**L**	**---**	**L**	**M**	**---**	**L**	**---**	**L**	**L**	**---**	-	-	-
CO3	**S**	**M**	**L**	**---**	**L**	**M**	**---**	**L**	**---**	**L**	**---**	**---**	-	L	-

CO4	**S**	**M**	**M**	**---**	**L**	**---**	**---**	**L**	**---**	**L**	**---**	**L**	S	-	_
CO5	**S**	**M**	**M**	**---**	**---**	**---**	**---**	**M**	**---**	**M**	**L**	**---**	-	-	_

S- Strong; M-Medium; L-Low

SYLLABUS

RETAINING WALLS: Design of cantilever and counter fort retaining walls

WATER TANK : Underground rectangular tanks – Overhead circular and rectangular tanks – Design of staging and foundations.

PRINCIPLES OF PRESTRESSING : Materials for pre stressed concrete – Different methods and systems – introduction to pre stressing and post tensioning- Uniform and non uniform pre stressing – Losses in pre stress – Analysis of simply supported beams with straight and parabolic tendons.

YIELD LINE THEORY: Application of virtual work method to Square, Rectangular and Triangular slabs.
ADVANCED TOPICS: Design of staircases (ordinary and doglegged) – Design of deep beams -flat slabs –

Design of Reinforced concrete walls – Principles of design of road bridges for IRC loading

TEXT BOOKS:

1. P.C.Varghese,"Advanced Reinforced Concrete structures", PHI Learning Pvt. Ltd., 09-Jan-2009
2. N.Krishna Raju, "Design of Reinforced Concrete Structures (IS:456-2000) -Tata McGraw-Hill Education
3. Prestressed concrete BY N Krishna Raju -Tata McGraw-Hill Education

REFERENCES:

1. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 1997

3.Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
NOTE:IS 456:2000,SP 16,IS:1343, IRC Bridge codes, BIS 3370, ISI 343 are permitted in the Examinations.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	M.Senthilkumar	Asst. Professor	CIVIL	Senthilkumar@vmkvec.edu.in

17CVCC17	MODERN METHODS OF STRUCTURAL ANALYSIS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course offers the various methods of analysis for indeterminate beams and portal frames. It aims to learn advanced methods like matrix methods of structural analysis of structures, plastic theory, analysis of special structures like arches and suspension cables and influence line for indeterminate structures.

PREREQUISITE

Structural Analysis

COURSE OBJECTIVES

1	This course is in continuation of Structural Analysis I. Here in advanced method of analysis like Matrix method and Plastic Analysis are covered
2	Advanced topics such as FE method and Space Structures are covered
3	Advanced method of analysis like finite element and matrix will be taught
4	After completion of the course the student will be able to Differentiate between various structural forms such as beams, plane truss, space truss, plane frame, space frame, arches, cables, plates and shells
5	The student studies to calculate the degree of static and kinematic indeterminacy of a given structure such as beams, truss and frames

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Analyse beams and frames by moment distribution method	Analyze
CO2 Analyse beams by matrix stiffness and flexibility methods	Analyze
CO3 Analyse continuous beams using theorem of three moments	Analyze
CO4 Plastic analysis of indeterminate beams and frames	Analyze
CO5 Analysis of Space trusses using method of tension coefficients	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	-	-	L	-	-	-	M	-	S	L	-	-
CO2	M	M	-	-	-	-	-	-	-	-	L	S	L	-	-
CO3	S	S	-	-	-	M	-	-	-	-	-	S	M	L	-
CO4	S	S	-	M	M	L	M	-	-	-	-	S	M	L	-
CO5	S	S	M	-	M	L	M	-	M	S	-	S	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

FLEXIBILITY METHOD FOR INDETERMINATE FRAMES: Equilibrium and compatibility – Determinate vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

MATRIX STIFFNESS METHOD: Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames

FINITE ELEMENT METHOD: Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element.

PLASTIC ANALYSIS OF STRUCTURES: Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems

SPACE AND CABLE STRUCTURES: Analysis of Space trusses using method of tension coefficients – Suspension bridges- cables with two and three hinged stiffening girders

TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P., "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2003

2. Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers, Delhi,1994

REFERENCES:

1. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press,

London and New York, 2003.

2. Vazirani V.N, & Ratwani, M.M, "Analysis of Structures", Khanna Publishers, Delhi

3. Structural Analysis – A Matrix Approach – G.S. Pandit & S.P. Gupta, Tata McGraw Hill

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC18	FOUNDATION ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course offers the various methods of analysis for indeterminate beams and portal frames. It aims to learn advanced methods like matrix methods of structural analysis of structures, plastic theory, analysis of special structures like arches and suspension cables and influence line for indeterminate structures.

PREREQUISITE - MECHANICS OF SOILS

COURSE OBJECTIVES

1	The capacity to investigate the soil condition
2	To design suitable foundation
3	The methods of minimizing settlement
4	Design aspects of combined and mat foundation
5	The knowledge about pressure distribution on retaining walls

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Analyse site conditions and applying sampling techniques	Apply
CO2 Understand the importance of advanced techniques involved in shallow foundation	Apply
CO3 Study the importance of structural design of spread footing	Understand
CO4 Know to fix the relative position of points on the ground using Pile foundation	Apply
CO5 Compute the consolidation settlement of foundations and explain the Significance of soil compaction and slope stability analysis	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	-	L	L	-	-	-	M	-	-	-	-	-
CO2	M	M	-	-	L	-	-	-	-	-	L	-	-	-	-
CO3	S	S	-	-	L	M	-	-	-	-	-	-	-	-	-
CO4	S	M	-	M	L	L	M	-	-	-	-	-	M	-	-
CO5	S	M	M	-	L	L	M	-	M	S	-	-	M	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

SITE INVESTIGATION AND SELECTION OF FOUNDATION: Introduction – Scope and objectives – Method of exploration boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests (SPT and SCPT) – Data interpretation – Selection of foundation based on soil condition

SHALLOW FOUNDATION: Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from insitu tests – Factors influencing bearing capacity – codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimizing settlement

FOOTINGS AND RAFTS: Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Codal provisions

PILES: Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from insitu tests (SPT and SCPT) – Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions

RETAINING WALLS: Earth pressure theory – Plastic equilibrium in soils – active and passive states –Rankine‟s theory – Coloumb‟s wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load alone – Graphical method (Culmann‟s method alone) – Stability of retaining wall

TEXT BOOK:

1. Punmia, B.C., Soil mechanics and foundations, Laxmi publications pvt. Ltd., New Delhi, 2005
2. Arora, K.R. Soil mechanics and foundation engineering, standard publishers and distributors, New Delhi, 1997.

REFERENCES:

1. Khan, I.H., A text book of Geotechnical Engineering, Prentice Hall of India, New Delhi,1999.

2. Gopal Ranjan and Rao, A.S.R. Basic and applied soil mechanics, Wiley Eastern Ltd., New, Delhi (India),1997.

COURSE DESIGNERS

S. No.	Name of the Faculty	Mail ID
1.	S.Sekar	Sekar.gis@gmail.com
2.	A.Fizoor Rahman	fizoorr@gmail.com

17CVCC19	ESTIMATION AND QUANTITY SURVEYING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course helps to understand estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works

PREREQUISITE - NIL

COURSE OBJECTIVES

1	This covers the rate analysis, valuation of properties and preparation of reports for estimation of various items.
2	The end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents.
3	Student should also be able to prepare value estimates.
4	Student will also be able to Exercise on cash flow in Civil engineering projects

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Study the estimation of quantities for buildings	Apply
CO2. Study the importance of Specifications And Tenders	Understand
CO3. Know to contract conditions and contract problems	Apply
CO4. Understand the principles of valuation and Value and cost	Apply
CO5. Understand the Principles for report preparation	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	M	S	M	M	S	S	S	-	-	S	-	-
CO2	S	M	L	-	-	-	-	S	S	S	-	-	-	-	-
CO3	S	M	M	-	-	-	-	S	S	S	-	-	-	L	-
CO4	S	M	M	-	-	-	-	S	S	S	-	-	-	-	-
CO5	S	M	M	-	-	-	-	L	-	-	-	L	-	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

ESTIMATION: Philosophy – purpose - Methods of estimation – advantages – types of estimates – approximate estimates – definite estimate – estimation of quantities for buildings, roads, canals and hydraulic structures – Sluices – Head and wing wall type

SPECIFICATIONS AND TENDERS : Specifications-Detailed and general specifications-construction specifications – sources –types of specifications – Tender notices – types – corrigendum notice – tender procedures – Drafting model tenders

CONTRACTS: Contract – types of contracts – formation of contract - contract conditions - contract problems-contract for labour, material, design and construction – drafting of contract documents – construction contracts – arbitration and legal requirements.

VALUE ENGINEERING: Basics - principles of valuation – Value and cost –value engineering – value analysis – phases in value engineering – information – function – Escalation – evaluation - recommendation implementation – Audit-Depreciation-rent fixation.

REPORT PREPARATION: Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – cost control in construction projects – Exercise on cash flow in Civil Engineering projects

TEXT BOOKS:

1. Estimating and costing in civil Engineering – B.N.Dutta, S.Dutta & Company, Lucknow,2005
2. Rangwala, ”Estimating Costing and Valuation,” - Charotar Publishing House ,2011.

REFERENCES:

1. A text book on Estimating and costing – G.S.Birdie – Dhanpat Rai and Sons, New Delhi.1982
2. Kohli, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S. Chand & Company Ltd., 2004

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	S.Sekar	Asst. Professor	CIVIL	Sekar.gis@gmail.com
2.	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in

17CVCC20	CONSTRUCTION PLANNING AND SCHEDULING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The purpose of this course is to learn about the Construction plan and construction method. To develop the knowledge about Quality control and safety during construction

PREREQUISITE- NIL

COURSE OBJECTIVES

1	Plan construction projects
2	Schedule the activities using network diagrams
3	Control the cost of the project by creating cash flows
4	Budgeting and how to use the project information as an information and decision making tool.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Study the Basic concepts in the development of construction plans	Apply
CO2. Study the Scheduling Procedures And Techniques	Understand
CO3. Know to Cost Control Monitoring And Accounting	Apply
CO4. Understand the Quality Control And Safety During Construction	Apply
CO5. Understand the Organization And Use Of Project Information	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	M	S	M	M	S	S	S	-	-			-
CO2	S	M	L	-	-	-	-	S	S	S	-	-			-
CO3	S	M	M	-	-	-	-	S	-	S	-	-			-
CO4	S	M	M	-	-	-	-	S	S	S	-	-			-
CO5	S	M	M	-	-	-	-	L	-	L	-	L			-

S- Strong; M-Medium; L-Low

SYLLABUS

CONSTRUCTION PLANNING: Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems.

SCHEDULING PROCEDURES AND TECHNIQUES: Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process –Introduction to application software.

COST CONTROL MONITORING AND ACCOUNTING: The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION: Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

ORGANIZATION AND USE OF PROJECT INFORMATION: Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow

TEXT BOOKS:

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.

2. Srinath,L.S., "Pert and CPM Priniples and Applications ", Affiliated East West Press, 2001

REFERENCES:

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.

2. Moder.J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.

3. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons 1986.

4. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVCC81	COMPUTER AIDED BUILDING DRAWING LAB	Category	L	T	P	Credit

		CC	**0**	**0**	**4**	**2**

Preamble

The aim of this course is to prepare the plan, elevation and sections of various types of buildings using any design software

Prerequisite - NIL

Course Objective

1	At the end of this course the student should be able to draft on computer building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements.
2	The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed buildings using computer software.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	To know about load bearing wall concept	Apply
CO2.	To know RCC framed structure concept	Apply
CO3.	To gain the knowledge about Office building drawings.	Apply
CO4.	To draw the industrial drawings as per industrial standard	Apply
CO5	To know about the orientation of the building construction	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	S	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	S	-	-	-	-	-	-	-	-	-	-	-	-
CO3	S	M	M	-	-	-	-	-	-	-	-	-	-	-	-
CO4	S	M	M	-	-	-	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

Syllabus

LIST OF EXPERIMENTS

. Buildings with load bearing walls (Flat and pitched roof) –
Including details of doors and windows
2. RCC framed structures
3. Office Buildings
4. Industrial buildings – North light roof structures – Trusses
5. Perspective view of one and two storey buildings

Text Books

1	cad manual – Department of Civil engineering

Course Designers

S.No	**Faculty Name**	**Designation**	**Dept / College**	**Email id**
1	A.Fizoor Rahman	Asso.Prof	VMKVEC	fizoorr@gmail.com
2	M.Senthilkumar	Asso.Prof	VMKVEC	Senthilkumar@vmkvec.edu.in

17CVCC82	STRENGTH OF MATERIALS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This laboratory course work is intended to provide students with opportunities to acquire knowledge and to develop skills in testing different materials used for the construction of building under the action of various forces and determining their characteristics experimentally. The experimental work involved in this laboratory will make the student to determine the mechanical and physical properties of materials like steel, wood, aluminium, cement, fine and coarse aggregate, etc. The students will be able to infer the suitability of these materials for construction.

PREREQUISITE- NIL

COURSE OBJECTIVES

1	The Experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains.
2	Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Determine the behavior of structural elements, such as bars, beams and springs subjected to tension, compression, shear, bending, and torsion by means of experiments	Apply
CO2. Determine the physical properties of constituent materials.	Apply
CO3. Determine the properties of materials and hardened including strength and durability.	Apply
CO4. Determine the Deflection strength of the materials.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	L	-	L	-	M	L	M	M	L	-	-	-
CO2	M	M	M	L	-	L	-	M	L	M	M	L	-	M	-
CO3	M	M	M	L	-	L	-	M	L	M	M	L	-	L	-
CO4	M	M	M	L	-	L	-	M	L	M	M	L	-	-	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Tension test on mild steel and tor steel rods
2. Compression test on wooden specimen
3. Double shear test on mild steel and Aluminium rods
4. Torsion test on mild steel rods
5. Impact test on metal specimen
6. Hardness test on metals
7. Deflection test on metal beam
8. Compression test on Helical spring
9. Tension test on Helical spring
10. Y deflection test on carriage spring.

TEXT BOOKS:

1. Strength of Materials Lab Manual by VMKV Engineering College.

REFERENCES:

1. Bansal, R.K., “A Text Book of Strength of Materials”, Laxmi Publications (P) Ltd. New Delhi 2010

2. James M. Gere and Stephen P. Timoshenko, “Mechanics of Materials” (3rd edition), McGraw Hill Book Company, Singapore, 2002.
3. IS 1608 : 1995 Mechanical testing of metals - Tensile Testing.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Sathiyaraj R	Asst..Prof	VMKVEC	sathiyaraj@vmkvec.edu.in
2	C.Kathirvel	Asst. Professor	VMKVEC	geologykathir@gmail.com

17CVCC83	SURVEY PRACTICAL -I LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The theory part of Surveying can be experimented in Survey lab I. This includes the experiments on chains, compass, plane table and levels.

PREREQUISITE- NIL

COURSE OBJECTIVES

1	Apply the basic principles of engineering surveying and measurements
2	Follow effectively field procedures required for a professional surveyor
3	Use techniques, skills and conventional surveying instruments necessary for engineering practice.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1.Use the surveying tools like chain, tape, compass, plane table and levels in the field and take accurate measurements, booking and plotting	Apply
CO2. Adjust or compensate the errors in the field measurements	Apply
CO3. Locate the field position on the plan or vice versa	Apply
CO4. Locate the elevation of given points with respect to a given datum	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	-	-	L	L	-	-	L	-	L	L	-
CO2	S	L	-	L	L	-	-	-	-	-	-	L	-	L	-
CO3	S	S	S	-	-	-	-	-	L	L	L	-	L	-	-
CO4	S	L	S	L	-	L	-	L	-	L	-	L	-	L	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. **CHAIN SURVEYING**
   - Ranging – changing and traverse.
2. **COMPASS SURVEYING**
   - Traverse.
3. **PLANE TABLE SURVEYING.**
   - Triangulation to find the distance between inaccessible points with and without known scale. – Three-point problem, two point problem.
4. **LEVELLING**
   - Study of levels and leveling staff – Fly leveling using dumpy level. – fly leveling using tilting level. – Check leveling.
5. **THEODOLITE SURVEYING**
   - Study of theodolite measurement of angles by reiteration and repetition - measurement of vertical angles.

REFERENCES:

1. SURVEY PRACTICAL -I LAB MANUAL by VMKV Engineeing College
2. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, 7th Edition, McGraw Hill, 2001.
3. Bannister and S. Raymond, "Surveying", 7th Edition, Longman, 2004.
4. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Sathiyaraj R	Asst..Prof	VMKVEC	sathiyaraj@vmkvec.edu.in
2	C.Kathirvel	Asst. Professor	VMKVEC	geologykathir@gmail.com

17CVCC84	HYDRAULIC ENGINEERING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The purpose of this course is to get exposure about the function of various hydraulic equipment.

PREREQUISITE

Mechanics of Fluids

COURSE OBJECTIVES

1	Student should be able to verify the principles studied in theory by conducting the experiments
2	The students will be able to measure flow in pipes and determine frictional losses.
3	The students will be able to develop characteristics of pumps and turbines

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Conducting experiments by using the principles studied in theory	Apply
CO2. Calculate flow in pipes and Frictional losses	Analyze
CO3. Developing characteristic curves of pumps and turbines	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	-	S	-	-	-	-	M	L	-	-			
CO2	S	L	M	M	-	-	-	-	L	L	-	L			
CO3	S	M	M	S	-	-	-	-	M	M	L	-			

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

CYCLE -I

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes

CYCLE –II

1. Study of minor losses in pipes
2. Study on performance characteristics of Pelton turbine
3. Study on performance characteristics of Francis turbine
4. Study on performance characteristics of Kaplan turbine
5. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
6. Study on performance characteristics of reciprocating pump.

REFERENCES:

HYDRAULIC ENGINEERING LAB MANUAL by VMKV Engineering College

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Sathiyaraj R	Asst..Prof	VMKVEC	sathiyaraj@vmkvec.edu.in
2	C.Kathirvel	Asst. Professor	VMKVEC	geologykathir@gmail.com

17CVCC85	**SURVEY PRACTICAL -II LAB**	Category	L	T	P	Credit

		CC	0	0	4	2

PREAMBLE

Knowledge on basic survey methods (Survey Lab I) is essential in order to determine the distance and heights of the objects using stadia, tangential as well as trignometrical principle.

PREREQUISITE

Fundamentals of surveying and Survey Lab I

COURSE OBJECTIVES

1	At the end of the course the student will posses knowledge about Survey field techniques.
2	The basic concepts in control surveying
3	The concepts in Route Surveying

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 -Use the surveying tools like Theodolite and Total Station in the field	Apply
CO2 -Take linear and angular measurements, booking and plotting accurately.	Apply
CO3 -Locate the position of the object after finding the distance and heights using stadia, tangential and trignometrical principle	Apply
CO4 -Set out a simple circular curve in the field	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	L	L	L	S	L	L	S	L	L
CO2	S	L	L	L	L	L	L	L	L	S	L	L	S	L	L
CO3	S	S	S	L	S	L	L	M	L	S	L	L	S	S	S
CO4	S	S	S	S	S	S	M	M	L	S	L	L	S	S	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

CYCLE -I

1. Study of theodolite and measurement of horizontal angle by repetition method.
2. Measurement of horizontal angle by reiteration method.
3. Determine the distance and heights of the objects using Stadia tacheometric method.
4. Determine the distance and heights of the objects using tangential tacheometric method.
5. Find the gradient between two points using stadia and tangential tacheometric principle.

CYCLE –II

6. Find the distance and elevation of the inaccessible (single) object by single plane method.
7. Find the distance and elevation of the inaccessible (single) object by double plane method.
8. Find the elevation of the inaccessible (double) object by double plane method.
9. Determine the elevation of the given point using subtense bar.
10. Measurement of horizontal, sloping and vertical distances of the object using Total station.

11. Setting out a circular curve using Total Station.

12. Using profile leveling, plot the longitudinal section and cross section of road

REFERENCES:

Surveying II Lab Manual by VMKV Engineering College

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C.Kathirvel	Asso..Prof	VMKVEC	geologykathir@gmail.com
2	Sathiyaraj R	Asst..Prof	VMKVEC	sathiyaraj@vmkvec.edu.in

17CVCC86	SOIL MECHANICS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To provide the hands on training in determination of Engineering and index properties of soils, applied in field problems.

PREREQUISITE- Nil

COURSE OBJECTIVES

1	At the end of this course, the student acquires the capacity to test the soil to assess its Engineering and Index properties
2	Students know the techniques to determine index properties and engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Grain size distribution - Hydrometer analysis	Apply
CO2. Relative density of sands	Apply
CO3. One dimensional consolidation test (Determination of co-efficient of consolidation only)	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	M	L	L	L	L	L	-	-	-
CO2	S	L	S	L	L	L	L	L	L	L	S	L	-	M	-
CO3	S	S	S	L	L	L	S	L	L	L	L	L	-	L	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Atterberg limits test
4. Determination of moisture - Density relationship using standard proctor.
5. Permeability determination (constant head and falling head methods)
6. Specific gravity of soil grains
7. Relative density of sands
8. Determination of shear strength parameters
   a) Direct shear test on cohesion less soil
   b) Unconfined compression test in cohesive soil
   c) Triaxial compression test
9. One d imensional consolidation test (Determination of co-efficient of consolidation only)

REFERENCES:

1. SOIL MECHANICS LAB MANUAL by VMKV Engineeing College
2. "Soil Engineering Laboratory Instruction Manual ", Published by the Engineering College Co operative Society, Chennai, 1996.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID

1	S.Sekar	Asst. Professor	CIVIL	Sekar.gis@gmail.com
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC87	ENVIRONMENTAL ENGINEERING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

PREREQUISITE- Nil

COURSE OBJECTIVES

1	The students completing the course will be able to characterize wastewater and conduct treatability studies.
2	To expected to be aware of the procedure for quantifying quality parameters for water and sewage.
3	To be conducted for characterization of water and municipal sewage.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Sampling and preservation methods and significance of characterization of water and Wastewater.	Apply
CO2. Determination of iron & fluoride	Apply
CO3. Determination of dissolved oxygen	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	M	L	L	L	L	L	L	L	-
CO2	S	L	S	L	L	L	L	L	L	L	L	L	-	L	-
CO3	S	S	S	L	L	L	L	L	S	L	L	M	L	-	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS :

1. Sampling and preservation methods and significance of characterization of water and
2. Wastewater.
3. Determination of PH and turbidity Hardness
4. Determination of iron & fluoride
5. Determination of residual chlorine
6. Determination of Chlorides
7. Determination of Ammonia Nitrogen
8. Determination of Sulphate
9. Determination of Optimum Coagulant Dosage
10. Determination of available Chlorine in Bleaching powder
11. Determination of dissolved oxygen
12. Determination of suspended, volatile and fixed solids
13. B.O.D. test
14. C.O.D. test
15. Introduction to Bacteriological Analysis (Demonstration only) To provide adequate knowledge and to assess the quality of water like hardness, pH, etc., for rural people

REFERENCES:

1. ENVIRONMENTAL ENGINEERING LAB MANUAL by VMKV Engineeing College

2. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998

3. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi, 199

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

17CVCC88	COMPUTER AIDED DESIGN AND DRAWING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course helps to know the design of R.C.C cantilever and counterfort retaining walls, Design of solid slab, Design of various types of steel structures

PREREQUISITE- Design Of Reinforced Concrete Elements

COURSE OBJECTIVES

1	The student acquires hands on experience in design and preparation of structural drawings for concrete structures normally encountered in Civil Engineering practice.
2	The student acquires hands on experience in design and preparation of structural drawings for steel structures normally encountered in Civil Engineering practice.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop drafting skills in drawing R.C.C. cantilever and counter fort type retaining walls with reinforcement details.	Apply
CO2. Develop drafting skills in Design of solid slab and R.C. Tee beam bridges	Apply
CO3. Design of rectangular, pressed and hemispherical bottomed steel tank –staging –rivetedjoints detailed drawing	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	M	L	L	L	L	L	L	L	-	-	-
CO2	S	L	S	L	L	L	L	L	L	L	L	L	-	-	-
CO3	S	S	S	L	L	L	L	S	L	L	L	L	-	-	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS :

1. Design and drawing of R.C.C. cantilever and counter fort type retaining walls with reinforcement details
2. Design of solid slab and R.C. Tee beam bridges for IRC loading and reinforcement detail
3. Design of rectangular, pressed and hemispherical bottomed steel tank –staging –riveted joints detailed drawing
4. Design of circular, rectangular and intze type water tank reinforcement details
5. Design of plate girder – twin girder deck type railway bridge – through type and deck type highway bridges – Truss girder bridges – detailed drawing – riveted connection

REFERENCES:

1.Computer Aided Design And Drawing Lab Manual by VMKV Engineeing College

2.Structural design & drawing (concrete & steel) – Krishnaraju, CBS Publishers.2005

3. Krishnaraju,N. "Structural Design & Drawing, Universities Press, 2009.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVCC89	CONCRETE AND CONSTRUCTION TECHNOLOGY LAB	Category	L	T	P	Credit
		EC	0	0	4	2

PREAMBLE

This course helps to know the To understand and perform various tests on cement, aggregates and concrete.

PREREQUISITE

Construction Materials

COURSE OBJECTIVES

1	Student knows the techniques to characterize various pavement materials through relevant tests.
2	To understand and perform various tests on cement, aggregates and concrete.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop the skills in compressive strength test on bricks	Apply
CO2. Develop the skills in Setting Time Test on Cement	Apply
CO3. Test on Impact Resistance Test on Aggregates	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	-	L	S	L	L	L	L	L	L	L	L
CO2	S	L	-	L	M	L	-	L	-	-	L	-	L	L	L
CO3	S	S	S	-	L	-	L	-	L	L	-	L	L	M	L

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS:

1. Compressive Strength Test on Bricks
2. Water Absorption Test on Bricks
3. Specific gravity Test on Cement
4. Soundness Test on Cement
5. Consistency and Setting Time Test on Cement
6. Compaction Factor test on Concrete
7. Crushing Strength Test on Aggregates
8. Impact Resistance Test on Aggregates
9. Slump cone on concrete
10. Cube and Cylinder strength on concrete The student will have to trainrural people to check the quality of building materials in the lab by the students through the knowledge acquired in this lab

TEXT BOOKS:

1. Concrete And Construction Technology Lab Manual by VMKV Engineering College
2. M.S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	R. Sathiyaraj	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC90	SURVEY CAMP	Category	L	T	P	Credit
		CC	0	0	2	1

PREAMBLE

This course helps to know the elevation of points by advanced methods and instruments.

PREREQUISITE

Survey Practical -II Lab

COURSE OBJECTIVES

1	Students completing this course would have acquired practical knowledge on handling survey instruments
2	Students knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and curves setting.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop the skills in field knowledge of surveying in Triangulation, Trilateration methods	Apply
CO2. Develop the skills in Levelling and calculation of area	Apply
CO3. Mapping of contoured area	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	M	L	L	L	L	L	-	-	-
CO2	S	L	S	L	L	L	L	L	L	L	M	L	-	-	-
CO3	S	S	S	L	L	M	L	L	L	L	L	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Ten days survey camp using Theodolite, cross staff, levelling staff, tapes, plane .The camp must involve work on a large area of not less than 400 hectares. at the end of the camp, each student shall have mapped and contoured the area. the camp record shall include all original field observations, calculations and plots

LIST OF EXPERIMENTS:

1. Triangulation
2. Trilateration
3. Road Profile leveling
4. Calculation of area using Offset Method
5. Height of a building

TEXT BOOKS:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, 7th Edition, McGraw Hill, 2001.
2. Bannister and S. Raymond, "Surveying", 7th Edition, Longman, 2004.
3. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.

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2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVCC91	COMPREHENSION LAB	Category	L	T	P	Credit
		CC	1	1	0	2

PREAMBLE

This course helps to know the at the end of the course the students able to attend interviews and competitive exams

PREREQUISITE - NIL

COURSE OBJECTIVES

1	The objective of "Comprehension" is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real-life problems which he/she may have to face in future as an engineer.
2	At the end of the course the students able to attend interviews and competitive exams

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop the skills of students in interview point of view	Apply
CO2. Develop the skills in objective type of question for competitive Examination	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	M	L	L	L	L	L	S	L	-	-
CO2	S	L	S	L	L	L	L	L	L	L	L	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

The comprehension assessment will consist of 3 tests covering all the subject of study in Civil Engineering Course.

TEXT BOOKS:

1. Text book of R.S Agarwall.

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2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

CATEGORY C – ELECTIVE COURSES
(i) PROGRAMME SPECIFIC (CLASS ROOM OR ONLINE)

17CVEC01	ENGINEERING GEOLOGY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Engineering Geology is the application of the geologic sciences to engineering practice for the purpose of assuring that the geologic factors affecting the engineering works are recognized and adequately provided for. Engineering geologic studies may be performed during the planning and design. A civil engineer should be able to understand an engineering geologic report, and incorporate adequate measures into the design of engineering works.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	At the end of this course the student shall be able to understand about Geological formations
2	Classification of rocks.
3	Morphology of rock
4	Importance of the study of geology for civil engineers with regard to founding structures like dams, bridges, buildings, etc
5	The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides and literate the rural people.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Acquire the knowledge of the topographical formation, interior earth, gradational activities and weathering and also the theory of plate tectonics which answers the reason for the occurrence of earthquake, landslides in an area.	Understand
CO2. Interpret minerals and rocks and assess its physical, mechanical and engineering properties	Apply
CO3. Determine geological structures and its relevance on civil projects.	Analyze
CO4. Analyze the surface and subsurface geological structures of the crust, soil and weathered thickness through geophysical exploration and report writing aspects with relevance to civil engineering projects	Analyze
CO5. Assess the geological aspects of the site suitability with relevance to the design of civil structures and vice-versa	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	S	S	M	S	M	M	S	S	S	-	-	-
CO2	S	M	M	L	L	M	M	L	L	L	L	M	-	-	-
CO3	S	S	S	S	L	L	M	L	L	L	L	L	-	L	-
CO4	S	S	S	M	M	S	S	L	L	L	M	M	S	-	-
CO5	S	S	S	S	S	S	S	S	S	S	S	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

GENERAL GEOLOGY: Geology in Civil Engineering - Branches of geology - Earth Structure and composition - Elementary knowledge on continental drift and plate tectonics. Earth processes - Weathering - Work of rivers, wind and sea and their engineering importance - Earthquake belts in India. Groundwater - Mode

of occurrence - prospecting - importance in civil engineering

MINERALOGY: Elementary knowledge on symmetry elements of important crystallographic systems - physical properties of minerals - study of the following rock forming minerals - Quartz family. Feldpar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet - properties, behavior and engineering significance of clay minerals - Fundamentals of process of formation of ore minerals - Coal and Petroleum - Their origin and occurence in India.

PETROLOGY: Classification of rocks - Distinction between Igneous, Sedimentatary and Metamorphic rocks. Decription occurence, engineering properties and distribution of following rocks. Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, Shale, Conglomerate and breccia. Metamorphic rocks, Quartzite, Marble, Slate, Thyllite, Gniess and Schist.

STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD: Attitude of beds - Outcrops - Geological maps - study of structures - Folds, Faults and joints - Their bearing on engineering Construction. Seismic and Electrical methods for Civil Engineering investigations. Remote sensing techniques - study of air photos and satellite images - Interpretation for Civil Engineering

GEOLOGY FOR ENGINEERING PROJECTS: Geological Investigations - Geophysical Investigations - Remote Sensing-Techniques - Geological Considerations for Dam Reservoirs, Tunnels and Road-Cuts - Practice in Geology - Demonstration for Clinometer, Electrical Resistivity Meter, Geological Maps - Identification of Crystals, Minerals and Rocks

TEXT BOOKS:

1. Parbin Singh, “Engineering and General Geology ", Katson Publication House, 2009
2. P.C. Rao & D.B. Rao,”A Text Book Of Geology”,Discovery Publishing House, 2010

REFERENCES:

1. Legeet, " Geology and Engineering ", McGraw Hill Book Company, 1998.
2. Blyth, " Geology for Engineers ", ELBS, 1995.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Sekar	Asst. Professor	CIVIL	sekar.gis@gmail.com
2	S.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com

17CVEC02	IRRIGATION ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This subject deals with study of irrigations practices and methods adopted in our country. Also to know the irrigation water requirement in order to design the structures like dams, weirs and canals.

PREREQUISITE

Environmental engineering

COURSE OBJECTIVES

1	To understand the need and mode of irrigation.
2	To know the irrigation management practices of the past, present and future.
3	To understand about the Water distribution efficiency and optimization techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Describe the importance of National Water Policy.	Understand
Co2. Determine the storage capacity of reservoir for a given demand.	Understand
Co3. Explain the different types and methods of irrigation practices	Apply
Co4. Compute the design parameters of canal	Apply
Co5. Discuss the various concepts of irrigation water management and softwares	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO11.	L	-	-	L	-	L	-	L	-	L	-	-	L	L	-
CO12.	S	M	S	L	-	-	-	-	-	-	-	M	L	-	-
CO13.	S	S	S	L	-	-	M	-	-	S	-	-	-	-	M
CO14.	S	S	S	L	-	-	-	-	-	-	-	-	M	-	-
CO15.	L	-	-	-	L	-	-	-	S	-	M	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

SOIL – PLANT WATER RELATIONSHIP : Definition – Need – Benefits- developments – Historical - Scope in the country and state. Soil – Water relationship - Wilting point – Soil fertility- Principal crops – Crop rotation – Crops and cropping season.

CROP WATER REQUIREMENTS: Duty and Delta – Definitions – Factors affecting Duty – Methods of Improving Duty, Consumptive use of water (Evapo – Transpiration) – Estimation of Evapo – Transpiration – Blaney and Criddle Method – Penman Methods – Lysimeter.

SOURCES, CONVEYANCE AND DISTRIBUTION OF WATER : Sources of Water – Rivers – Streams – Reservoirs and Tanks. Lift irrigation – Devices and equipment for Lift irrigation. Components of irrigation networks – Main and Branch canal – Distributors – Minors – Water courses and field chak. Water application methods – Surface irrigation – Border – Check and Furrow – Subsurface irrigation – Sprinkler and Drip irrigation.

CONTROL AND REGULAR WORKS: Canal regulation works – Necessity and location of falls – Head and cross

regulator – Canal escapes. Cross drainage works – Types of cross drainage work. River training works – Classification of River training works – Groynes or Spurs – Bank protection.

IRRIGATION WATER MANAGEMENT: Irrigation Efficiencies – Water conveyance efficiency – Water application efficiency – Water storage efficiency – Water distribution efficiency. Need for optimization – Need for interdisciplinary and participation approach. Roles and responsibilities of farmer"s and government agencies in Turn Over.

TEXT BOOKS:

1. Garg, S.K., "Irrigation Engineering and Hydraulic Structures",Khanna Publishers,2009.
2. Sharma R.K., Irrigation Engineering and Hydraulic Structures, Oxford and IBH Publishing Company, New Delhi, 1994.

REFERENCES:

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd.
2. Sathyanarayana Murthy, Irrigation Design and Drawing, Published by Mrs.L.Banumathi,Tuni,East Godavari District, A.P. 1998.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	R.SATHIYARAJ	Asst. Professor	CIVIL	sathiyaraj.r.25@gmail.com
2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC03	GEOGRAPHICAL INFORMATION SYSTEM	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Geographical Information System is the application of the geologic sciences to engineering practice for the purpose of assuring that the geologic factors affecting the engineering works are recognized and adequately provided for. Engineering geologic studies may be performed during the planning and design. A civil engineer should be able to understand an engineering geologic report, and incorporate adequate measures into the design of engineering works.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To provide exposure to applications of GIS in various application domains through case studies
2	Students will learn about the use of zone mapping for water bodies .
3	Students will learn about the use of mapping techniques for Agriculture and Earth sciences
4	Students will also learn about the recent techniques used for GPS system
5	The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides and literate the rural people

COURSE OUTCOMES

On the successful completion of the course, students will be able to

(CO1) Acquire the knowledge of the topographical formation, interior earth, gradational activities and GIS Technique and data INPUT	Understand
(CO2)) Understand the importance of advanced techniques involved in data Analysis and modelling	Understand
(CO3) Study the importance of Data Output And Error Analysis.	Analyse
(CO4) Understand the importance of Natural Resources And Wasteland Management using GIS	Understand
(CO5) Analysis of RS and GIS data and interpreting the data for modeling applications	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	S	S	M	S	M	M	S	S	S	L	L	-
CO2.	S	M	M	L	L	M	M	L	L	L	L	M	L	S	-
CO3.	S	S	S	S	L	L	M	L	L	L	L	L	-	-	M
CO4.	S	S	S	M	M	S	S	L	L	L	M	M	M	M	-
CO5.	S	S	S	S	S	S	S	S	S	S	S	S	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

GIS TECHNIQUE AND DATA INPUT: MAP – Types of Maps – Development of GIS – Components of GIS – Hardware, software, organisation – Types of data – Spatial and non-spatial data – Print, Line and Polygon – Vector and Raster data – Database structures – Files – Vector and Raster data structures.

DATA ANALYSIS AND MODELLING: Data Retrieval – Query – Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Modelling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS.

DATA OUTPUT AND ERROR ANALYSIS: Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photo write Devices – Sources of Errors – Types of Errors – Elimination – Accuracies.

GIS APPLICATIONS IN RESOURCE MANAGEMENT: Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Wasteland Management - Social Resources - Cadastral Records – LIS

ADVANCED GIS APPLICATION: AM/FM – Utility Network Management – Integration with Remote Sensing – Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Model.

TEXT BOOKS:

1. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000
2. Michael N Demers, Fundamentals of Geographical Information Systems, Second Edition, John Wiley Publications, 2002

REFERENCES:

1. Paul A Longley, Michael F Goodchild etal, Geographical Information Systems Volume I and II, Second Edition, John Wiley Publications, 1999

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2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC04	REPAIR AND REHABLITATION OF STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To impart knowledge on understanding the properties of concrete, causes of its failure, effects and measures to repair and rehabilitate it

PREREQUISITE

Construction techniques equipments and practices

COURSE OBJECTIVES

1	To know about the various construction techniques, practices
2	To know about the equipment needed for different types of construction activities.
3	To understand about the various construction procedures for sub to super structure
4	To know about the various types of structures from foundation to super structure.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Explain the factors affecting the durability of concrete structures	Understand
Co2. Identify the causes and effects of distress in concrete structures	Understand
Co3Diagnose distress in concrete structures and suggest suitable maintenance and repair strategies	Apply
Co4. Enumerate the concept of quality assurance in structures, basic mechanisms by which quality assurance schemes are developed and operated with case studies	Apply
Co5. Suggest suitable materials of repair related to the distress with case studies	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	-	L	-	L	-	-	-	-	L	-	M	-	-	L	-
CO2.	M	M	L	M	-	L	M	S	-	-	M	-	-	M	S
CO3.	S	S	S	M	M	-	L	-	M	-	S	S	M	L	-
CO4.	L	M	M	M	-	L	L	-	-	-	S	-	-	L	M
CO5.	L	M	M	M	-	S	M	L	M	M	M	-	L	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

CONCRETE TECHNOLOGY: Cements – Grade of cements - concrete chemicals and Applications – Grade of concrete - manufacturing of concrete – Batching – mixing – transporting – placing – compaction of concrete – curing and finishing - Testing of fresh and hardened concrete – quality of concrete – Extreme Weather Concreting - Ready Mix Concrete.

CONSTRUCTION PRACTICES: Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.

SUB STRUCTURE CONSTRUCTION : Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

SUPER STRUCTURE CONSTRUCTION: Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks.

CONSTRUCTION EQUIPMENT: Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling

TEXT BOOKS:

1) Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
2) Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
3) Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, New Delhi, 2008.

REFERENCES:

1) Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2)Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

COURSE DESIGNERS

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2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC05	TRAFFIC ENGINEERING MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Students will acquire comprehensive knowledge of traffic surveys and studies such as volume count, Speed and delay, origin and destination, Parking, pedestrian and accident surveys. They will achieve knowledge on design of at-grade and grade separated intersections. Students will become familiar with various traffic control and traffic management measures.

PREREQUISITE

Railway, airort and harbour engineering

COURSE OBJECTIVES

1	To achieve knowledge on design of „at grade" and „grade separated" intersections.
2	To become familiar with various traffic control and traffic management measures
3	To give an overview of Traffic engineering
4	To know about the Various surveys to be conducted, traffic regulation, management and traffic safety

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Explain road user and vehicular characteristics	Understand
Co2. Bring out speed and volume studies and their relationships	Understand
Co3.Enumerate the various road safety requirements	Understand
Co4. Design geometrics of intersections	Apply
Co5. Design the signal phasing and design a rotary	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	L	S	M	S	M	M	S	S	S	L	L	-
CO2.	S	L	-	-	L	M	M	L	M	L	M	M	M	L	M
CO3.	S	S	S	S	L	L	S	L	L	M	L	L	-	-	M

CO4.	**L**	**L**	**L**	**L**	**M**	**L**	**S**	**L**	**M**	**L**	**M**	**M**	**M**	**M**	**L**
CO5.	**S**	**S**	**M**	**-**	**S**	**S**	**L**	**S**	**S**	**S**	**S**	**S**	**L**	**-**	**-**

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics**.**

TRAFFIC SURVEYS AND ANALYSIS : Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems.

TRAFFIC CONTROL : Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design.

GEOMETRIC DESIGN OF INTERSECTIONS: Conflicts at Intersections, Classification of Intersections at Grade, - Chanallised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Chanallisation and Rotary design (Problems), Grade Separators

TRAFFIC MANAGEMENT: Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

TEXT BOOKS:

1. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications,Delhi, 2000.
2.Khanna Kand Justo CEG,Highway Engineering, Khanna Publishers,Roorkee,2001.

REFERENCES:

1.Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2.Guidelines of Ministry of Road Transport and Highways, Government of India.

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2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC06	HYDROLOGY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

It is the science that deals with the waters of the earth, their occurrence, circulation, distribution and their reaction with environment including their relation to living things.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	The mechanics of rainfall, its spatial and temporal measurement and their applications will be understood.
2	The mechanics of rainfall, its distribution and measurement of rainfall using Hydrograph.
3	Analysis of Simple statistical and application of probability
4	Student will also learn simple methods of flood routing and ground water hydrology.
5	Distribution of rainfall and run off shall also be understood.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain the importance of Hydrological cycle and the measurement and analysis of rainfall data	Understand
CO2. Compute the quantity of runoff generated from a catchment	Apply
CO3.Develop hydrographs to measure the stream flow	Apply
CO4. Estimate floods and propose suitable control measures	Apply
CO5. Suggest methods of conserving surface and groundwater storage	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	M	-	-	-	L	S	L	-	-	-	M	L	L	-
CO2	S	M	L	L	-	-	S	-	-	-	-	M	L	L	-
CO3	S	M	L	L	-	-	M	-	-	-	-	L	L	L	-
CO4	S	M	-	L	-	-	S	-	-	-	-	L	L	L	-
CO5	L	-	L	-	-	L	M	L	L	L	-	L	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

PRECIPITATION: Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

ABSTRACTION FROM PRECIPITATION: Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

HYDROGRAPHS: Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

FLOODS AND FLOOD ROUTING: Flood frequency studies – Recurrence interval – Gumbel‟s method – Flood routing – Reservoir flood routing – Muskingum‟s Channel Routing – Flood control

GROUND WATER HYDROLOGY: Types of aquifers – Darcy‟s law – Dupuit‟s assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady

flow analysis only.

TEXT BOOKS:

4. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000
5. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2000

REFERENCES:

4. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000
5. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd.,
6. Raghunath,H.M,Ground Water,New Age International(P) Limited,Publishers.
7. Raghunath,H.M, Hydrology:Principles,Analysis & Design, New Age International(P) Limited,Publishers.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC07	DISASTER MITIGATION AND MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course deals with the various disasters and to expose the students about the measures, its effect against built structures, and Hazard Assessment procedure in India. This course also deals with the methods of mitigating various hazards such that their impact on communities is reduced.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Understand basic concepts in Disaster Management
2	To Understand Definitions and Terminologies used in Disaster Management
3	To Understand the Challenges posed by Disasters
4	To understand Impacts of Disasters

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the various types of disaster viz Hydrological, Coastal and Marine Disasters, Atmospheric Disasters, Geological, Mass Movement and Land Disasters, Wind and Water Driven Disasters.	Understand
CO2. Identify the potential deficiencies of existing buildings for Earthquake disaster and suggest suitable remedial measures.	Understand
CO3.Derive the guide lines for the precautionary measures and rehabilitation measures for Earthquake disaster.	Apply
CO4. Derive the protection measures against floods, cyclone, land slides	Apply
CO5. Understand the effects of disasters on built structures in India	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	L	-	-	-	-	-	-	-	-	L	-	-
CO2	M	M	L	L	-	M	-	-	-	-	-	-	L	-	-
CO3	S	M	S	M	-	L	-	M	-	-	-	-	M	L	-
CO4	S	M	S	-	L	-	-	-	-	-	-	-	M	L	-
CO5	L	L	-	L	-	-	-	-	-	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Concept of disaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events (Global, national and regional); Natural and man-made hazards

RISK ASSESSMENT AND VULNERABILITY ANALYSIS: Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment ;Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

DISASTER MANAGEMENT MECHANISM: Concepts of risk management and crisis management ; Disaster

management cycle ;Response and Recovery ; Development, Prevention, Mitigation and Preparedness; Planning for relief

DISASTER RESPONSE: Mass media and disaster management; Disaster Response Plan; Communication, Participation, and Activation of Emergency Preparedness Plan; Logistics Management; Psychological Response; Trauma and Stress Management; Rumour and Panic Management ;Minimum Standards of Relief; Managing Relief; Funding.

DISASTER MANAGEMENT IN INDIA: Strategies for disaster management planning; Steps for formulating a disaster risk reduction plan; Disaster management Act and Policy in India; Organisational structure for disaster management in India; Preparation of state and district disaster management plans.

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W. N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner‟s Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S. C. Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.
4. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.
5. Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. National Policy on Disaster Management, NDMA, New Delhi, 2009.
7. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.

COURSE DESIGNERS

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2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC08	REMOTE SENSING TECHNIQUES AND APPLICATIONS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Remote sensing is the science and art of obtaining information about an object, area or phenomenon, by the use of either recording or real time sensing devices that are not in physical contact with the object. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. These GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. Remote sensing and GPS data are further used in numerous applications, including GIS data collection, surveying, and mapping.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Students will learn about the land use mapping techniques,site suitability techniques
2	Students will learn about the use of zone mapping for water bodies
3	Students will learn about the use of mapping techniques for Agriculture and Earth sciences
4	Students will also learn about the recent techniques used for GPS system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Recollect the fundamentals of physics of Remote sensing and concepts.	Remember
CO2. Outline the various data acquisition systems and collection methods for remote sensing data information and storage	Understand
CO3.Apply knowledge of satellites on various Civil Engineering applications.	Apply
CO4. Utilize the various data input methods for mapping	Apply
CO5. Creation of data models using remote sensing techniques and GPS	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	S	-	-	-	-	-	-	-	-	-	-	-	L	-	-
CO4	S	L	-	-	L	-	-	-	L	L	L	-	L	L	-
CO5	S	L	-	-	L	-	-	-	L	L	L	-	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Definition – Physics of remote sensing – electromagnetic radiation (EMR) – remote sensing windows – interaction of EMR with atmosphere, earth surface, soils, water and vegetation – platform and sensors – image interpretations.

LAND USE STUDIES: Definition of land use – land use / land cover classification – schemes and levels of classification systems with RS data – land use mapping – change detection – urban land use planning, site suitability analysis, transportation planning.

WATER RESOURCES: Areal assessment of surface water bodies – Capacity survey of water bodies – mapping of snow-covered areas – flood risk zone mapping – identification of groundwater potential zones, recharge areas – droughts, definition, drought assessment and management.

AGRICULTURE, SOIL AND FORESTRY: Crop inventory mapping – production estimation – command area monitoring – soil mapping – crop stress detection - estimation of soil erosion – forest types and density mapping – forest fire risk zone mapping.

EARTH SCIENCE: Lithology – lithological mapping – structural mapping – Geomorphology – nature and type of landforms – identification – use of remote sensing data for landslides – targeting mineral resources – Engineering geology and Environmental geology.

TEXT BOOKS:

1. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman., Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (Asia) Pvt. Ltd., New Delhi, 2004
2. Lo. C.P.and A.K.W.Yeung, Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi, 2002

REFERENCES:

1. Chandra,A.M,Geo Informatics,New Age International(P) Limited,Publishers.
2. Fazal,Shahab,GIS Basics,New Age International(P) Limited,Publishers.
3. Space Applications Centre. Manual for Forest mapping and Damage detection using satellite data, Report No.IRS-UP/SAC/FMDD/TN/16/90,1990, pp-253.
4. Sabins, F.F.Jr. Remote sensing principles and interpretation, W.H.Freeman & Co., 1978.
5. Manual of Remote Sensing Vol. II. American Society of Photogrammetry

COURSE DESIGNERS

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1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC09	HOUSING PLANNING AND MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course work imparts knowledge required for understanding the general principles of building planning and services with the help of relevant codes, manuals and guidelines.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	An introduction to housing planning
2	Construction and financing of housing projects.
3	The course focuses on cost effective construction materials and methods.
4	Emphasis has also been given on the principles of sustainable housing policies and programmes.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply the general planning considerations and development control rules for different types of buildings.	Apply
CO2. Apply the principles of electrical and lighting services for different uses in buildings	Apply
CO3. Understand and apply the principles of plumbing services for domestic and industrial needs	Understand
CO4. Plan and design the requirements for HVAC systems, fire fighting and other necessary services for a various types buildings	Apply
CO5. Incorporate the integrated planning and designing of necessary building services for better usage of buildings	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	M	-	-	-
CO2	S	S	S	M	M	M	M	-	-	L	-	M	-	-	-
CO3	S	S	S	M	M	-	L	-	-	-	-	L	-	-	-
CO4	S	S	S	M	M	L	L	-	-	-	-	L	-	-	-
CO5	S	S	S	M	M	L	L	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO HOUSING: Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels.

HOUSING PROGRAMMES: Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

PLANNING AND DESIGN OF HOUSING PROJECTS: Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS:

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

HOUSING FINANCE AND PROJECT APPRAISAL: Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems)

TEXT BOOKS:

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House,Bombay, 1997.

REFERENCES:

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. Dhir,B.M,Construction Planning And Management , New Age International(P)Limited,Publishers.
3. Lal,A.K,Hand Book Of Low Cost Housing, New Age International(P)Limited,Publishers.
4. Panchdhari,A.C,Water Supply & Sanitary Installations,New Age International(P)Limited,Publishers.

COURSE DESIGNERS

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2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC10	MANAGEMENT OF IRRIGATION SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This subject deals with study of irrigations practices and methods adopted in our country. Also to know the irrigation water requirement in order to design the structures like dams, weirs and canals.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	He/she shall also be able to appreciate the importance due and duly given to stake holders.
2	The structural and non structural activities for the management of water resources
3	The management plans involved in scheduling
4	Case studies on use of ground water will be taught

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe the importance of National Water Policy.	Understand
CO2. Determine the storage capacity of reservoir for a given demand.	Understand
CO3. Explain the different types and methods of irrigation practices	Apply
CO4. Compute the design parameters of canal	Apply
CO5. Discuss the various concepts of irrigation water management and softwares	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	-	-	L	-	L	-	L	-	-	-	-	L	L	-
CO2	S	M	S	L	-	-	-	-	-	-	-	-	L	-	-
CO3	S	S	S	L	-	-	-	-	-	-	-	-	-	-	-
CO4	S	S	S	L	-	-	-	-	-	-	-	-	M	-	-
CO5	L	-	-	-	L	-	-	-	-	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

IRRIGATION SYSTEM REQUIREMENTS: Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

IRRIGATION SCHEDULING: Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

MANAGEMENT: Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

OPERATION: Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

INVOLVEMENT OF STAKE HOLDERS: Farmer‟s participation in System operation – Water user‟s associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TEXT BOOKS:

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES:

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC11	GROUND IMPROVEMENT TECHNIQUES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course deals with the different ground improvement methods adopted for improving the properties of remolded and in-situ soils by adopting different techniques such as in- situ densification, consolidation and dewatering methods. This course enables the students to understand how reinforced earth walls can obviate the problems associated with conventional retaining walls. Also the students would be exposed to the concepts of grouting, soil stabilization and the use of geo textiles to improve the engineering performance of soils.

PREREQUISITE

Mechanics of soils

COURSE OBJECTIVES

1	Further he/she is in a position to decide various ways and means of improving the soil and implementing techniques of improvement.
2	About the drainage and dewatering techniques available
3	About the various treatments available for soil
4	About the reinforcement and grout techniques
5	Further he/she is in a position to decide various ways of ground improvements.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Enumerate the role of ground improvement and select appropriate ground improvement technique for the given subsoil condition.	Apply
CO2. Suggest appropriate dewatering technique for lowering the ground water table	Apply
CO3. Recommend suitable techniques for densifyingcohesionless soil deposit	Apply
CO4. Suggest appropriate techniques for consolidating cohesive deposits	Apply
CO5. Perform simple design of reinforced earth walls and illustrate the role of geo-textile in ground improvement	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	---	---	L	---	L	---	---	---	---	S	M	L
CO2	S	M	L	---	L	M	---	L	---	L	L	---	S	M	L
CO3	S	M	L	---	L	M	---	L	---	L	---	---	S	M	L
CO4	S	M	M	---	L	---	---	L	---	L	---	L	S	M	M
CO5	S	M	M	---	---	---	---	M	---	M	L	---	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

DRAINAGE AND DEWATERING: Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS: Insitu densification of cohesionless

and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniquesonly - relative merits of various methods and their limitations.

EARTH REINFORCEMENT: Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

GROUT TECHNIQUES: Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TEXT BOOKS:

1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGrawHill, 1994.
2. Purushothama Raj, P. "Ground Improvement Techniques", Laxmi Publications,New Delhi, 2005

REFERENCES:

1. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.
2. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
3. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002.

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2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC12	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The aim of the course is to assess the dynamic properties of soil. To decide various ways and means of improving the soil and implementing techniques of improvement. The drainage and dewatering techniques available in field.

PREREQUISITE

Mechanics of soils

COURSE OBJECTIVES

1	Also about the various design parameters required for the design of machine foundation
2	About the different vibratory systems available for designing
3	About the dynamic properties of soil
4	About the various isolation techniques available
5	Design of foundation for various reciprocating machines

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Determine the Permeability of Cohesive and Cohesion less soils	Apply
CO2. Estimate consolidation parameters and compute consolidation	Apply
CO3. Perform simple design of reinforced earth walls and illustrate the role of geo-textile in ground improvement	Apply
CO4. Calculate the lateral earth pressure also check the stability of retaining walls.	Apply
CO5. Perform simple design of reinforced earth walls and illustrate the role of geo-textile in ground improvement	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	---	---	L	---	L	---	---	---	---	S	M	L
CO2	S	M	L	---	L	M	---	L	---	L	L	---	S	M	L
CO3	S	M	L	---	L	M	---	L	---	L	---	---	S	M	L
CO4	S	M	M	---	L	---	---	L	---	L	---	L	S	M	M
CO5	S	M	M	---	---	---	---	M	---	M	L	---	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

WAVES AND WAVE PROPAGATION: Wave propagation in an elastic homogeneous isotropic medium-Raleigh, shear and compression waves-waves in elastic half space

DYNAMIC PROPERTIES OF SOILS: Elastic properties of soils-coefficient of elastic, uniform and non- uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions

DESIGN PROCEDURES: Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

VIBRATION ISOLATION: Vibration isolation technique-mechanical isolation-foundation isolation-isolation

by location-isolation by barriers- active passive isolation tests.

TEXT BOOKS:

1. Kameswara Rao, "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998
2. IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill, 1996.

REFERENCES:

1. Kameswara Rao, "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi,2003
2. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 1999

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2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17CVEC13	ELECTRONIC SURVEYING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The aim of the course is to understand the working of EDM equipment and solve the surveying problems with EDM equipment

PREREQUISITE

Surveying I

COURSE OBJECTIVES

1	The student will posses knowledge about Electronic surveying
2	About the propagation of electromagnetic waves and its main principles
3	Various implementations of surveying
4	The student will Study about different EDM instruments and Total Station.
5	Methods of measuring distance, historical development

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO6. Compute the linear measurement in chain surveying and angular measurements in compass surveying.	Apply
CO7. Demonstrate the significance of plane table surveying in preparation of plans	Understand
CO8. Find the relative position of points on the ground using levelling principles	Apply
CO9. Find the distance and heights of objects using tacheometric principle	Apply
CO10. Explain the importance of advanced techniques involved in surveying.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**S**	**M**	**L**	---	---	**L**	---	**L**	---	---	---	---	-	-	-
CO2	**S**	**M**	**L**	---	**L**	**M**	---	**L**	---	**L**	**L**	---	-	-	-
CO3	**S**	**M**	**L**	---	**L**	**M**	---	**L**	---	**L**	---	---	-	-	-
CO4	**S**	**M**	**M**	---	**L**	---	---	**L**	---	**L**	---	**L**	-	-	-
CO5	**S**	**M**	**M**	---	---	---	---	**M**	---	**M**	**L**	---	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS : Methods of measuring distance, historical development, basic principles of EDM, classifications, applications and comparison with conventional surveying

BASIC ELETRONICS : Fundamentals of electronics, resonant circuits, semiconductors, Lasers, Cathode ray tube, photo multiplier tube, transducers, oscillators, frequency mixing, modulation and demodulation, Kerrcell modulator, measurement of phase difference, reflectors and power sources.

PROPAGATION OF ELECTROMAGNETIC WAVES : Definition, classification, applications, propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting, computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions, reference refractive index, first velocity correction, computation of refractive index for microwaves, measurement of atmospheric parameters, mean refractive index, real time application of first

velocity correction, second velocity correction and total atmospheric correction

ELECTROMAGNETIC DISTANCE MEASURING SYSTEM : Electro-optical system, measuring principle, working principle, sources of error, infrared EDM instruments, Laser EDM instruments and total station. Microwave system, measuring principle, working principle, sources of error, microwave EDM instruments, comparison with Electrooptical system, care and maintenance of EDM instruments, Modern Positioning Systems. EDM traversing, trilateration and base line measurement using EDM.

FIELD STUDIES : Study of different EDM instruments and Total Station. EDM traversing, trilateration and base line measurement using EDM.

TEXT BOOKS:

1. Satheesh Gopi,K.Sathikumar,"Advanced Surveying"Dorling Publication,2008

2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.

REFERENCE BOOKS:

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983..Soastamoinen, J.J.

2.Surveyor"s guide to electro-magnetic Distance Measurement,Adam Hilger Ltd., 1967.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC14	AIR POLLUTION MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The course work offers the basic knowledge on various sources of air pollutants and their possible effects on local, regional and global environment. It provides various techniques for sampling and analyzing he pollutants. Also, it deals with the principles and design of control of particulate/gaseous air pollutants and its emerging trends to fulfil the legal aspects of air pollution to have a sustainable environment for future generation. In addition.

PREREQUISITE

Environmental engineering

COURSE OBJECTIVES

1	About noise pollution and the methods of controlling the same.
2	The student is expected to know about source inventory and control mechanism.
3	To impart knowledge on the sources, effects
4	The control techniques of air pollutants and noise pollution
5	The sources, characteristics and effects of air

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Identify the sources of air pollution, impacts of air pollutants and their measurements	Apply
Co2. identify the significance of meteorological factors in pollutants dispersion and to predict the pollutant concentration	Understand
Co3. Suggest preventive and control measures for air pollution.	Apply
Co4. Suggest locations for industries and appropriate city planning tips for the effective air pollution management of a city	Apply
CO5. The course work offers the basic knowledge on various sources of air pollutants and their possible effects on local, regional and global environment.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**S**	**M**	**L**	**L**	**---**	**L**	**---**	**L**	**---**	**---**	**---**	**---**	-	-	-
CO2	**S**	**M**	**L**	**L**	**L**	**M**	**---**	**L**	**---**	**L**	**L**	**---**	-	-	-
CO3	**S**	**M**	**L**	**L**	**L**	**M**	**---**	**L**	**---**	**L**	**---**	**---**	-	-	-
CO4	**S**	**M**	**M**	**S**	**L**	**---**	**---**	**L**	**---**	**L**	**---**	**L**	-	-	-
CO5	**S**	**M**	**M**	**S**	**---**	**---**	**---**	**M**	**---**	**M**	**L**	**---**	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

SOURCES AND EFFECTS OF AIR POLLUTANTS : Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

DISPERSION OF POLLUTANTS : Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

AIR POLLUTION CONTROL : Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

AIR QUALITY MANAGEMENT : Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

NOISE POLLUTION: Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

TEXT BOOKS:

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996

REFERENCE BOOKS:

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997
2.Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company,New Delhi, 1991.

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2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC15	BRIDGE STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley, or road, for the purpose of providing passage over the obstacle. There are many different designs that each serve a particular purpose and apply to different situations. Designs of bridges vary depending on the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it. This course offers the design of bridges such as RCC bridges, design principles of steel and prestressed concrete bridges, design principles of substructure and design of different types of bearings as per IRC loadings standards, Indian Railway standards bridge rules and MOST codes. It aims at determination of safe as well as economical section using different kinds of material used in construction and maintenance

PREREQUISITE

Design of steel structures

COURSE OBJECTIVES

1	To impart exposure on various aspects of structural design
2	Compare the behavior of bridge structures with that of the normal reinforced concrete structures.
3	Understand the performance of composite members.
4	Finally to learn the design of bridge structures.
5	Common types of steel and concrete bridges

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Identify the type of bridge and its basic requirements for particular location	Understand
Co2. Design the culverts and deck slab bridges	Create
Co3. Design the long span bridges	apply
Co4. Demonstrate the design principles of steel bridges	apply
CO5. Design the bridge bearings and piers	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**L**	**S**	**S**	**S**	**---**	**L**	**S**	**L**	**---**	**---**	**---**	**---**	-	-	-
CO2	**S**	**S**	**S**	**S**	**L**	**M**	**S**	**L**	**---**	**L**	**L**	**---**	-	-	-
CO3	**S**	**S**	**S**	**S**	**L**	**M**	**S**	**L**	**---**	**L**	**---**	**---**	-	-	-
CO4	**S**	**S**	**S**	**S**	**L**	**---**	**S**	**L**	**---**	**L**	**---**	**L**	-	-	-
CO5	**S**	**S**	**S**	**S**	**---**	**---**	**S**	**M**	**---**	**M**	**L**	**---**	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

STEEL BRIDGES : Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

REINFORCED CONCRETE SLAB BRIDGES : Design of solid slab bridges for IRC loading - Design of kerb

- Design of tee beam bridges - Design of panel and cantilever for IRC loading

REINFORCED CONCRETE GIRDERS BRIDGES : Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

PRESTRESSED CONCRETE BRIDGES : Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

TEXT BOOKS:

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co. New Delhi, 2007
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 2008

REFERENCE BOOKS:

1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC16	TALL BUILDINGS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The aim of the course is to understand the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure).

PREREQUISITE

Design of Steel structures

COURSE OBJECTIVES

1	He should know the rudimentary principles of designing tall buildings as per the existing course.
2	To provide an insight to the design of tall buildings.
3	To enlighten the students on modern techniques available for the analysis of tall buildings

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Understanding on the behaviour of tall buildings subjected to lateral building.	Understand
Co2. The students should have knowledge about the designing tall buildings	apply
Co3. Rudimentary principles of designing tall buildings as per the existing codes.	apply
Co4. Analysis of Bearing Wall Buildings ,The Cross Wall Structure	apply
CO5. Explain the importance of High-Rise Suspension Systems ,Pneumatic High - Rise Buildings	apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**S**	**M**	**L**	**M**	**---**	**L**	**M**	**L**	**S**	**---**	**---**	**---**	-	-	-
CO2	**S**	**M**	**L**	**M**	**L**	**M**	**M**	**L**	**S**	**L**	**L**	**---**	-	-	-
CO3	**S**	**M**	**L**	**S**	**L**	**M**	**M**	**L**	**---**	**L**	**---**	**---**	-	-	-
CO4	**S**	**M**	**M**	**S**	**L**	**---**	**M**	**L**	**S**	**M**	**---**	**L**	-	-	-
CO5	**S**	**M**	**M**	**M**	**---**	**---**	**M**	**M**	**---**	**M**	**L**	**---**	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Waterand Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

THE VERTICAL STRUCTURE PLANE: Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD : The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures -

Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS : Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

OTHER HIGH-RISE BUILDING STRUCTURE: Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

TEXT BOOKS:

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons.
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991

REFERENCE BOOKS:

1. Coull, A. and Smith, Stafford, B. " Tall Buildings ", Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers", John Wiley, 1994.
3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Taranath.B.S., Structural Analysis and Design of Tall Buildings, Mc Graw Hill 1998.

COURSE DESIGNERS

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2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC17	STRUCTURAL DYNAMICS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to understand how to arrive the dynamic forces and structures

PREREQUISITE

Structural analysis

COURSE OBJECTIVES

1	To learn how to idealise the structure into systems of reduced number of degrees of freedom
2	To learn about the discritization of various structures
3	To understand about the seismic design of various structures
4	They also be able to interpret the results.
5	To learn how to idealise analyse these systems for the forces.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. general theory of vibration and solve problems of single degree of freedom (SDOF) systems	Understand
Co2. solve dynamic problems in multi-degree of freedom (MDOF) systems	apply
Co3. To introduce dynamic analysis of continuous systems	apply
Co4. To apply structural dynamic principles to the analysis of structures for seismic and wind loading	apply
CO5. To introduce blast loading	apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	---	---	L	---	L	---	---	---	---	-	-	-
CO2	S	M	L	---	L	M	---	L	---	L	L	---	-	-	-
CO3	S	M	L	---	L	M	---	L	---	L	---	---	-	-	-
CO4	S	M	M	---	L	---	---	L	---	L	---	L	-	-	-
CO5	S	M	M	---	---	---	---	M	---	M	L	---	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF DYNAMICS : Difference between static loading and dynamic loading – Nature of dynamic loads – Wind, Earthquake and Impact Loads – Damping – Viscous and structural damping – single degree of freedom (SDOF) Systems – Formulation of equation of motion – Newton‟s Law and D‟Alembert‟sprinciples – Examples of SDOF modeling.

SINGLE DEGREE FREEDOM SYSTEMS : Free vibration response of SDOF system – Response of undamped and damped SDOF system to harmonic excitation – characteristic of resonance – Response to impulse and an arbitrary forcing function – Duhamel Integral formulation.

MULTIDEGREE OF FREEDOM SYSTEMS : MDOF systems – examples – Lumped parameter model – Formulation of equation of motion – Free vibration of MDOF systems as Eigen value problem – concept of mode shapes and natural frequencies – 2 DOF example – orthogonal properties of normal modes.

SUPERPOSITION PRINCIPLES: Harmonic excitation of 2 DOF system – Principle of mode superposition (principle only) for dynamic analysis – vibration isolation – vibration measuring instruments.

DESIGN FOR WIND AND EARTHQUAKE: Effect of wind and earthquake on structures – Principles of aseismic design – Methods of Vibration control – codal provisions for design for wind and earthquake (explanation of
Provisions only – no design)

TEXT BOOKS:

1. Mario Paz," Structural Dynamics Theory and Computation", Van Nostrand Reinhold, 2004
2. Anil K.Chopra, "Dynamics of Structures Theory and Applications to Earthquake Engineering" Pearson Education., 2003.

REFERENCE BOOKS:

1. Clough R.W. and Penzien, J., Dynamics of Structures, McGraw-Hill, 1990
2. Craig R.R. Jr., Structural Dynamics – An Introduction to Computer Methods, John Wiley and Sons, 1981

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC18	WIND ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The course includes studies of sustainable development and energy sources. Basic mathematical and physical concepts will be covered. An introduction to prerequisites for wind power development including how a wind turbine works, planning for wind energy, environmental impact, location and economic aspects will be given. The phases of wind power projects is studied. Oral and written presentations in a scientific context will be discussed and practiced in the course. A site study visit to an operating wind farm is included.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To learn about the forces generated on structures due to normal wind as well as gusts.
2	To analyses the dynamic effects produced due to chimney,tower and silos
3	To understand about the seismic design of various structures
4	To analyses the application in design and its implementations
5	To learn about the forces generated on structures due to normal wind as well as gusts.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. give an account of and analyse energy sources and their sustainability	Understand
Co2. identify and explain a wind power project's phases	apply
Co3. identify and evaluate factors affecting wind energy development	apply
Co4. analyse the siting conditions for wind power development	apply
CO5. clearly present an individual or group assignment within wind power in oral or written form	apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**L**	**S**	**S**	**S**	**---**	**L**	**S**	**L**	**---**	**---**	**L**	**---**	-	-	-
CO2	**L**	**S**	**S**	**S**	**L**	**M**	**S**	**L**	**---**	**L**	**L**	**---**	-	-	-
CO3	**S**	**S**	**S**	**S**	**L**	**M**	**L**	**L**	**---**	**L**	**---**	**---**	-	-	-
CO4	**L**	**S**	**L**	**S**	**L**	**---**	**S**	**L**	**---**	**L**	**---**	**L**	-	-	-
CO5	**S**	**S**	**S**	**S**	**---**	**---**	**S**	**M**	**---**	**L**	**L**	**---**	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

EFFECT OF WIND ON STRUCTURES : Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only)..

EFFECT ON TYPICAL STRUCTURES : Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges

APPLICATION TO DESIGN : Design forces on multistorey building, towers and roof trusses.

INTRODUCTION TO WIND TUNNEL: Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TEXT BOOKS:

1. Peter Sachs, "Wind Forces in Engineering, Pergamon Press, New York, 1992.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

REFERENCE BOOKS:

1. Devenport A.G., "Wind Loads on Structures", Division of Building Research, Ottowa, 1990.
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 1995

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2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC19	COMPUTER AIDED DESIGN OF STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to train the studentS to design and analysis a structure by using computers.

PREREQUISITE

Design of reinforced concrete

COURSE OBJECTIVES

1	To creating a computer code as well as using commercially
2	To know about the available software for the design of Civil Engineering structures.
3	To understand about the structural analysis involved with the help of finite element techniques
4	To design and optimization involved in steel and RCC structures

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learn the design optimization of structures	apply
Co2. Adopt these methods in the field	Analyze
Co3. Develop drafting skills in drawing plan, section and elevation of residential buildings using AutoCAD	Analyze
Co4.Develop drafting skills in drawing plan, section and elevation of public buildings using AutoCAD software	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	M	M	---	---	-	-	-
CO2	S	S	---	L	S	M	---	M	M	M	---	---	-	-	-
CO3	S	S	---	L	S	M	---	M	M	M	---	---	-	-	-
CO4	S	S	---	L	S	M	---	M	M	M	---	---	-	-	-
CO5	S	S	---	L	S	M	---	M	M	M	---	---	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

COMPUTER GRAPHICS : Graphic primitives - Transformations -Wire frame modeling and solid modeling - Graphic standards –Drafting packages

STRUCTURAL ANALYSIS : Fundamentals of finite element analysis - Principles of structural analysis - Analysis packages and applications.

DESIGN AND OPTIMISATION: Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

EXPERT SYSTEMS : Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

TEXT BOOKS:

1. Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Ltd, New Delhi, 2000

2. Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House,New Delhi, 2006

REFERENCE BOOKS:

1. Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford, 1990.

2. Rao S.S., "Optimisation Theory and Applications", Wiley Eastern Limited, New Delhi, 1977.

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2	B.Subha	Asst. Professor	CIVIL	subhajaya85@gmail.com

17CVEC20	INDUSTRIAL STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to know about the special aspects with respect to Civil Engineering structures in industries.

PREREQUISITE

Design of steel structures

COURSE OBJECTIVES

1	To know about the functional requirements involved in the design
2	To know about the design of RCC structures.
3	To understand about the design of Steel structures.
4	To design and optimization involved in prefabricated structures.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1. Data required to design industrial structures	Understand
CO 2. Data required to design RCC structure	Understand
CO 3. Designing industrial structures	Apply
CO 4. Designing RCC structure	Apply
CO 5. Principles of prefabrication	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO2	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO4	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO5	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING: Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

FUNCTIONAL REQUIREMENTS: Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act

DESIGN OF STEEL STRUCTURES: Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos**.**

DESIGN OF R.C. STRUCTURES: Silos and bunkers – Chimneys – Principles of folded plates and shell roofs.

PREFABRICATION: Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TEXT BOOKS:

1.N. Subramanian,"Design of Steel Structures: Theory and Practice,Oxford University Press, Incorporated, Mar-2011

2.P.C.Varghese,"Advanced Reinforced Concrete structures", PHI Learning Pvt. Ltd., 09-Jan-2009

REFERENCES:

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995

2.Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of IndianStandards, New Delhi 1990

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	P.Sankar	Asst. Professor	CIVIL	sankarp35vidhu@gmail.com
2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC21	SMART STRUCTURES AND SMART MATERIALS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is designed to give an insight into the latest developments regarding smart materials and their use in structures

PREREQUISITE

Smart materials.

COURSE OBJECTIVES

1	To know about the measuring techniques for various materials
2	To know about the concepts of sensors for various materials
3	To understand about the concepts of signal processing and control systems for various materials
4	To deals with structures which can self adjust their stiffness with load.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1 Measuring techniques for various materials	Understand
CO 2 Concepts of sensors for various materials	Understand
CO 3 The concepts of signal processing and control systems for various materials	Analyze
CO 4 Using structures which can self adjust their stiffness with load	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO2	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---
CO4	S	S	---	L	S	M	---	M	M	M	---	---	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors

MEASURING TECHNIQUES: Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

SENSORS : Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement

ACTUATORS: Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive

Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials..

SIGNAL PROCESSING AND CONTROL SYSTEMS: Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

TEXT BOOKS:

Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

REFERENCES:

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.
2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC22	FINITE ELEMENT TECHNIQUES	Category	L	T	P	Credit
		EC	2	1	0	3

PREAMBLE

The purpose of the course is to understand &analyses linear elastic structures, that has been studied about in core courses, using finite element method.

PREREQUISITE

Structural analysis

COURSE OBJECTIVES

1	To analyze linear elastic structures that he has studied about in core courses using finite element method.
2	To know about the concepts of finite element analysis of one dimensional problems
3	To understand about the concepts of finite element analysis of two dimensional problems
4	To deals with finite element analysis of isoparametric problems and its applications with software packages

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1. Analyzing with the use of FE Method	Analyze
CO 2. Analysis of one dimensional problems with the use of FE Method	Analyze
CO 3. Analysis of two dimensional problems with the use of FE Method	Analyze
CO 4. Analyzing structure with the use of software	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M		M	-	M	---	M	---	---	---
CO2	S	S	---	L	S	M		-	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M		M	--	M	---	---	---	---	---
CO4	S	S	---	L	S	M		M	-	M	---	---	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION – VARIATIONAL FORMULATION: General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS : One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time

dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics

FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS : Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

ISOPARAMETRIC ELEMENTS AND FORMULATION: Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration

APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS : Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow

TEXT BOOKS:

1 . Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", Third Edition, Prentice Hall, India, 2003

2. S.S.Rao, "The Finite Element Method in Engineering", Pergaman Press, 2003.

REFERENCES:

1. J.N.Reddy, "An Introduction to Finite Element Method", McGraw-Hill, Intl. Student Edition,1985.

2. Zienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1, 4/e, McGraw-Hill, Book Co.

COURSE DESIGNERS

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC23	DESIGN OF PLATE AND SHELL STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to understand the rudimentary principles involved in the analysis.

PREREQUISITE

Design of steel structures

COURSE OBJECTIVES

1	To design of rectangular plates.
2	To know about the design of thin shells
3	To analysis of shells
4	To deals with the design of folded plates

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Designing of rectangular plates	Analyze
CO2. Designing of thin shells	Analyze
CO3. Analysis of shells	Analyze
CO4. Designing of folded plates	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M		M	-	M	---	M	---	---	---
CO2	S	S	---	L	S	M		-	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M		M	--	M	---	---	---	---	---
CO4	S	S	---	L	S	M		M	-	M	---	---	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

THIN PLATES WITH SMALL DEFLECTION: Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions

RECTANGULAR PLATES: Simply supported rectangular plates – Navier‟s solution and Levy‟s method.

THIN SHELLS : Classification of shells-structural actions – membrane theory.

ANALYSIS OF SHELLS: Analysis of spherical dome – cylindrical shells – folded plates

DESIGN OF SHELLS : Design of spherical dome – cylindrical shells – folded plates

TEXT BOOKS:

1. G.S. Ramaswamy, Design and Construction of Shell Structures, CBS Publishers, New Delhi, 1996

2. S. Timoshenko & S. Woinowsky – Krieger, “Theory of Plates and Shells”, McGraw Hill Book Company,2010

REFERENCES:

Theory and analysis of plates, Rudolph szilard, Prentice Hall Inc, 1995

COURSE DESIGNERS

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC24	GROUND WATER ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to understand the ground improvement techniques and quality of ground water.

PREREQUISITE

Environmental engineering

COURSE OBJECTIVES

1	To know the types of aquifers
2	To understand the surface and subsurface investigation in detail
3	To integrate the fundamental and basic knowledge of ground water movement
4	To introduce the different model studies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyzing the types of aquifers	Analyze
CO2. Analysis of the surface and subsurface investigation in detail	Analyze
CO3. Analysis of ground water movement	Analyze
CO4. Analyzing different model studies	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	---	M	---	M	---	---	---
CO2	S	S	---	L	S	M	---	-	---	M	---	---	---	---	---
CO3	S	S	---	L	S	M	---	M	---	M	---	---	---	---	---
CO4	S	S	---	L	S	M	---	M	---	M	---	---	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

HYDROGEOLOGICAL PARAMETERS: Introduction - Water bearing Properties of Rock - Properties of aquifer - Transmissivity and storage coefficient - Problems in Specific yield - specific capacity -Darcy‟s law and permeability - Methods of Estimation - Ground water table fluctuation and its interpretations - Type of aquifers - Groundwater development and Potential in India - groundwater legislation, GEC norms.

EVALUATION OF AQUIFER PROPERTIES: Darcy‟s equation - governing equation of ground water flow - steady and unsteady flow equations for confined and unconfined aquifer - water table aquifer - Dupit Forchheimer assumption - one dimensional flow - well hydraulics - hydro geological boundaries - concept of image - image well - well theory - interference of wells - partial penetration of well

GROUNDWATER HYDRAULICS AND EXPLORATION: Geological methods - Geophysical - electrical resistivity - seismic refraction - water wells classification - drilling of deep wells - well design, construction and maintenance - well development. Pumping test analysis - well characteristics - draw down test - Tracer tests.

GROUNDWATER QUALITY AND MOVEMENT: Ground water chemistry - Origin, movement and quality -

Water quality standards - Remediation of saline intrusion - Remediation schemes - Artificial recharge techniques - Ground water Pollution and legislation

GROUNDWATER MANAGEMENT: Need for management model - database for groundwater management - protection zone delineation groundwater balance. Introduction to groundwater model - Types, model formulation, and boundary conditions - case study.

TEXT BOOKS:

1. Todd D. K.," Ground water hydrology", John Wiley & Sons, 3rd Edition , 2005

2. Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010. 3. Bouwer H., "Groundwater Hydrology", Tata Mc Graw Hill, Company Ltd, Indian Edition 1978

REFERENCES:

1. Health R. C. and Trainer F.W., "Introduction of Ground water Hydrology", John Wiley and sons, 1985

COURSE DESIGNERS

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC25	PRINCIPLES OF STRUCTURAL DYNAMICS AND SEISMIC DESIGN	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to impart the knowledge about the fundamentals definitions of earthquake, their responses to earthquake, and their application to the design of earthquake resistant structures.

PREREQUISITE

Foundation engineering

COURSE OBJECTIVES

1	To introduce dynamic loading and the dynamic performance of the structures to the students
2	To understand the different types of dynamic loading.
3	To know the performance of structures under earthquake loading.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyzing dynamic loading and the dynamic performance of the structures to the students	Analyze
CO2. Analysis different types of dynamic loading	Analyze
CO3. Analysis of the performance of structures under earthquake loading	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	---	M	---	M	---	---	---
CO2	S	S	---	L	S	M	---	---	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M	---	M	---	M	---	M	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

ELEMENTS OF SEISMOLOGY: Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration

RESPONSE OF STRUCTURES TO EARTHQUAKE: Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading – Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes

DESIGN METHODOLOGY : Causes of damage – Planning considerations / Architectural concepts – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Design and detailing as per IS: 13920 – 1993..

SEISMIC HAZARD ANALYSIS: Identification and Evaluation of Earthquake Sources – Geologic Evidence – Tectonic Evidence – Historical Seismicity – Instrumental Seismicity – Deterministic Seismic Hazard Analysis –

Probabilistic Seismic Hazard Analysis

SPECIAL PROBLEMS AND CASE STUDIES: Structural Configuration - Seismic performance - Irregular Buildings - Soil performance, Modern Concepts – Base Isolation - Adoptive system - Case studies

TEXT BOOKS:

1. Chopra, A.K., “Dynamics of Structures – Theory and Applications to Earthquake Engineering”, 4th Edition, Pearson Education, 2011.

2. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007

REFERENCES:

1. Biggs, J.M., “Introduction to Structural Dynamics”, McGraw Hill Book Co., New York, 1964

2. Dowrick, D.J., “Earthquake Resistant Design”, John Wiley & Sons, London, 2009

3. Paz, M. and Leigh.W. “Structural Dynamics – Theory & Computation”, 4th Edition, CBS Publishers & Distributors, Shahdara, Delhi, 2006.

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC26	CONTRACT LAWS AND REGULATIONS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To study the various types of construction contracts and their legal aspects and provisions. To study the of tenders, arbitration, legal requirement, and labour regulations.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To study the various types of construction contracts and their legal aspects and provisions.Policy
2	To study the of tenders, arbitration, legal requirement, and labour regulations.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To know about the construction contracts	Apply
CO2 . To Study about the tender documents.	Apply
CO3. To Know about the rules of evidence of contract.	Apply
CO4. To Study the planning about legeal requirements.	Apply
CO5. To Understand about the labour requirements	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

CONSTRUCTION CONTRACTS: Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability –Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

TENDERS: Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

ARBITRATION : Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

LEGAL REQUIREMENTS: Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and

Rural Land –Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law– Local Government Laws for Approval – Statutory Regulations

LABOUR REGULATION: Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes,Labour Administration – Insurance and Safety Regulations – Workmen‟s Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws.

TEXT BOOKS:

1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India,

2. Jimmie Hinze, Construction Contracts, McGraw Hill, 2001.

3. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, McGraw Hill, 2000.

REFERENCES:

1. Kwaku, A., Tenah, P.E. Jose M.Guevara, P.E., Fundamentals of Construction Management and Organisation, Printice Hall, 1985.M.M.Tripathi Private Ltd., Bombay,1982.

2. Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 2006.

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC27	TRANSPORT ECONOMICS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to creates awareness among the engineering students about transport economics.

PREREQUISITE

Highway engineering

COURSE OBJECTIVES

1	To know the effects of human activities &modern technology on transport
2	To understand the pricing of transport services
3	To know the performance of transport financing.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyzing the effects of human activities &modern technology on transport	Analyze
CO2. Analysis of the pricing of transport services	Analyze
CO3. Analysis of the performance of transport financing	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	---	L	S	M	---	M	---	M	---	M	---	---	---
CO2	S	S	---	L	S	M	---	---	M	M	---	---	---	---	---
CO3	S	S	---	L	S	M	---	M	--	M	---	M	---	---	---

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Introduction to Transportation Economics - Purpose and major considerations in Transport economics Transportation Demand and Supply - Transport Costing: Types of cost and their behavior: direct and indirect; fixed and variable, Treatment of assets and capital depreciation - infrastructure, vehicle/carrying unit and others, Transport costs: Internal and External

PRICING OF TRANSPORT SERVICES: Vehicle operations cost - running cost - pollution cost - value of travel time - road damage cost - congestion cost - accident cost.

ECONOMIC EVALUATION : Economic Evaluation of Highway schemes - Need and Methods of Economic Evaluation - Economic Analysis economic evaluation, economic studies -Transportation plans - Benefit cost method, Net present value method, and internal rate of return method and comparison of various methods.

TRANSPORT FINANCING: Revenue Sources, Expenditure Sources, Traditional Project Delivery Methods , Innovative Financing , Credit financing, Private financing, BOT, BOOT, dedicated road funds, road pricing, tolls, Private provisions, advantages & limitations - Methods for raising funds for maintenance, improvement and expansion of transportation networks: Taxation and user fee, Financing through loans, bonds, PPPs and concessions.

TRANSPORT ECONOMICS: Transport Coordination policies - Objectives and method to achieve coordination

among different modes and between private and public undertakings - Case Studies

TEXT BOOKS:

1. Kadiyali L.R, “Traffic Engineering and Transport Planning”, 6th Edition, Khanna Technical Publications, 2005.

2. Patrick Mccarthy, Transportation Economics, Blackwell Publishing, 2000.

REFERENCES:

1. Wohl and Martin, “Traffic System Analysis for Engineering and Planners”, Tata McGraw Hill, 1983.

2. Emile Quinet and Roger Vickerman, Principles of Transportation Economics, Edward Elgar Publishing, 2004

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2	Sathiyaraj R	Asst. Professor	CIVIL	sathiyaraj@vmkvec.edu.in

17CVEC28	MASS TRANSPORT MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of the course is to develop and systematize the basic concepts and technical aspects of mass transport management.

PREREQUISITE

Highway Engineering

COURSE OBJECTIVES

1	To know the different Mass Transportation Systems
2	To understand the Provisions of Transport Facilities
3	To know the Evaluation of Mass transport system.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. This course will have an indepth knowledge in Traffic Engineering , Transport Planning	Apply
Co2. Transport Planning, Highway Design and Construction,	Apply
Co3. Sustainable Urban and Transport Development and will be efficient enough to take up projects in the field.	Apply
Co4. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings	Apply
CO5. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	-	M	-	-	-	-	M	-
CO2.	S	M	L	S	S	-	M	-	-	-	-	L	-	-	-
CO3.	S	M	M	S	-	-	-	M	-	-	-	-	L	M	-
CO4.	S	M	M	M	M	-	-	-	-	M	-	-	-	-	-
CO5.	S	M	M	-	-	M	-	-	-	-	L	-	S	-	L

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: History and Role of Transit - Recent Trends in Mass Transportation Characteristics - Different Mass Transportation Systems - Demand Characteristics - Spatial, Temporal and Behavioral Characteristics of Transportation Demand - Structures of Urban Areas - Provisions of Transport Facilities - Basic Management Issues Ridership prediction and routing.

FARE STRUCTURE: Methods of Financing - Budgeting and Recounting - Fare Structures - Replacement Programs - Fare Collected System – Incentives.

SCHEDULING: Preparation of Schedules and Duty Roasters - Earning of Occupancy - Cost of operation - Capital Cost Accident cost.

TERMINAL: Utility Designs - Fleet Location and Maintenance - Depot Localities - Bus Terminals - Case studies

EVALUATION: Evaluation of Mass transport system - BRTS, MRTS, LRTS, Metro rail and Mono rail.

TEXT BOOKS:

1. Hutchinson, Urban Transport Planning, John Wiley, 2006

2. Hay, W.W., An Introduction to Transportation Engineering, 2nd Ed., John Wiley & Sons, 2001

REFERENCES:

1. Agarwal M.K., "Urban Transportation in India", INAE, Allied Publishers Ltd., 1996.

2. Vuchic V.R., "Urban Public Transportation System and Technology", Prentice Hall, Inc. Englewood Cliffs, 1991.

3. Stubbs P.C et al, "Transport Economics", George Allen and Ubwin, Boston, 1984. 6. Stephen Gelaster, "Fundmental of Transport Economics", Basil Black Well, Oxford, 1981

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC29	WATER RESOURCES SYSTEMS ANALYSIS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Focusing on conflict resolution, Water Resources Systems Analysis discusses systematic approaches to the mathematical modeling of various water resources issues, which helps decision-makers allocate water effectively and efficiently. Readers will gain an understanding of simulation, optimization, multi-criterion-decision-making, as well as engineering economics.

PREREQUISITE

Environmental Engineering

COURSE OBJECTIVES

1	The student is exposed to different phases in Water Resources Management and National Water Policy
2	To Learn about knowledge on Reservoir planning
3	To learn about management and economic analysis including Irrigation .
4	To Learn about Irrigation management practices.
5	To understand the concepts of radioisotope and nuclear imaging.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. An ability to apply knowledge of mathematics, science, and engineering to solve real world problems.	Analyse
Co2. An ability to design and conduct experiments, as well as to analyze, interprets and validate.	Analyze
Co3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.	Apply
Co4. An ability to function on multi-disciplinary teams.	Apply
CO5. An ability to use the techniques, skills, and modern engineering tools to real engineering problems.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	-	-	-	-	-	-	-	-
CO2.	S	M	L	S	S	M	-	-	-	-	-	-	M	-	-
CO3.	S	M	M	S	-	-	L	M	M	-	-	-	-	L	L
CO4.	S	M	M	M	-	-	-	-	-	L	M	-	-	-	-
CO5.	S	M	M	-	-	-	-	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

WATER RESOURCES: Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Estimation of water requirements for irrigation and drinking- Single and multipurpose reservoir – Multi objective – Fixation of Storage capacity -Strategies for reservoir operation – Design flood-levees and flood walls.

WATER RESOURCE MANAGEMENT: Economics of water resources planning – National Water Policy –

Consumptive and non consumptive water use – Water quality – Scope and aims of master plan – Concept of basin as a unit for development – Water budget - Conjunctive use of surface and ground water.

IRRIGATION ENGINEERING: Need – Merits and Demerits – Duty, Delta and Base period – Irrigation efficiencies – Crops and Seasons – Crop water Requirement – Estimation of Consumptive use of water.

CANAL IRRIGATION: Types of Impounding structures: Gravity dam – Diversion Head works – Canal drop – Cross drainage works – Canal regulations – Canal outlets – Canal lining – Kennady‟s and Lacey‟s Regime theory.

IRRIGATION METHODS AND MANAGEMENT: Lift irrigation – Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation – Merits and demerits – Irrigation scheduling – Water distribution – Participatory irrigation management with a case study.

TEXT BOOKS:

1. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000.

2. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009

3. Garg S. K., “Irrigation Engineering and Hydraulic structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

REFERENCES:

1. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New AgeInternational Publishers, 2005

2.Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw- Hill Inc., New Delhi, 1997

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC30	ARCHITECTURE	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The Bachelor of Architecture degree programme prepares students for professional practice in the field of Architecture. Being an undergraduate programme, it has bright scope, providing exposure to a variety of interests in this field and assisting students to discover their own directions for future development.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Learn about architectural design
2	To know about survey
3	To Learn about basic Design & Principle
4	To know about Building Rules
5	To learn about Landscape concept.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Ability to gain knowledge of Humanities, Sciences and Architecture.	Apply
Co2 . Ability to understand elements of Architecture and apply basic principles in Architectural Design.	Apply
Co3. Ability to identify social, economical and cultural issues in Architectural Design.	Apply
Co4. Ability to analyze and apply theoretical knowledge to achieve Architectural Design solutions.	Apply
CO5. Ability to understand ethical and professional responsibilities.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	M	-	-	-	-	L	-	-
CO2.	S	M	L	S	-	M	-	-	-	-	M	-	-	-	-
CO3.	S	M	M	S	-	-	M	-	-	-	-	-	-	M	-
CO4.	S	M	M	M	-	-	-	-	S	-	-	-	-	-	S
CO5.	S	M	M	-	M	-	-	-	-	L	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

ARCHITECTURAL DESIGN: Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

SITE PLANNING: Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

BUILDING TYPES: Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations

CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN: Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept.

IRRIGATION METHODS AND MANAGEMENT: Planning – Definition, concepts and processes- Urban planning standards and zoning regulations - Urban renewal – Conservation – Principles of Landscape design.

TEXT BOOKS:

1. Pramar. V.S. "Design fundamental in Architecture", Somaiya Publications Pvt. Ltd., New Delhi, 1997.

2. Muthu Shoba Mohan.G.,"Principles of Architecture"., Oxford University Press., New Delhi, 2006.

REFERENCES:

1. Rangwala. S.C. "Town Planning" Charotar Publishing House., Anand, 2005.

2. De Chiara.J., Michael. J. Crosbie.,"Time Saver Standards for Building Types", McGraw Hill

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC31	PAVEMENT ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Transportation is necessary for a nation‟s growth and development. In fact, it has consumed a considerable portion of human race‟s time and resources for as long as it has existed. Several factors should be taken into account in a pavement design, for example the traffic flow, the asphalt mixtures materials and also the environmental factor.

PREREQUISITE

Highway Engineering

COURSE OBJECTIVES

1	To know about Pavement design.
2	To develop skills in conducting analysis of pavements by calculating the response due to vehicular loading
3	To perform design of rigid and flexible pavements based on traffic and environmental factors
4	To develop skills in engineering economics (especially life-cycle cost calculations for alternative designs)
5	To develop basic understanding of the principles of pavement management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. The students will have the opportunity to develop several designs of pavement structures throughout the semester.	Analyse
Co2 . Students will analyze traffic and geotechnical data from real-life projects and theoretical examples	Apply
Co3. The students will also gain experience in calculating pavement response using state-of-the-art mechanistic software. Students will also use technology to present their semester design projects.	Apply
Co4. The students are required to complete a semester design problem and present their findings to the instructor and other students.	Apply
CO5. The students are tasked with developing pavement designs and then selecting the optimum design based on several factors, including life-cycle cost analysis.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	M	-	-	-	-	M	-	-
CO2.	S	M	L	S	-	M	-	-	-	-	M	-	-	-	-
CO3.	S	M	M	S	-	-	M	-	-	-	-	-	M	S	-
CO4.	S	M	M	M	-	-	-	-	S	-	-	-	-	-	L
CO5.	S	M	M	-	M	-	-	-	-	M	-	L	-	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM: Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

DESIGN OF FLEXIBLE PAVEMENTS: Flexible pavement design factors influencing design of flexible pavement, Empirical – Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

DESIGN OF RIGID PAVEMENT: Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

PERFORMANCE EVALUATION AND MAINTENANCE: Pavement Evaluation - causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index. - Pavement maintenance (IRC Recommendations only).

STABILIZATION OF PAVEMENTS: Stabilisation with special reference book to highway pavements – Choice of stabilizers –Testing and field control Stabilisation for rural roads in India – use of Geo synthetics in roads.

TEXT BOOKS:

1. Wright P.H. ”Highway Engineers”, John Wiley and Sons, Inc., New York, 1996.

2. Khanna, S.K., Justo C.E.G. and Veeraragavan. A., “Highway Engineering”, Nem Chand and Brothers, 10th Edition, Roorkee, 2014.

REFERENCES:

1. Wright P.H. ”Highway Engineers”, John Wiley and Sons, Inc., New York, 1996.

2. Khanna, S.K., Justo C.E.G. and Veeraragavan. A., “Highway Engineering”, Nem Chand and Brothers, 10th Edition, Roorkee, 2014.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVEC32	STORAGE STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the student to basic theory and concepts of design of storage structures like steel and concrete tanks, bunkers and silos.

PREREQUISITE

Design of Reinforced Concrete elements

COURSE OBJECTIVES

1	To introduce the student to basic theory and concepts of design of storage structures.
2	To know about Design Concepts of Steel and concrete tanks.
3	To Know about Design Concepts of Bunker and Silos

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. At the end of the course the student shall be able to design concrete and steel material storage structures.	Analyse
Co2 . To Know about Design Procedure as per IRC guide lines	Apply
Co3. To know about scope of concrete road construction in india.	Apply
Co4. To Study about Pavement Maintenance	Apply
CO5. To get the knowledge about the Geo synthetics in roads	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	M	-	-	-	-	M	-	-
CO2.	S	M	L	S	-	M	-	-	-	-	M	-	-	-	-
CO3.	S	M	M	S	-	-	S	-	-	-	-	-	M	L	-
CO4.	S	M	M	M	-	-	-	-	S	-	-	-	-	-	L
CO5.	S	M	M	-	M	-	-	-	-	L	-	L	-	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

STEEL WATER TANKS: Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

CONCRETE WATER TANKS: Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome –Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

STEEL BUNKERS AND SILOS: Design of square bunker – Jansen‟s and Airy‟s theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder –

stiffeners.

CONCRETE BUNKERS AND SILOS: Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction

PRESTRESSED CONCRETE WATER TANKS: Principles of circular prestressing – Design of prestressed concrete circular water tanks

TEXT BOOKS:

1. Rajagopalan K., "Storage Structures", Tata McGraw Hill, New Delhi, 1998.

2. Krishna Raju N., "Advanced Reinforced Concrete Design", CBS Publishers and Distributors, New Delhi, 1998.

REFERENCES:

1. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.

2. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVEC33	EXPERIMENTAL ANALYSIS OF STRESS	Category	L	T	P	Credit
		EC	2	1	0	3

PREAMBLE

To make students aware of various measurement techniques and experimental planning and procedures adopted in laboratory

PREREQUISITE

Structural Analysis

COURSE OBJECTIVES

1	To know about Strain gauges. Electrical Strain gauges.
2	To know about Design Concepts of Photo Elasiticity, Model Analysis
3	To Know about Brittle Coatings

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. Students will be able to select the appropriate strain gauges for strain measurements and they have sufficient knowledge in model analysis and predict the behaviour of prototypes.	Analyse
Co2 . Students get knowledge about the photo elasiticity.	Apply
Co3. Ability to know about the model analysia	Apply
Co4. To take the proper measurements in stain gauge .	Apply
CO5. To know the details about the coating to protect from brittle.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	M	-	-	-	-	M	-	-
CO2.	S	M	L	S	-	M	-	-	-	-	M	-	-	-	-
CO3.	S	M	M	S	-	-	L	-	-	-	-	-	M	-	-
CO4.	S	M	M	M	-	-	-	-	S	-	-	-	-	-	M
CO5.	S	M	M	-	M	-	-	-	-	L	-	S	-	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

STRAIN GAUGES: Definition of Gauge length, sensitivity and range – Characteristics of an ideal strain gauge –Different types of mechanical strain gauges for use in metal and concrete specimens – Optical strain gauge – Acoustic strain gauge – Pneumatic strain gauge – Merits and demerits.

ELECTRICAL STRAIN GAUGES: Inductance, capacitance and piezo-electric gauges – Bonded and unbounded resistance gauges and their application in stress analysis – Fixing technique and measurement of strains Rosettes– Determination of principal strains using rosettes – Use of Murphy‟s construction for drawing circle of strains – Mohr‟s stress circle – Analytical solution.

PHOTO ELASTICITY: Principles – Maxwell‟s stress optic law – Plane and circularly polarised light and their use in photo elasticity – Polariscopes – Diffusion type, lense type and reflection type polariscopes –Isochromatics and Isoclinics – Model materials – Calibration methods for finding material fringevalue – Model fringe value – Examples of beam flexure and diametrically loaded circular plates.

MODEL ANALYSIS: Direct and indirect models – Laws of structural similitude – Choice of scales – Limitation of model

studies - Buckingham piktheorem – Dimensional analysis – Model materials – Begg‟s deformeter and its use in model analysis – Simple design of models for direct and indirect model analysis.

BRITTLE COATINGS: Historical review – Stress Coat – Ceramic coatings – Application – Moire fringe method of stress analysis.

TEXT BOOKS:

1. T.K.Roy, "Experimental Analysis of Stress and Strains", S.Chand and Company Ltd., New Delhi, 2000

2. Hetenyi. M., Hand Book of Experimental Stress Analysis, John Wiley and Sons Inc., New York, 1966

REFERENCES:

1. J.W.Dally and W.F.Riley, "Experimental Stress Analysis", McGraw Hill Book, New York, 1990.

2. L.S. Srinath, "Experimental Stress Analysis", Tata-McGraw Hill Book Company, New Delhi, 2001.

3. Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, New Delhi, 2004.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVEC34	SHORING, SCAFFOLDING AND FORM WORK	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Formwork function Supporting Structure, Scaffolding function for working plate forms arrangement,Shoring function for supporting method for unsafe structure.

PREREQUISITE

Construction materials

COURSE OBJECTIVES

1	To study and understand the overall and detailed planning of formwork, plant and site
2	To understand the Design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels
3	To know the latest methods of form construction.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. To Study the materials associated with formwork	Apply
Co2 . To Study the design aspects of formwork under various requirements.	Apply
Co3. To Know the design of forms and shores	Apply
Co4. To Study the planning and erection aspects of form work for buildings	Apply
CO5. To Understand few other special types of forms.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	-	-	-	-	-	-	-	-
CO2.	S	M	L	S	S	M	-	-	-	-	-	-	M	-	-
CO3.	S	M	M	S	-	-	L	M	M	-	-	-	-	L	L
CO4.	S	M	M	M	-	-	-	-	-	L	M	-	-	-	-
CO5.	S	M	M	-	-	-	-	-	-	-	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING, SITE EQUIPMENT & PLANT FOR FORM WORK: Introduction - Forms for foundations, columns, beams walls etc., General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples. Overall Planning - Detailed planning - Standard units - Corner units - Pass units - Calculation of labour constants - Formwork hours - Labour Requirement - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan.

MATERIALS ACCESSORIES PROPRIETARY PRODUCTS & PRESSURES: Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood - Types and grades - Jointing Boarding - Textured surfaces and strength - Reconstituted wood - Steel - Aluminum - Hardware and fasteners - Nails in Plywood - Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.

DESIGN OF FORMS AND SHORES: Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Examples in each.

Simple wood stresses - Slenderness ratio - Allowable load vs length behaviour of wood shores - Form lining Design Tables for Wall formwork - Slab Formwork - Column Formwork - Slab props - Stacking Towers - Free standing and restrained - Rosett Shoring - Shoring Tower - Heavy Duty props.

BUILDING AND ERECTING THE FORM WORK: Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Sky deck and Multiflex - Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence - Cycling with lifting fork - Moving with table trolley and table prop. Various causes of failures - ACI - Design deficiencies - Permitted and gradual irregularities.

FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS: Hemispherical, Parabolic, Translational shells - Typical barrel vaults Folded plate roof details - Forms for Thin Shell roof slabs design considerations - Building the forms - Placing concrete - Form removed -Strength requirements -Tunnel forming components - Curb forms invert forms - Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method - Pressures on tunnels - Continuous Advancing Slope method - Form construction - Shafts. Slip Forms.

TEXT BOOKS:

1. Austin, C.K., Formwork for Concrete, Cleaver -Hume Press Ltd., London, 1996.

2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996

REFERENCES:

1. Austin, C.K., Formwork for Concrete, Cleaver -Hume Press Ltd., London, 1996.

2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996

3. Michael P. Hurst, Construction Press, London and New York, 2003. 4. Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVEC35	MUNICIPAL SOLID AND WASTE MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Structure is an arrangement and organization of interrelated elements in a material object or system, or the object or system so organized. Material structures include man-made objects such as buildings and machines and natural objects such as biological organisms, minerals and chemicals.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	The on-site/off-site processing of the same and the disposal methods.
2	The student is expected to know about the various effects and disposal options for the municipal solid waste.
3	The collection and supply of water
4	The offsite processing involved in site

COURSE OUTCOMES

On the successful completion of the course, students will be able to

Co1. To know about the types of waste & Sources	Analyse
Co2 . To Study the on site Storage & Processing	Apply
Co3. To study about the collection & transfer the waste	Apply
Co4. To Study the process of off site processing	Apply
CO5. To know about the solid waste disposal	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	L	-	-	-	-	-	-	L	-	-	-	-	M
CO2.	S	M	L	S	S	S	-	-	-	-	-	-	L	-	-
CO3.	S	M	M	S	-	-	L	M	M	-	-	-	-	S	M
CO4.	S	M	M	M	-	-	-	-	-	L	M	-	-	-	-
CO5.	S	M	M	-	-	-	-	-	-	-	-	L	S	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

SOURCES AND TYPES OF MUNICIPAL SOLID WASTES: Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

ON-SITE STORAGE & PROCESSING: On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

COLLECTION AND TRANSFER: Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

OFF-SITE PROCESSING: Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

DISPOSAL: Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment.

TEXT BOOKS:

1. George Tchobanoglous et.al., "Integrated Solid Waste Management", McGraw-HillPublishers, 2002.

2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management",Springer, 1994.

REFERENCES:

1. R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes – problems and Solutions", Lewis Publishers, 1997.

2. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	M.Senthilkumar	Asst. Professor	CIVIL	senthilkumar@vmkvec.edu.in
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17CVEC36	WASTE WATER ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants..

PREREQUISITE

Environmental Engineering

COURSE OBJECTIVES

1	To Understand basic concepts in Transmission of water system
2	To Understand the process and Treatment of waste water.
3	To Understand the methods of Sewage Disposal
4	To understand the advances in sewage treatment

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. An ability to estimate sewage generation and design sewer system including sewage pumping stations	Understand
CO2. The required understanding on the characteristics and composition of sewage, self purification of streams	Understand
CO3. An ability to perform basic design of the unit operations and processes that are used in sewage treatment	Apply
CO4. Understand the standard methods for disposal of sewage.	Apply
CO5. Gain knowledge on sludge treatment and disposal.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	S	S	S	S	-	-	M	-	S	S	S	S
CO2	M	M	S	S	M	S	S	-	-	S	-	S	M	M	S
CO3	S	S	S	S	S	M	M	-	M	-	-	-	S	S	S
CO4	M	S	M	M	M	S	S	L	-	-	-	-	M	S	M
CO5	S	S	S	S	S	S	S	-	-	-	M	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

SEWERAGE SYSTEM: COLLECTION & TRANSMISSION

Sources of wastewater – Quantity of sanitary sewage – Estimation of storm runoff – Wastewater characteristics and significance – Effluent disposal standards – Design of sewers – Computer applications – Laying, jointing and testing of sewers – Sewer appurtenances – Pump selection – Drainage in buildings – Sanitary fixture and fittings –Systems of Sanitary plumbing – House Drainage – House Sewer connection.

SEWAGE TREATMENT – PRIMARY TREATMENT

Objectives – Unit Operations & Processes - Materials for sewers – Layout of wastewater Treatment Plant - Characteristics and composition of sewage – Principles, functions and design of screen, grit chambers and

primary sedimentation tanks.

SEWAGE TREATMENT – SECONDARY TREATMENT

Secondary Treatment – Activated Sludge Process and Trickling filter – Stabilisation Ponds and Septic tanks – Advances in Sewage Treatment

SEWAGE DISPOSAL

Methods – Dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system – Wastewater reclamation techniques.

SLUDGE TREATMENT AND DISPOSAL

Thickening – Sludge digestion – Biogas recovery – Design of Drying beds – Conditioning and Dewatering – Sludge disposal.

TEXT BOOKS:

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
2. Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.

REFERENCES:

1. Manual on Sewerage and Sewage Treatment Systems Part A,B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.
3. Syed R. Qasim "Wastewater Treatment Plants", CRC Press, Washington D.C.,2010
4. Gray N.F, "Water Technology", Elsevier India Pvt. Ltd., New Delhi, 2006.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	C.Kathirvel	Asst. Professor	CIVIL	geologykathir@gmail.com
2	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com

17BTEC02	OCEAN SCIENCE	Category	L	T	P	Credit
		EC - PS	3	0	0	3

PREAMBLE

Ocean science explains about the various aspects of marine ecosystem. It gives the basic knowledge about availability of the bio resources and its applications. It also deals with exploration of various culturing techniques offew marine organisms in the laboratory conditions. This study further facilitates the student to understand the economic importance of marine derived products.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To state the art of marine ecosystem and their properties
2	To describe the about biodiversity in marine environment and their resources
3	To perform various culture techniques of marine organisms
4	To develop drug from marine compounds and their economic Values
5	To assess the human impact on marine environment

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Recall the Marine ecosystem sources and their properties	Remember
CO2. Describe the biodiversity in marine environment	Understand
CO3. Demonstrate the different culture techniques of marine organisms	Analyse
CO4. Assess the developed drug	Analyse
CO5. Criticize the human impact on marine environment	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	L	M	-	-	-	-	L	-	-	-
CO2	M	L	-	M	S	L	-	-	-	-	-	-	-	-	-
CO3	S	-	L	M	L	-	M	-	-	-	-	M	-	-	-
CO4	S	M	M	L	L	-	L	-	-	-	L	L	-	-	-
CO5	S	S	S	M	L	L	S	-	-	-	-	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to Marine Environment

Stratification of coastal environment- Bathymetric map, Thermocline; components of marine ecosystem; Biotic and Abiotic and their interrelationships-Role in food chain, food web ;Trophic systems; Taxonomy of marine flora and fauna; Physico chemical properties of marine water

Biodiversity and Bioresources

Biodiversity of marine ecosystem – Phytoplankton; Algal bloom; Indicator organisms. Bio-geocycles; Bioresources and their economic importance; Adaptations of flora and fauna in marine & estuarine environment.

Culture Techniques

Culture Techniques of microalgae; seaweeds; tiger shrimp; lobsters; Common marine pathogens and symptoms; Transgenesis and cryopreservation

Economic Value

Economic importance of marine products; Economic value - corals, sponges, pearls, oysters, molluscs; Drug development from natural marine derived compounds

Impacts on Marine Environment

Human Impact on Marine Environment – Oil spill, Nuclear reactors, Thermal impact, Bio fouling; Heavy metal pollution.

REFERENCE BOOKS

1. 1. Milton Fingerman and RachakondaNagabhushanam, Recent Advances in Marine Biotechnology (Series) Biomaterials and Bioprocessing, Science Publishers 2009.
2. Proksch and Werner E.G.Muller, Frontiers in Marine Biotechnology. Horizon Bioscience, 2006

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. G. Karthiga Devi	Assistant Professor	**Biotechnology**	devigk19@gmail.com
2	Dr.S.Vinoth	Assistant Professor	**Biotechnology**	vinogenes@gmail.com

17BTEC26	ECO FRIENDLY MULTI STOREY BUILDING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The built environment is a major source of society‘s environmental impact, and is a major opportunity to find solutions. Recent attention to ‒green construction‖ emerges in many domains including energy systems, water use, construction processes, architectural design, site planning and brownfield development, At present, environmental issues can be considered in seemingly unlimited areas of the design and construction process.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To state about the infrastructure providing clean drinking water, clean air to breath and safe building to live in.
2	To explain the students about the threats due to pollution leading to sustainable infrastructure
3	To demonstrate the impact and aspects of green building and Architecture

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Underline the concepts related to pollution problem during construction.	Remember
CO2. Classify the design of system for comfortable living	Understand
CO3. Employ geochemical transport model to maintain the thermodynamics equilibrium and kinetic control.	Apply
CO4. Appraise the Construction of buildings for economically, environmentally and socially sustainable to future.	Analyse
CO5. Evaluate the resources and sustainability of construction and green buildings	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	S	M	S	-	L	L	M	M	L	-	-
CO2	S	M	L	M	-	-	-	-	-	-	L	-	-	L	-
CO3	S	M	M	M	-	-	-	-	L	L	L	M	M	-	-
CO4	S	M	M	M	-	-	-	-	M	L	-	L	S	M	M
CO5	S	M	L	L	-	-	-	-	-	-	-	S	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Concepts of Constructing Multi Storey Building

Study of water, soil, air and their related pollution problems in construction. Identification and development of

technical solution to solve / control problems- legislative, economic and social concern.

Concept of Human Habitat

Design of systems – Living area, ventilation, electrical circuits (less consumption) technologies and structures to suit the growing population for comfortable living.

Geochemical Aspects of Green Building

Geochemical transport model maintaining thermodynamics equilibrium and kinetic control-Hydrology transfer resources and impact of bioremediation, treatment plant design, problem solving techniques, civil and environmental application of engineering science and creative problems solving methods

Engineering Architecture

Impact of architecture, engineering and construction on individuals, communities and nation. Construction of buildings which are economically, environmentally and socially sustainable to future - knowledge, tools and materials that enhance the safety and cost effective

Resources and Sustainability

Environmental chemistry, advanced air and water treatment technologies durability of construction, green building (sustainable buildings). Resource efficient building from planning to design, construction, maintenance, renovation and demolition.

REFERENCE BOOKS

1. Adaptation and mitigation of climate change - Scientific Technical Analysis. Cambridge University Press, Cambridge, 2006
2. Arvind Krishnan et al. – Climate Responsive Architecture, Tata Mcgraw –Hill New Delhi 2001.
3. Sandra Mendler, William Odell, The Guide Book Of Sustainable Design, John Wiley & Sons, 2000.
4. Lawson.B , Bulding Materials, Energy And The Environment; Towards Ecologically Sustainable Development Raia, Act, 1996

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.S.Vinoth	Assistant Professor	Biotechnology	vinogenes@gmail.com
2	Dr. S. Chozhavendhan	Associate Professor	Biotechnology	scvibt@gmail.com

17BTEC27	RENEWABLE ENERGY AND CONSTRUCTION METHODS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Course provides an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To list out the explore society‘s present needs and future energy demands.
2	To explain conventional energy sources and systems, including fossil fuels and nuclear energy.
3	To perform on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.
4	To outline the energy conservation methods will be emphasized.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To state the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.	Remember
CO2. Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.	Understand
CO3. Illustrate and describe the primary renewable energy resources and technologies.	Apply
CO4. Illustrate the basic electrical concepts and system components.	Apply
CO5. Estimate the quantify energy demands and make comparisons among energy uses, resources, and technologies.	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PC07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	S	M	S	-	-	-	-	-	-	-	-
CO2	S	M	L	M	-	L	S	-	L	-	-	S	M	-	-
CO3	S	M	M	M	-	L	S	-	-	-	-	M	M	-	-
CO4	S	M	M	M	-	M	S	-	-	-	-	L	S	-	-
CO5	S	M	L	L	-	M	S	-	-	-	-	S	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Principles of Solar Radiation

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Solar Energy Collection Storage and Applications

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Wind Energy

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-mass

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

Ocean Energy and Direct Energy Conversion

OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics. Need for DEC, Carnot cycle, limitations, principles of DEC.

TEXT BOOKS

1. GD Rai- Non-Conventional Energy Sources, Khanna Publishers, 2004
2. Twidell&Wier Renewable Energy Resources – 3rd Edition –, CRC Pres, Taylor & Francis, 2015
3. D.O.hall and R.P. Overeed - Biomass Renegerable Energy – John Wiley and Sons, New york, 1987.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.S.Vinoth	Assistant Professor	Biotechnology	vinogenes@gmail.com
2	Dr. G. Karthiga Devi	Assistant Professor	Biotechnology	devigk19@gmail.com

17BTEC28	ENVIRONMENTAL FRIENDLY PRACTICES IN CIVIL ENGINEERING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course will make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To list out the students, who can work in a multi-disciplinary environment to anticipate and address evolving challenges of the 21st century.
2	To summarize the synthesize data with sound engineering principles, methodologies, and the latest technology into creative, sustainable, safe and economical engineering solutions to environmental engineering problems.
3	To classify the Characterize and mitigate natural and man-made hazards
4	To outline the fundamental knowledge of the inter-relationships between the built environment and natural systems.
5	To design the technological innovations needed to safeguard, improve, and economize infrastructure and society
6	To generate and apply high performance eco-friendly structural materials and systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Recall the function on multidisciplinary teams.	Remember
CO2. Exemplify to identify, formulate, and solve engineering problems.	Understand
CO3. Illustrate the professional and ethical responsibility. An ability to communicate effectively.	Apply
CO4. Categorize the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	Analyse
CO5. Measure the convert units of energy—to quantify energy demands and make comparisons among energy uses, resources, and technologies.	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	S	M	S	-	M	L	-	-	-	-	-
CO2	S	M	L	M	-	L	S	-	-	-	-	S	S	-	-
CO3	S	M	M	M	-	M	S	S	-	-	-	M	M	-	-
CO4	S	M	M	M	-	-	S	-	-	L	-	L	S	-	-

CO5	S	M	L	L	-	-	S	-	-	-	-	S	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Civil Engineering in Twenty First Century

Esstential skills and strategies- critical thinking, finance and economics, design skill, communication, law and ethics, heritage and future.

Environmental Impact Design (EID)

Definition, scope and strategies of EID, categorical types- Direct, indirect and cumulative and its impact. Focus on construction process, materialization and building efficiencies and its life cycle.

Geochemical Aspects of green building

Geochemical transport model maintaining thermodynamics equilibrium and kinetic control-Hydrology transfer resources and impact of bioremediation, treatment plant design, problem solving techniques, civil and environmental application of engineering science and creative problems solving methods

Environmental Geology

Introduction, definition, scope, geological factors- location, design, construction, operation and maintenance (residential, commercial and industrial development) stormwater drainage system, sewage treatment plant, geohazards.

Environmental Public Health Protection

Definition, discipline - epidemiology, toxicology, exposure science, environmental engineering, law. Environmental health profession.

TEXT BOOKS

1. Prof. D. Venkat Reddy, NIT-Karnataka, Engineering Geology, Vikas Publishers, 2010 ISBN 978-81259-19032

2. Novice, Robert (editor) (1999-03-29). "Overview of the environment and health in Europe in the 1990s" (PDF). World Health Organization.

3. Neil S. Grigg, P.E.D.WRE, Marvin E. Crisus, P.E.Darrell, G. Fontune, J.Siller. 2001. Civil Engineering practice in twenty first century. ASCE Press.

REFERENCE BOOK

1. Legget, Robert F., and Karrow, Paul F., 1983, Handbook of geology in civil engineering: McGraw-Hill Book Company, 1,340 pages, 50 chapters, five appendices, 771 illustrations. ISBN 0-07-037061-3
2. Price, David George, Engineering Geology: Principles and Practice, Springer, 2008 ISBN 3-540-29249-7

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Subbaiya	Associate Professor	Biotechnology	rsubbaiya80@gmail.com
2	Dr. G. Karthiga Devi	Assistant Professor	Biotechnology	devigk19@gmail.com

17BTEC25	BIOLOGY FOR NON BIOLOGISTS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The purpose of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To list out the students with the basic organization of organisms and subsequent building to a living being
2	To summarize about the machinery of the cell functions that is ultimately responsible for various daily activities.
3	To implement the knowledge about biological problems that requires engineering expertise to solve them.

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1: Recall the structure and cell theory of living organism.	Remember
CO2: Discuss about the biological diversity of life.	Understand
CO3: Classify the application of enzymes in industrial level.	Apply
CO4: Detect the uses of Bioremediation and Biosensors using molecular machines.	Analyse
CO5: Appraise in detail about the principles of cell signaling in nervous system and immune system.	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO	PO	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	M	-	-	-	-	-	-	L	M	M	-
CO2	S	M	M	M	S	L	L	-	L	L	-	L	S	S	-
CO3	-	M	M	M	L	M	L	-	L	S	L	S	L	M	L
CO4	S	S	S	M	M	S	S	L	S	M	-	S	S	S	L
CO5	S	M	M	M	-	-	-	-	-	L	L	L	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BIOLOGY – CELL AND CELL STRUCTURE AND FUNCTION:

Introduction, Scope, Disciplines of biology –An over View of plants, animal, Microorganism.

INTRODUTION TO BIOLOGY – BIO CHEMISTRY, ENZYME, INDUSTRIAL USE:

Prokaryotes – Eukaryotes, Cell, Cell structure, Organelles and their functions, Yeast, Bacteria –Friends and Foe.

FOOD DIET NUTRITION:

Major constituents of food – carbohydrate, protein, lipids, vitamins and minerals. Balanced diet-BI-Junk food, Fermented food, nutritional values.

ENVIRONMENT:

Clean environment-Reduce, Recycle and Reuse-Renewable energy-Waste management –water-waste water management – personal hygiene, Global Climatic Changes -Tsunami, global warming, storms, vardha,Okhi. Recycled products -Paper, No to plastic, go green.

HEALTH, IMMUNE SYSTEM AND MEDICINE:

Immunology- Blood Grouping – Antigen- Antibody. Antibiotics, Vaccines their significance. Diagnosis – Parameters in Urine and Blood. Instruments – ECG, ECHO, MRI, X-ray. Prophylaxis, Chemotherapy and Allergy.

TEXT BOOKS:

1. J.M.Berg, J.L.Tymosczko and L.Sryer. Biochemistry, W.H Freeman publication.
2. STUDENT COMPANION to accompany Biochemistry, Fifth Edition-Richard I. Gum port.
3. Frank H.Deis, Nancy Count Gerber, Roger E.Koeppe, 2 Molecular motors

REFERENCE BOOKS:

1. Albert‘s, 2003, Molecular Biology of the cell
2. Lodish, 2004, Molecular cell Biology

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Deepapriya	Assistant Professor	Biotechnology	deepapriya21@gmail.com
2	Dr. R. Subbaiya	Associate Professor	Biotechnology	rsubbaiya80@gmail.com

17CSEC06	CRYPTOGRAPHY AND NETWORK SECURITY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To understand the concepts in cryptography and network security and their applications in real time.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To understand the basic concepts in understanding cryptography and network security
2	To study various algorithms used in cryptography
3	To understand key exchange methods used
4	To study the applications of cryptography in authentication
5	To understand various security threats
6	To understand the basic concepts in understanding cryptography and network security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand basic concepts in cryptography and network security	Understand
CO2: Able to understand and apply cryptography methods	Apply
CO3: Able to apply techniques in information security	Apply
CO4: Able to understand and apply authentication concepts	Understand and Apply
CO5: Able to apply security and firewall concepts	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Security trends – Attacks and services – Classical crypto systems – Different types of ciphers – LFSR sequences – Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite fields – continued fractions

METHODS

Simple DES – Differential cryptanalysis – DES – Modes of operation – Triple DES –AES – RC4 – RSA – Attacks – Primality test – factoring

TECHNIQUES

Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange –ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks -MD5 – Digital signatures – RSA – ElGamal – DSA.

AUTHENTICATION

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP,S/MIME – IP security – Web Security – SSL, TLS, SET.

SECURITY AND FIREWALLS

System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.

TEXT BOOKS

1. Dr. S. Bose and Dr.P. Vijayakumar, ‑Cryptography and Network Security‖, First Edition, Pearson Education, 2016.
2. Wade Trappe, Lawrence C Washington, ‑Introduction to Cryptography with coding theory‖, 2nd ed, Pearson, 2007.
3. William Stallings, ―Cryptography and Network Security Principles and Practices‖, Pearson/PHI, 6th edition, 2013.

REFERENCE BOOK

1. W. Mao, ‑Modern Cryptography – Theory and Practice‖, Pearson Education, Second Edition, 2007.
2.Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition –Prentice Hall of India, 2006.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor	CSE	rjaichandran@avit.ac.in

17CSCC19	INTRERNET OF THINGS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To study and understand the technologies involved in Internet of Things (IoT) and apply them practically..

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To understand the basic concepts of IOT
2	To study the methodology of IOT
3	To Develop IOT applications using Raspberry PI
4	To Develop IOT applications using Arduino and Intel Edison
5	To apply cloud concepts in IOT

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand basics in IOT	Understand
CO2: Able to understand Methodology in IOT	Understand
CO3: Able to design IOT applications using Raspberry	Design
CO4: Able to design IOT applications using Aurdino and Intel Edison	Design
CO5: Able to apply Cloud computing in IOT	Apply
CO1: Able to understand basics in IOT	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M									L	L	-	-	-
CO2	M	M		L								L	-	-	-
CO3	M	M	L	L		M							-	-	-
CO4	M	S	L			L				L		M	-	-	-
CO5	M	L				M					M	L	-	-	-
CO6	M	M									L	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

IOT METHODOLOGY

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development

IOT WITH RASPBERRY

Basics of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services

IOT WITH AURDINO AND INTEL EDISON

Basics of Aurdino, Intel Edison with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

APPLICATIONS

Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, –Internet of Things – A hands-on approach‖, Universities Press, 2015.
2. Manoel Carlos Ramon, –Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers‖, Apress, 2014.

REFERENCE BOOKS:

1. Marco Schwartz, –Internet of Things with the Arduino Yun‖, Packt Publishing, 2014

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor	CSE	rjaichandran@avit.ac.in

17CSCC17	CYBER SECURITY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To understand the need for Cyber Security in real time and to study techniques involved in it

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To understand the fundamentals of Cyber Security
2	To study various attacking techniques
3	To apply exploitation in cyber space
4	To study about Malicious codes
5	Defending against cyber attacks

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to Understand basics in cyber security	Understand
CO2: Able to apply attackers techniques in real time	Apply
CO3: Able to apply exploitation in web applications	Apply
CO4: Able to understand and apply malicious in networks.	Understand and Apply
CO5: Able to apply defense and analysis techniques in real time	Apply
CO1: Able to Understand basics in cyber security	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles

ATTACKER TECHNIQUES
Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure

EXPLOITATION
Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

MALICIOUS CODE

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation

DEFENSE AND ANALYSIS TECHNIQUES

Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools

TEXT BOOKS:

1. James Graham, Richard Howard and Ryan Olson, ―Cyber Security Essentials‖, CRC Press, Taylor & Francis Group, 2011.
2. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, ―Cyber security: The Essential Body of Knowledge‖, Cengage Learning, 2012.

REFERENCE BOOKS:

1. Ali Jahangiri, ―Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts‖, 2009.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor	CSE	rjaichandran@avit.ac.in

17CSEC11	GREEN COMPUTING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To acquire knowledge to adopt green computing practices and To learn about energy saving practices.

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To acquire knowledge to adopt green computing practices
2	To minimize negative impacts on the environment.
3	To learn about energy saving practices and To understand the impact of e-waste and carbon waste .
4	To learn about green compliance. And implementation using IT.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To acquire knowledge to adopt green computing practices	Understand
CO2: To minimize negative impacts on the environment.	Apply
CO3: To learn about energy saving practices and To understand the impact of e-waste and carbon waste	Understand
CO4: To learn about green compliance. And implementation using IT.	Understand Apply
CO5: Able to apply defense and analysis techniques in real time	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M		S			M			S		L	L			
CO2	M	S	M		S					L		L			
CO3	M	M		M			M		L						
CO4	M	S						L		M		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS

Green IT Fundamentals: Business, IT, and the Environment – Benefits of a Green Data Centre - Green Computing: CarbonFoot Print, Scoop on Power–GreenITStrategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

GREEN ASSETS AND MODELING

Green Assets: Buildings, Data Centres, Networks, Devices, Computer and Earth Friendly peripherals, Greening Mobile devices – Green Business Process Management: Modelling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

GRID FRAMEWORK

Virtualizing of IT Systems – Role of Electric Utilities, Telecommuting, Teleconferencing and Teleporting – Materials Recycling – Best Ways for Green PC – Green Data Center – Green Grid Framework. Optimizing Computer Power Management, Seamless Sharing Across Systems. Collaborating and Cloud Computing, Virtual Presence.

GREEN COMPLIANCE

Socio-Cultural Aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, And Audits – Emergent Carbon Issues: Technologies and Future. Best Ways to Make Computer Greener.

GREEN INITIATIVES WITH IT and CASE STUDIES

Green Initiative Drivers and Benefits with IT - Resources and Offerings to Assist Green Initiatives. - Green Initiative Strategy with IT - Green Initiative Planning with IT - Green Initiative Implementation with IT - Green Initiative Assessment with IT. The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector

TEXT BOOKS:

1. Bhuvan Unhelkar, ―Green IT Strategies and Applications-Using Environmental Intelligence‖, CRC Press, June 2011

2. Carl Speshocky, ―Empowering Green Initiatives with IT‖, John Wiley and Sons, 2010.

REFERENCE BOOKS:

1. Alin Gales, Michael Schaefer, Mike Ebbers, ―Green Data Center: Steps for the Journey‖, Shoff/IBM rebook, 2011.
2. John Lamb, ―The Greening of IT‖, Pearson Education, 2009.
3. Jason Harris, ―Green Computing and Green IT- Best Practices on Regulations and Industry‖, Lulu.com, 2008.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in

17CSEC34	WEB DESIGN AND MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To understand and learn the scripting languages with design of web applications. and maintenance and evaluation of web design management

PREREQUISITE: Web Technology

COURSE OBJECTIVES

1	To learn the concepts of Web design patterns and page design.
2	To understand and learn the scripting languages with design of web applications.
3	To learn the maintenance and evaluation of web design management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To familiarize decision support systems and their characteristics	Understand
CO2: To study about Intelligent DSS and applications of DSS.	Apply
CO3: To learn the technologies related to decision support systems	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S		S		M				L		L				
CO2		M		M				S							
CO3	S		M			L	M				L				
CO4															
CO5															

S- Strong; M-Medium; L-Low

SYLLABUS

SITE ORGANIZATION AND NAVIGATION

User Centered Design–Web Medium–Web Design Process–Basics of Web Design –Introduction to Software used for Web Design – ADOBE IMAGE READY, DREAM WEAVER, FLASH – Evaluating Process – Site Types and Architectures – Navigation Theory – Basic Navigation Practices – Search – Sitemaps

ELEMENTS OF PAGEDESIGN

Browser Compatible Design Issues-Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia – GUI Widgets and Forms – Web Design Patterns – STATIC pages: Slice– URL in ADOBE IMAGE READY. Creation and Editing of site map – Layer, Tables, Frame set, - CSS style – Forms –Tools like Insert, Rollover etc., in DREAM WEAVER.

SCRIPTING LANGUAGES AND ANIMATION USING FLASH

Client side scripting :XHTML – DHTML – JavaScript – XML Server Side Scripting: Perl–PHP– ASP/JSP Designing a Simple Web Application - Introduction to MACROMEDIA FLASH, Importing Other File Formats to Flash – Saving and Exporting Flash Files, Frame by Frame Animation–Motion Tweening – Shape Tweening..

PRE-PRODUCTION MANAGEMENT

Principles of Project Management – Web Project Method – Project Road Map – Project Clarification – Solution Definition – Project Specification – Content – Writing and Managing Content.

PRODUCTION, MAINTENANCE AND EVALUATION

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – **Case Study:** Using the Skills and Concepts Learn with the ADOBE IMAGE READY, DREAM WEAVER, FLASH, and Scripts, Develop Portfolios in the Form of Web Pages which have to be uploaded in Free Public Domain

TEXT BOOKS:

1. Themas A. Powell, ―The Complete Reference–Web Design‖, Tata McGraw Hill, Third Edition, 2003.
2. Ashley Friedlein, ―Web Project Management‖, Morgan Kaufmann Publishers, 2001.
3.H.M. Deitel, P.J. Deitel, A.B. Goldberg, ―Internet and World Wide Web – How to Program‖, Third Edition, Pearson Education, 2004

REFERENCE BOOKS:

1. Joel Sklar, ―Principles of Web Design‖, Thomson Learning, 2001.
2. Van Duyne, Landay and Hong, ―The Design of Sites: Patterns for Creating Winning Websites‖, Second Edition, Prentice Hall, 2006.
3. Lynch, Horton and Rosenfeld, ―Web Style Guide: Basic Design Principles for Creating Websites‖, Second Edition, Yale University Press, 2002.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in

17BMEC04	MEMS AND ITS BIOMEDICAL APPLICATIONS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To enable the students to acquire knowledge about the principles and applications of MEMS & Nanotechnology in Biomedical Industry.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To understand the working principle of MEMS & Microsystems.
2	To understand the working of MOEMS Technology.
3	To give an insight to the microfluidic systems.
4	To give an insight to the Bio-MEMS & its application in healthcare.
5	To study about the biomedical Nanotechnology & its application in research domain.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Introduces the concepts of microfluidic systems.	Understand
CO2. Introduce about the Basics of working of MOEMS Technology	Understand
CO3. Explain the working principle of MEMS & Microsystems	Understand
CO4. Analyze the nanomaterial in various biomedical application	Analyze
CO5. Evaluate about the biomedical Nanotechnology & its application in research domain	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	--	M	--	S	M	M	--	--	--	--	M	--	--	--
CO2	S	--	M	L	S	M	M	--	--	--	--	S	--	--	--
CO3	S	--	M	--	M	S	S	M	--	--	--	M	--	L	--
CO4	M	--	M	L	L	S	S	S	--	--	--	M	L	--	L
CO5	S	--	M	--	M	S	S	S	--	--	--	M	M	L	--

S- Strong; M-Medium; L-Low

SYLLABUS

MEMS & MICROSYSTEM

MEMS and Microsystems-Introduction-Typical MEMS and Microsystem Products-Application of Micro- system in Healthcare Industry – Working Principles of Microsystems Micro-sensors – Micro-actuation – MEMS with Microactuation – Micro-accelerators.

MICRO-OPTO ELECTROMECHANICAL SYSTEMS (MOEMS)

Fundamental principle of MOEMS Technology, Advantages - Light Modulators, Beam splitter – Micro-lens, Micro- mirrors - Digital Micro-mirror Device, Grating Light Valve, Optical Switch, Waveguide and Tuning

MICROFLUIDIC SYSTEMS

Microfluidics - Introduction and Fluid Properties, Applications of MFS-Fluid Actuation Methods - Electrophoresis, Dielectrophoresis, Electrowetting, Optoelectrowetting, Electro osmosis Flow, Electrothermal Flow, Thermocapillary Effect – Microfluidic Channel – Microdispenser – Microneedle - Microfilter

BIOMEMS

Introduction to BioMEMS, BioMEMS for Clinical Monitoring, Lab on a chip, DNA Sensors, E-Nose, E-Tongue, Microsystem approaches to PCR, MEMS based Implantable Drug Delivery System, Emerging, BioMEMS Technology.

BIOMEDICAL NANOTECHNOLOGY

Introduction to nanoscale phenomena, Nanoparticles - Nanomaterial characterization – XRD,SAXS,TEM,SEM, Scanning Tunneling microscopy, AFM, SPM technique, Biomolecular sensing for cancer diagnostics using carbon nanotubes, Carbon nanotube biosensors, Magnetic nanoparticles for MRImaging, Nano-devicesin biomedical applications.

TEXT BOOKS:

1. Tai-Ran Hsu, **"MEMS & Microsystems- Design, Manufacture and Nanoscale Engineering"**, John Wiley & Sons, 2nd Edition2008.
2. Nitaigour Premch and Mahalik, **"MEMS"**, Tata McGraw Hill, 2nd Reprint 2008.
3. Wanjun Wang & Steven A. Soper,**"BioMEMS – Technologies and applications"**, CRC Press, First Edition 2007.

REFERENCES:

1. Steven S. Saliterman, **"Fundamentals of BioMEMS & Medical Microdevices"**, International Society for Optical Engineering, 1st Edition 2006.
2. Gerald A Urban, **"BioMEMS"**, Springer, 1st Edition 2006.
3. Abraham P. Lee and James L. Lee, **"BioMEMS and Biomedical Nanotechnology"**, Volume-I, Springer, 1st Edition, 2006.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. R. Ezhilan	Assistant Professor	BME	ezhilan@vmkvec.edu.in
2	Mr.R.Pathamuth	Assistant Professor (Gr-II)	BME	pathamuthu@avit.ac.in
3	Mr.S.Kannan	Assistant Professor	BME	kannan@vmkvec.edu.in

17BMEC12	HOSPITAL MANAGEMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE
To provide the knowledge of planning, designing and safety management in hospital services.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To obtain the knowledge about the basic planning and organization of hospitals.
2	To study about the clinical and administrative services.
3	To impart knowledge on designing of hospital services.
4	To study and analyze the safety management in hospitals.
5	To study and analyze the infection control in hospitals.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Summarize the importance of hospital in healthcare and planning of hospital design	Understand
CO2. Identify various clinical services needed in the hospital	Apply
CO3. Build the idea about the hospital services design	Create
CO4. Examine the supporting services needed to build the hospital and safety guidelines	Evaluate
CO5. Plan the implementation of various infection control techniques	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	--	--	--	S	--	--	--	--	M	--	--	--
CO2	S	S	M	S	--	--	--	--	M	--	--	--	--	--	--
CO3	S	L	S	L	--	M	--	--	M	--	--	M	--	--	M
CO4	S	M	M	--	--	M	M	M	M	--	--	--	--	--	--
CO5	S	M	M	L	--	M	--	--	M	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING AND ORGANIZATION OF THE HOSPITALS
Roles of hospital in healthcare – hospital planning and design-outpatient services the nursing unit – intensive care Unit – nursing services – effective hospital management – directing and leading – controlling – financial management.

CLINICAL AND ADMINISTRATIVE SERVICES
Radiology and imaging services – laboratory services – operation theatre suite pharmacy – central sterile supply

department – hospital infection – materials management – evaluation of hospital services.

DESIGNING OF HOSPITAL SERVICES

Engineering department – maintenance management – clinical engineering electrical system – air conditioning system – water supply and sanitary system centralized medical gas system – communication system – solid waste management and transportation.

DESIGNING SUPPORT SERVICES AND SAFETY MANAGEMENT
Admitting department – medical records department – food service department laundry and linen service housekeeping – Volunteer department – safety in hospital fire safety – Alarm system – disaster management.

HOSPITAL INFECTION CONTROL
Importance of infection control – hand hygiene – aseptic techniques – isolation precautions – disinfection and Sterilization – clinical laboratory standards to infection control – health care workers safety.

TEXT BOOKS:

1. Kunders G D, ―Biomechanics: Hospitals, facilities planning and management‖, Tata Mcgraw Hill, 2008.
2. Sakharkar B M, ―Principles of hospital administration and planning‖, Jaypee Brothers Medical Publishers Pvt. Limited, 2nd Edition, 2009.

REFERENCE:

1. Sanjiv Singh, Sakthikumar Gupta, Sunil Kant, ―Hospital infection control guidelines, principles and practice‖, Jaypee Brothers Medical Publishers Pvt Limited, 1st Edition, 2012.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs. R.Indumathi	Assistant Professor (Gr-II)	BME	indhumr@avit.ac.in
2	Mrs.S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in

17BMEC20	HOSPITAL INFORMATION SYSTEM	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

With an objective of imbibing a professional approach amongst students towards hospital management. The subject encompasses management principles, staffing and marketing processes, discussing their significance and role in effective and efficient management of health care organizations.

PREREQUISITE:NIL

COURSE OBJECTIVES

1	To understand the hospital information system and supporting service
2	To study the hospital management information systems.
3	To know about the concepts of staffing process.
4	To study the concept of marketing and management.
5	To plan the maintenance of records in the other supportive departments of hospital.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain the various information system of Hospital & Supporting service	Understand
CO2. Analyze the Principle of Hospital Management	Analyze
CO3. Explain the various concept of Staffing process	Understand
CO4. Explain the various concept of Marketing And Management	Understand
CO5. Design and develop the computer used to maintenance of records in the other supportive departments of hospital	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	--	L	M	--	--	--	--	--	M	--	--	--
CO2	S	L	--	--	L	L	--	--	--	--	--	M	L	--	--
CO3	S	L	--	--	L	L	--	--	--	--	--	M	M	--	--
CO4	S	M	--	--	L	M	--	--	--	--	--	M	S	L	--
CO5	S	L	--	--	L	L	--	--	--	--	--	M	S	M	--

S- Strong; M-Medium; L-Low

SYLLABUS

HOSPITAL INFORMATION SYSTEMS & SUPPORTIVE SERVICES

Management Decisions and Related Information Requirement - Clinical Information Systems - Administrative Information

Systems - Support Service Technical Information Systems – Medical Transcription, Medical Records Department – Central Sterilization and Supply Department – Pharmacy – Food Services - Laundry Services.

PRINCIPLE OF HOSPITAL MANAGEMENT

Importance of management and Hospital, Management control systems. Forecasting techniques decision - making process.

STAFFING

Staffing pattern in hospitals, Selection, Recruiting process, Training of staff, Organizational structures, Career development

MARKETING AND MANAGEMENT

Basic concepts marketing, Principles of social marketing, Social marketing in health sector, Consumer behavior and research health, Advertising in Health Sector, Relevance of e-marketing of Health care services

COMPUTER IN HOSPITAL

System Development life cycle, Reasons to use computers in hospital, main categories of information systems in hospitals

TEXT BOOKS:

1.Goyal R.C., ―Human Resource Management in Hospital‖, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
2.G.D.Kunders, ―Hospitals – Facilities Planning and Management‖ – TMH, New Delhi – Fifth Reprint 2007.

REFERENCES:

1. Nauhria R.N. and Rajnish Prakash, -Management & systems‖, New Delhi Wheeler publishing, 1995.
2. Koontz, ―Essentials of Management‖, McGraw Hill, 1995.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. R.Pathamuthu	Assistant Professor (Gr-II)	BME	pathamuthu@avit.ac.in
2	Mr. R. Ezhilan	Assistant Professor	BME	ezhilan@vmkvec.edu.in

17BMEC05	HOME MEDICARE TECHNOLOGY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The purpose of the course on home medicare technology for biomedical engineering students is to outline the health care that can be made available at home along with recent digital and tele-health technologies.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To introduce the biomedical instruments that can be used at home.
2	To understand the skills required for home medicare for the elderly and the children.
3	To emphasize the need for home medicare system
4	To learn the advances in healthcare technologies and wireless technology related to healthcare system
5	To provide the advance medical technology in home medicare.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Review the biomedical instruments that can be used at home	Understand
CO2. Comprehend the advances in healthcare technologies and wireless technology related to healthcare system	Understand
CO3. Identify the skills required for home medicare for the elderly and the children	Analyze
CO4. Summarize the organization and the need for home medicare system	Evaluate
CO5. Associate digital technical advancements with home medicare	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	--	--	--	--	--	--	--	M	--	L	--
CO2	S	M	M	M	M	--	--	S	--	--	--	M	L	--	--
CO3	S	M	M	M	M	--	--	S	--	--	--	M	M	L	L
CO4	S	M	M	M	M	--	--	S	--	--	--	M	M	L	L
CO5	S	M	M	M	M	--	--	S	--	--	--	M	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO HOME MEDICARE

Home health care, purpose, legal and ethical aspects, Organization of homecare system, Historical development of home care, Environmental influences on home care, Home care organization, Home care nursing practice, Role of home care nurse and orientation strategies, Infection control in home, Patient education in home.

WORKING WITH USERS

Basic human needs, communication and interpersonal skills, Caregiver observation, recording and reporting, confidentiality, Working with elderly, aged, Working with children, need for home care, Mobility transfers and ambulation, range of motion exercises, Skin care and comfort.

MEDICAL INSTRUMENTS AND DEVICES AT HOME

Medical devices at home and its implementation, Scope of market for home medical devices, Unique challenges to the design & implementation of hightech home care devices, Infant monitors, Medical alert services, Activity monitors.

DIGITAL HOME CARE

Video communication to support care delivery to independently living seniors, Establishing an infrastructure for telecare, Implementation of mobile computing in home care programs, Home medicare management by videophone, Continuous home care through wireless bio-signal monitoring system.

ADVANCES IN MEDICAL TECHNOLOGIES

Dynamic configuration of home services, Personalized ambient monitoring, Support for mental health at home, Multi model interaction and technologies for care at home, User centered design of technologies to support care at home.

TEXT BOOKS:

1. Robyn Rice, **"Home care nursing practice: Concepts and Application"**, Elsevier, 4th Edition, 2006.
2. Lodewijk Bos, **"Handbook of Digital Homecare: Successes and Failures"**, Vol.3, Springer, 2011.

REFERENCES:

1. Yadin David, Wolf W. von Maltzahn, Michael R. Neuman, Joseph.D,Bronzino, **"Clinical Engineering"**, CRC Press, 1st Edition, 2010.
2. KenethJ. Tumer, **"Advances in home care technologies"**, AT research series, Vol 31, 1st Edition, IOS press, 2012.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in
2	Mr. A.Subbiah	Assistant Professor (Gr-II)	BME	subbiah@avit.ac.in

17BMEC10	BODY AREA NETWORKS AND MOBILE HEALTHCARE	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To enable the students to gain knowledge in various aspects of BAN related to health and the techniques to apply these in proper health care delivery.

PRERQUISITE – NIL

COURSE OBJECTIVES

1	To Learn about body area network
2	To study the different BAN hardware related to it
3	To Provide knowledge in the applications of Body Area Networks
4	To study the concept of telemedicine
5	To Provide knowledge in the applications of Telemedicine

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain about working of Body Area Network	Understand
CO2. Analyze the Hardware for BAN	Analyze
CO3. Design and develop the applications of BAN	Apply
CO4. Explain the fundamental concept of telemedicine	Understand
CO5. Design and develop the applications of telemedicine	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	--	--	L	--	--	--	--	--	--	M	M	--	--
CO2	S	L	--	--	L	L	--	--	--	--	--	M	M	M	--
CO3	S	M	L	L	M	M	--	--	--	--	--	M	M	--	L
CO4	S	M	L	L	M	M	--	--	--	--	--	M	S	L	--
CO5	S	M	L	L	M	M	--	--	--	--	--	M	M	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Definition, BAN and Healthcare, Technical Challenges- Sensor design, biocompatibility, Energy Supply, optimal node placement, number of nodes, System security and reliability, BSN Architecture – Introduction.

HARDWARE FOR BAN

Processor – Low Power MCUs, Mobile Computing MCUs ,Integrated processor with radio transceiver, Memory, Antenna – PCB antenna, Wire antenna, Ceramic antenna, External antenna, Sensor Interface, Power sources –

Batteries and fuel cells for sensor nodes.

APPLICATIONS OF BAN
Monitoring patients with chronic disease, Hospital patients, Elderly patients, Cardiac arrhymias monitoring, Multi patient monitoring systems, Multichannel Neural recording, Gait analysis, Sports Medicine, Electronic pill.

FUNDAMENTALS OF TELEMEDICINE
History of telemedicine, definition of telemedicine, tele-health, tele-care, scope, Telemedicine Systems, benefits & limitations of telemedicine.

APPLICATIONS OF TELEMEDICINE
Teleradiology, telepathology, telecardiology, teleoncology, teledermatology, telesurgery, e Health and Cyber Medicine.

TEXT BOOK:

1. Annalisa Bonfiglio, Danilo De Rossi, "Wearable Monitoring Systems", Springer, 2011.
2. Norris A C, ―Essentials of Telemedicine and Telecare‖, John Wiley, New York, 2002.

REFERENCES:

1. Zhang, Yuan-Ting, ―Wearable Medical Sensors and Systems‖, Springer, 2013.
2. H K Huang, ―PACS and Imaging Informatics: Basic Principles and Applications‖, Wiley, New Jersey, 2010.
3. Guang-Zhong Yang (Ed.), ―Body Sensor Networks‖, Springer, 2006.
4. Mehmet R. Yuce,Jamil Y.Khan, ―Wireless Body Area Networks Technology, Implementation, and applications‖, Pan Stanford Publishing Pte.Ltd,Singapore, 2012.
5. Khandpur R S, ―Handbook of Biomedical Instrumentation‖, Tata McGraw Hill, New Delhi, 2003

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr.R.Pathamuthu	Assistant Professor (Gr-II)	BME	pathamuthu@avit.ac.in
2	Mr.S.Kannan	Assistant Professor	BME	kannan@vmkvec.edu.in

17ATEC04	SPECIAL TYPES OF VEHICLES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course reviews the fundamental concepts of earth moving equipments, power train concepts, sub systems of special types of vehicles, farm equipment, military and combat vehicles and special purpose vehicles for industrial applications.

PREREQUISITE: Web Technology

COURSE OBJECTIVES

1	To learn the detailed study of earth moving and constructional equipments
2	To learn the detailed study of power train concepts
3	To learn the detailed study of sub systems of special types of vehicles
4	To learn the detailed study of farm equipments, military and combat vehicles
5	To learn of detailed study of special purpose vehicles for industrial applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand earth moving and constructional equipments	Understand
CO2: Know the power train concepts	Understand
CO3: Know the sub systems of special types of vehicles	Understand
CO4: Use farm equipments, military and combat vehicles	Apply
CO5: Use special purpose vehicles for industrial applications	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	--	L	L	--	--	--	--	L	--	--	--
CO2	S	M	M	M	M	L	L	--	--	--	--	L	--	--	--
CO3	S	S	S	S	S	M	M	--	--	--	L	--	--	--	--
CO4	S	S	S	S	S	M	M	--	--	--	L	--	--	--	--
CO5	S	S	S	S	S	S	S	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES

Construction layout, capacity and applications. Power Plants, Chassis and Transmission, Multivalve vehicles.

EARTH MOVING MACHINES

Earthmovers like dumpers, loaders - single bucket, Multi bucket and rotary types- bulldozers, excavators, backhoe loaders, scrappers, drag and self powered types, Bush cutters, stumpers, tree dozer, rippers etc. – Power and capacity of earthmoving machines.

SCRAPPERS, GRADERS, SHOVELS AND DITCHERS

Scrappers, elevating graders, motor graders, self powered scrappers and graders, Power shovel, revolving and stripper shovels – drag lines – ditchers – capacity of shovels.

FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES

Power take off, special implements. Special features and constructional details of tankers, gun carriers and transport vehicles.

VEHICLE SYSTEMS, FEATURES

Brake system and actuation – OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Kinematics for loader and bulldozer operational linkages. Safety features, safe warning system for dumper. Design aspects on dumper body, loader bucket and water tank of sprinkler.

TEXT BOOKS:

1. Off the road wheeled and combined traction devices – Ash gate Publishing Co.Ltd. 1988
2. Satyanarayana. B., Construction planning and equipment, standard publishers and distributors, New Delhi.

REFERENCE BOOKS:

1. Abrosimov.K. Branberg.A and Katayer.K, Road making machinery, MIR Publishers, Moscow, 1971.
2. Bart H Vanderveen, Tanks and Transport vehicles, Frederic Warne and Co Ltd.,London.
3. Nakra C.P., –Farm machines and equipments‖ Dhanparai Publishing company Pvt. Ltd.

Robert L Peurifoy, –Construction, planning, equipment and methods‖ Tata McGraw Hill Publishing company Ltd.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	T.Raja	Associate Professor	Auto / VMKVEC	rajat@vmkvec.edu.in
2	R. Prabhakar	Associate Professor	Auto / VMKVEC	prabhakar@vmkvec.edu.in
3	N. Shivakumar	Asst. Prof. - II	Mechanical, AVIT	shivakumar@avit.ac.in

17ATEC06	AUTOMOTIVE SAFETY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To study and purpose is to understand Automotive Safety.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To understand the Safety Systems
2	To understand the Safety Concepts.
3	To understand the Safety Equipments
4	To understand the Collision Warning and Avoidance
5	To understand the Comfort and Convenience System Standards

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To understand about vehicle safety while running	Understand
CO2: To understand about the vehicle operating system	Understand
CO3: To learn about how to handle the safety equipment‘s in vehicle	Understand
CO4: How to drive the vehicle in safety method and avoid the accidents	Apply
CO5: To learn about how to use the modern technology in vehicle	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	--	--	--	L	--	--	--	M	L	--	--
CO2	S	M	M	L	--	--	--	M	--	--	--	M	L	--	--
CO3	S	M	M	L	--	--	--	L	--	--	--	M	L	--	--
CO4	S	S	S	M	L	--	--	M	--	--	--	M	L	--	--
CO5	S	S	S	M	M	--	--	M	--	--	--	M	L	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger

compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone

SAFETY CONCEPTS

Active safety: driving safety, conditional safety, perceptibility safety, operating safety, passive safety: exterior safety, interior safety, deformation behavior of vehicle body, speed and acceleration characteristics of passenger compartment on impact

SAFETY EQUIPMENTS

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety

COLLISION WARNING AND AVOIDANCE

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions

COMFORT AND CONVENIENCE SYSTEM

Steering and mirror adjustment, central locking system, Garage door opening system, tyre pressure control system, rain sensor system, environment information system

TEXT BOOKS:

1. Bosch, –Automotive Handbook‖, 8th Edition, SAE publication, 2011.
2. Powloski. J., –Vehicle Body Engineering‖, Business books limited, London, 1969.

REFERENCE BOOKS:

Ronald.K.Jurgen, –Automotive Electronics Handbook‖, Second Edition, McGraw-Hill Inc.,

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	T.Raja	Associate Professor	Auto / VMKVEC	rajat@vmkvec.edu.in
2	R. Prabhakar	Associate Professor	Auto / VMKVEC	prabhakar@vmkvec.edu.in
3	B. Samuvel Michael	Asso. Prof. Gr - II	Mechanical, AVIT	samuvelmichael@avit.ac.in

17ATEC10	ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES	Category	L	T	P	C
		EC(PS)	3	0	0	3

PREAMBLE

To study and understand the substitute for conventional automobile fuels and energy source

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To impart the knowledge of various alternate fuels in vehicles.
2	To understand the entire properties of alcohols.
3	To understand the various fuels like natural gas, LPG, hydrogen and biogas
4	To impart the knowledge of vegetable oils..
5	To impart the knowledge of electric and solar vehicles

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To learn the detailed study of alternate fuel	Understand
CO2: To learn the detailed study of alternate fuel‘s properties	Understand
CO3: To learn the detailed study LPG and Hydrogen fuels	Understand
CO4: To learn about how to use the bio fuel in IC engine	Apply
CO5: To learn how to design the electric drive vehicle	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	--	--	--	L	--	--	--	M	L	--	--
CO2	S	M	M	L	--	--	--	M	--	--	--	M	L	--	--
CO3	S	M	M	L	--	--	--	L	--	--	--	M	L	--	--
CO4	S	S	S	M	L	--	--	M	--	--	--	M	L	--	--
CO5	S	S	S	M	M	--	--	M	--	--	--	M	L	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Estimation of petroleum reserve - Need for alternate fuel - Availability and properties of alternate fuels– general use of alcohols - LPG - Hydrogen - Ammonia, CNG, and LNG - Vegetable oils and Biogas - Merits and demerits of various alternate fuels.

ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engine. Methanol and gasoline blends Combustion characteristics in engines - emission characteristics.

CNG, LPG, HYDROGEN AND BIOGAS

Availability of CNG, properties, modification required to use in engines - performance and emission characteristics of CNG using LPG in SI & CI engines. Performance and emission for LPG - Hydrogen – Storage and handling, performance and safety aspects.

VEGETABLE OILS

Various vegetable oils for engines - Esterification - Performance in engines - Performance and emission Characteristics

ELECTRIC AND SOLAR POWERED VEHICLES

Layout of an electric vehicle - Advantage and limitations - Specifications - System component. Electronic control system - High energy and power density batteries - Hybrid vehicle - Solar

TEXT BOOKS:

1. K. K. Ramalingm, internal Combustion Engines, Scitech publications, Chennai, 2003.

MaheswarDayal, " Energy today & tomorrow ", I & B Horishr India, 1982

REFERENCE BOOKS:

1. " Alcohols and motor fuels progess in technology ", Series No.19, SAE Publication USA 1980.

2. SAE Paper Nos. 840367, 841156, 841333, 841334.

3. " The properties and performance of modern alternate fuels " - SAE Paper No.841210.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	T.Raja	Associate Professor	Auto / VMKVEC	rajat@vmkvec.edu.in
2	R. Prabhakar	Associate Professor	Auto / VMKVEC	prabhakar@vmkvec.edu.in
3	B. Samuvel Michael	Asso. Prof. Gr - II	Mechanical, AVIT	samuvelmichael@avit.ac.in

17ATEC15	VEHICLE TRANSPORT MANAGEMENT	Category	L	T	P	C
		EC(PS)	3	0	0	3

PREAMBLE

This course reviews the methods of training and training procedure in the transport management, scheduling and fare structure of various public and private and state government undertaking vehicles , maintenance and motor vehicle act

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To study the various test of selection processes and personal management
2	To learn the various transport system
3	To learn the various fare collecting methods and problems on scheduling
4	To study the Motor vehicle Act of India
5	To study the maintenance of transport industry and design of Bus depot layout

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Apply the personal management and training for selection processes	Understand
CO2; Understand the various division of transport management	Apply
CO3: Construct table for various fare collecting methods and apply it	Apply
CO4: Know the motor vehicle Act of India	Apply
CO5: Apply the maintenance system of transport	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	--	--	--	--	L	--	--	--	--	--	--	L	--	--
CO2	S	--	--	--	--		--	--	--	--	--	--	L	--	--
CO3	S	L	M	M	M	--	--	L	L	--	--	--	L	--	--
CO4	S	--	--	--	--	M	L		L	L	--	--	L	--	--
CO5	S	M	M	M	M	--	--	M	L	M	M	M	L	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Personnel management; objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests..

TRANSPORT SYSTEMS

Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. Chain of responsibility forms of ownership by state, municipality, public body and private undertakings

SCHEDULING AND FARE STRUCTURE

Principal features of operating costs for transport vehicles with examples of estimating the costs. Fare structure and method of drawing up of a fare table. Various types of fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling

MOTOR VEHICLE ACT

Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, Power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

MAINTENANCE

Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

TEXT BOOKS:

1.John Duke, "Fleet Management", McGraw-Hill Co, USA, 1984.

REFERENCE BOOKS:

1. Government Motor Vehicle Act, Publication on latest act to be used as on date.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	T.Raja	Associate Professor	Auto / VMKVEC	rajat@vmkvec.edu.in
2	R. Prabhakar	Associate Professor	Auto / VMKVEC	prabhakar@vmkvec.edu.in
3	A.Imithyas	Asst. Prof. Gr - I	Mechanical, AVIT	imthicyr @avit.ac.in

17ATEC17	VEHICLE AIR-CONDITIONING	Category	L	T	P	C
		EC(PS)	3	0	0	3

PREAMBLE
To teach the students about the vehicle air-conditioning

PREREQUISITE: NIL

COURSE OBJECTIVES

1	Understand the principles and applications of Air conditioning systems.
2	To understand the air conditioner – heating system.
3	To understands the properties of air conditioning coolant.
4	To study about air routing and temperature control
5	To study heater- air conditioner trouble shooting &service

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Gain knowledge about various air conditioning systems	Understand
CO2: Gain the knowledge of cooling and heating loads in an air-conditioning system	Understand
CO3: Evaluate the diagnostic characteristics of Refrigeration system	Apply
CO4: Evaluate the various testing of air control and handling systems.	Apply
CO5: Learn the various methods of Trouble shooting in air conditioning systems.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	S	S	S	M	S	L	S	L	--	--
CO2	S	M	L	L	L	M	M	M	M	M	L	M	L	--	--
CO3	S	M	M	M	L	S	S	S	M	S	L	S	L	--	--
CO4	S	M	M	M	L	M	M	M	M	M	L	M	L	--	--
CO5	S	M	L	L	L	M	M	M	M	M	L	M	L	--	--

S- Strong; M-Medium; L-Low

SYLLABUS
AUTOMOTIVE AIR-CONDITIONING FUNDAMENTALS

Basic Air conditioning system- Location of Air conditioning components in a car – schematic layout of a Refrigeration system. Compressor components- condenser and high-pressure service ports. Thermostatic expansion valve and Orifice tube – expansion valve calibration – evaporator temperature controls for air conditioning systems

AIRCONDITIONER – HEATING SYSTEM

Manually controlled air conditioner- Heater system- ford automatically controlled air conditioner- Heater systems- Chrysler automatically controlled air conditioner- heater system, general motors automatically controlled Air conditioner- heater system- Flushing and evacuating

REFRIGERANT

Containers- handling refrigerant – discharging, charging and leak detection – refrigeration system Diagnosis – Diagnostic procedure – Ambient conditions affecting system pressures

AIR ROUTING AND TEMPERATURE CONTROL

Objectives – Evaporators case air flow through the Dash recalculating unit – Automatic Temperature control – Duct system- Controlling flow – vacuum reserve – testing the air control and handling systems.

HEATER- AIR CONDITIONER TROUBLE SHOOTING

Air conditioner maintenance and service- servicing heater system. Removing and replacing components.

trouble shooting of air conditioner- heating system- compressor service

TEXT BOOKS:

1. William H Crouse and Donald L Anglin, Automotive Air Conditioning McGraw Hill inc; 1990.

REFERENCE BOOKS:

1. Mitchell information services, Inc., Mitchell Automotive Heating and Air conditioning systems, prentice Hall Inc, 1989.
2. McDonald K.L., Automotive Air conditioning., Theodore Audel series., 1978
3. Goings.L.F., Automotive Air conditioning., American Technical services, 1974
4. Paul Weisler, Paul Weisler, Automotive Air conditioning, Restone Publishing Co. Inc., 1990.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	T.Raja	Associate Professor	Auto / VMKVEC	rajat@vmkvec.edu.in
2	R. Prabhakar	Associate Professor	Auto / VMKVEC	prabhakar@vmkvec.edu.in
3	C.Thiagarajan	Asst. Prof. Gr -II	Mechanical, AVIT	cthiagarajan @avit.ac.in

17EEEC10	POWER QUALITY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE:

This course imparts knowledge about various electrical power quality issues and their origin and address the effects of power quality problems on electrical power system. It also emphasis need for PQ monitoring and measurement.

PREREQUISITE : Nil

COURSE OBJECTIVES

1	Describe various power quality problems.
2	Identify the root cause of power quality problems.
3	Explain the impact of PQ issues on various electrical components.
4	Interpret the need for PQ monitoring and measurement.
5	Illustrate the harmonics distortion in the given electical drive.
6	Determine various power quality issues and their solutions in residential / commercial / industrial facilities.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain various power quality problems.	Understand
CO2: Discuss the root cause of power quality problems.	Understand
CO3: Explain the impact of PQ issues on various electrical components.	Understand
CO4: Discuss the need for PQ monitoring and measurement.	Understand
CO5: Compute the harmonics distortion in the given electical drive.	Apply
CO6: Analyze various power quality issues and their solutions in residential / commercial / industrial facilities.	Analyze

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L										
CO2	M	L										
CO3	M	L										

CO4	M	L										
CO5	S	M	L	L								
CO6	S	S	M	M								

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction
Power quality - Impact of PQ on end users, Need for PQ monitoring, Various PQ Problems
Voltage disturbances
Voltage dips, over voltages, short supply interruptions, voltage fluctuations and flicker - sources, effects, measurement and mitigation
Transients
Transient system model, examples of transient models and their response, power system transient model, types and causes of transients, lightning, other switching transients.
Voltage and Current Unbalance
Symmetrical components of currents and voltages, sources, effects, measurements and mitigation
Harmonics
Definition, odd and even harmonics, harmonic phase sequence, voltage and current harmonics, individual and total harmonic distortion, harmonic standards, sources, effects on various electrical components, measurements and mitigation, passive and active filters (Case Studies)
Power factor
Active and reactive power flow with nonlinear load, displacement and distortion power factor, power factor penalty, power factor improvement, applications of synchronous condensers and static VAR compensators, automatic power factor controller (Case Studies)
Grounding
Shock and fire hazards, essential of a grounded system, earth resistance tests, methods of grounding.
Solving power quality problems using CPD
Power quality measuring equipment-Smart power quality analyzers, Introduction to custom power devices (CPD) – STATCOM, DVR, UPQC.

Text Book
1. Sankaran C,‖Power Quality‖, CRC Press special Indian edition 2009.
Reference Books
1. Angelo Baggini, –Handbook of Power Quality‖ John Wiley & Sons Ltd, 2008.
2. Roger .C. Dugan, Mark F.Mcgranaghan & H.Wayne Beaty,‖ Electrical power system Quality‖ McGraw-Hill Newyork Second edition 2003.
3. Barry W.Kennedy, –Power Quality Primer‖, McGraw-Hill, New York, 2000.
4. Math H.J.Bollen, « Understanding Power Quality Problems : Voltage Sags and Interruptions », IEEE Press, New York, 2000.
5. Arrillaga.J, Watson.N.R and Chen.S, « Power System Quality Assessment », John Wiley & Sons Ltd., England, 2000
6. Bhim Singh, Ambrish Chandra and Kamal Al-Haddad: Power Quality: Problems and Mitigation Technique, Wiley Publications, 2015

COURSE DESIGNERS				
S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Sankarganesh	Associate Professor	EEE	sankarganesh@vmkvec.edu.in
2	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in

17EEEC11	POWER SYSTEM PLANNING AND RELIABILITY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To make students become familiar with power system operation and the various control actions to be implemented on the power system for reliability

PREREQUISITE : NIL

COURSE OBJECTIVES

1	To introduce the students learn the objectives of power system
2	To make the students learn the reliability stability analysis of generation in power system
3	To make the students learn the reliability stability analysis of transmission in power system
4	To familiarize the students with the planning of expansion of power system
5	To introduce the students with the overview of planning of distribution system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the load forecasting , Load growth patterns and their importance in planning	Understand
CO2: Determine the reliability of iso and interconnected generation systems, reliability indices like LOLP and expected value of demand not served.	Understand
CO3: Determine the reliability indices like LOLP and expected value of demand not Served in transmission system	Understand
CO4: Solve the Capacitor placer problem in transmission system and radial distributions system.	Apply
CO5: Design the primary and secondary distribution systems	Create
CO6: Describe the planning of expansion of power system and distribution system	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S							M					
CO2		S					M								
CO3		S					M								
CO4							M		S	S					
CO5			M				S			S					
CO6	S	S	S		S		M			S					

S- Strong; M-Medium; L-Low

SYLLABUS

LOAD FORECASTING

Objectives of forecasting - Load growth patterns and their importance in planning - Load forecasting Based on discounted multiple regression technique-Weather sensitive load forecasting-Determination of annual forecasting-Use of AI in load forecasting.

GENERATION SYSTEM RELIABILITY ANALYSIS

Probabilistic generation and load models- Determination of LOLP and expected value of demand not served – Determination of reliability of iso and interconnected generation systems.

TRANSMISSION SYSTEM RELIABILITY ANALYSIS

Deterministic contingency analysis-probabilistic load flow-Fuzzy load flow probabilistic transmission system reliability analysis-Determination of reliability indices like LOLP and expected value of demand not served.

EXPANSION PLANNING

Basic concepts on expansion planning-procedure followed for integrate transmission system planning, current practice in India-Capacitor placer problem in transmission system and radial distributions system.

DISTRIBUTION SYSTEM PLANNING OVERVIEW

Introduction, sub transmission lines and distribution substations-Design primary and secondary systems-distribution system protection and coordination of protective devices.

TEXT BOOKS

1.Roy Billinton and Allan Ronald, ―Power System Reliability.‖

2.J.Endreny,‖Reliability modeling in electric power systems‖John Wiley & sons

REFERENCES

1. Proceeding of work shop on energy systems planning & manufacturing CI.

2. R.L .Sullivan, ― Power System Planning‖,.

3. Turan Gonen, Electric power distribution system Engineering _McGraw Hill,1986

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	V.MANJULA	Assistant Professor	Electrical and Electronics Engineering	manjbees@gmail.com

17EEEC16	ELECTRIC VEHICLES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course introduces the fundamental concepts, principles, analysis and design of hybrid, electric vehicles.

PREREQUISITE: Basic Electrical & Electronics Engineering.

COURSE OBJECTIVES

1	To understand the basic concepts and dynamics of electric vehicles.
2	To familiarize and design of battery backup.
3	To analyze the characteristics of different types of DC & AC Motors.
4	To understand different types of power transmission configuration, clutch and braking.
5	To study about hybrid electric vehicles.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Describe the basic concepts of electric vehicles.	Understand
CO2: Design the propulsion system for electric vehicles.	Evaluate
CO3: Explain the construction, characteristics and application of batteries.	Analyze
CO4: Elucidate performance characteristics of DC&AC electrical machines.	Analyze
CO5: Design the drive train model for electric vehicles.	Evaluate
CO6: Describe about the various types and configuration of hybrid electric vehicle.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	M	-	L	L	-	-	-	-	-	-	-
CO2	S	M	S	L	M	-	L	M	-	-	-	-	-	-	-
CO3	S	-	-	-	M	-	-	-	-	-	-	-	-	-	-
CO4	S	-	-	-	M	-	-	-	-	-	-	-	-	-	-
CO5	S	M	S	L	M	-	L	M	-	M	M	-	-	-	-
CO6	S	-	-	-	M	-	L	L	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

ELECTRIC VEHICLES

Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.

BATTERY

Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries.

DC & AC ELECTRICAL MACHINES

Motor and Engine rating, Requirements, DC machines, Three phase A/c machines, Induction machines, permanent magnet machines, switched reluctance machines.

ELECTRIC VEHICLE DRIVE TRAIN

Transmission configuration, Components – gears, differential, clutch, brakes regenerative braking, motor sizing.

HYBRID ELECTRIC VEHICLES

Types – series, parallel and series, parallel configuration – Design – Drive train, sizing of components.

TEXT BOOKS:

1. Iqbal Hussain, *"Electric & Hybrid Vehicles – Design Fundamentals"*, Second Edition, CRC Press,
2. James Larminie, ‖*Electric Vehicle Technology Explained*‖, John Wiley & Sons, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, *"Modern Electric, Hybrid Electric, and Fuel Cell Vehicles-Fundamentals*‖, CRC Press, 2010.
2. Sandeep Dhameja, *"Electric Vehicle Battery Systems",* Newnes, 2000 .http://nptel.ac.in/courses/108103009

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in
2	Mr. V.Rattankumar	Assistant Professor	EEE	rattankumar@avit.ac.in

17EEEC18	RENEWABLE ENERGY TECHNOLOGY	Category	L	T	P	C
		CC	3	0	0	3

PREAMBLE

To introduce the fundamentals of PV & WIND technologies and Converters used in renewable energy technologies

PREREQUISITE: Non Conventional Energy Sources and its applications

COURSE OBJECTIVES

1	To learn about PV technology principles.
2	To learn economical and environmental merits of solar energy for variety applications.
3	To learn modern wind turbine control & monitoring.
4	To learn various power converters in the field of renewable energy technologies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the PV technologies	Understand
CO2: Applications of PV technology.	Apply
CO3: Design the solar power plant.	Apply
CO4: Understand modern wind turbines and its control.	Understand
CO5: Analyze various power converters to select for particular application.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	S				M			L		M		-	-
CO2	M	L	L				M			M		M		-	-
CO3	S	S	S	S	M				L					-	-
CO4	L	L	L		S		M		L					-	-
CO5	S	S	S	M	M									-	-
CO6	M	M	S				M			L		M		-	-

S- Strong; M-Medium; L-Low

SYLLABUS

SOLAR THERMAL TECHNOLOGIES

Principle of working, types, design and operation of - Solar heating and cooling systems - Thermal Energy storage systems – Solar Desalination – Solar cooker : domestic, community – Solar pond – Solar drying.Principle of working, types, design and operation of - Solar heating and cooling systems - Thermal Energy storage systems – Solar Desalination – Solar cooker : domestic, community – Solar pond – Solar drying

SPV SYSTEM DESIGN AND APPLICATIONS

Solar cell array system analysis and performance prediction- Shadow analysis: reliability - solar cellarray design concepts - PV system design - design process and optimization - detailed array design - storage autonomy - voltage regulation - maximum tracking - centralized and decentralized SPVsystems - stand alone - hybrid and grid

connected system - System installation - operation andmaintenances - field experience - PV market analysis and economics of SPV systems.

DIRECT ROTOR COUPLED GENERATOR (MULTIPOLE) [VARIABLE SPEED VARIABLE FREQ.]

Excited Rotor Synch. Generator / PMG Generator, Control Rectifier, Capacitor Banks, Step Up / BoostConverter (DC-DC Step Up), Grid Tied Inverter, Power Management, Grid Monitoring Unit (Voltageand Current), Transformer, Safety Chain Circuits.

MODERN WIND TURBINE CONTROL & MONITORING SYSTEM

Details of Pitch System & Control Algorithms, Protections used & Safety Consideration in Wind turbines, Wind Turbine Monitoring with Error codes, SCADA & Databases: Remote Monitoring andGeneration Reports, Operation & Maintenance for Product Life Cycle, Balancing technique (Rotor &Blade), FACTS control & LVRT & New trends for new Grid Codes.

POWER CONVERTERS

Solar: Block diagram of solar photo voltaic system: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection Of inverter, battery sizing, array sizing.
Wind: three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

TEXT BOOKS:

1.Goswami, D.Y., Kreider, J. F. and & Francis., Principles of Solar Engineering, Taylor and Francis,2000

2.Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press, 1996

REFERENCE BOOKS:

1. Sukhatme S P, J K Nayak, Solar Energy – Principle of Thermal Storage and collection, Tata McGraw Hill, 2008.

2. Solar Energy International, Photovoltaic – Design and Installation Manual – New Society Publishers, 2006

3.Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd., 1983

4. John D Sorensen and Jens N Sorensen, Wind Energy Systems, Woodhead Publishing Ltd, 2011

5. Rashid .M. H –power electronics Hand book‖, Academic press, 2001.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in
2	Mr. V.Rattankumar	Assistant Professor	EEE	rattankumar@avit.ac.in

17EEEC21	NON CONVENTIONAL ENERGY SOURCES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Non Conventional resources include solar energy, wind, falling water, the heat of the earth (geothermal), plant materials (biomass), waves, ocean currents, temperature differences in the oceans and the energy of the tides. Non Conventional energy technologies produce power, heat or mechanical energy by converting those resources either to electricity or to motive power. It concerned with development of the national grid system will focus on those resources that have established themselves commercially and are cost effective for on grid applications. Such commercial technologies include hydroelectric power, solar energy, fuels derived from biomass, wind energy and geothermal energy. Wave, ocean current, ocean thermal and other technologies that are in the research or early commercial stage, as well as non-electric Non Conventional energy technologies, such as solar water heaters and geothermal heat pumps, are also based on Non Conventional resources, but outside the scope of this Manual.

PREREQUISITE-NIL

COURSE OBJECTIVES

1	To learn about PV technology principles.
2	To learn economical and environmental merits of solar energy for variety applications.
3	To learn modern wind turbine control & monitoring.
4	To learn various power converters in the field of renewable energy technologies.
5	To study and analyse different types of Power converters for Renewable energy conversion

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1	Understand to Renewable Energy Sources, Principles of Solar Radiation, Different Methods of Solar Energy Storage and its Applications, Concepts of Solar Ponds, Solar Distillation and Photo Voltaic Energy Conversion	Understand and Analyse
CO2	Learn the Flat Plate and Concentrating Collectors, Classification of Concentrating Collectors	Analyse
CO3	Learn the Wind Energy, Horizontal and Vertical Access Wind Mills, Bio Conversion	Analyse
CO4	Types of Bio-Gas Digesters and Utilization for Cooking Geothermal Energy Resources	Understand and Apply

CO5	Types of Wells and Methods of Harnessing the Energy, Ocean Energy and Setting of OTEC Plants	Understand
CO6	Tidal and Wave Energy and Mini Hydel Power Plant, Need and Principles of Direct Energy Conversion, Concepts of Thermo-Electric Generators and MHD Generators	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	S				M			L		M	S	M	S
CO2	M	L	L				M			M			S	L	M
CO3	S	M	S	S	M									M	S
CO4	L	L	L		S		M						L	L	S
CO5	S	S	S	M	M									M	
CO6												M	S	M	

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Statistics on conventional energy sources, Classification of Energy Resources, Definition Concepts of NCES, Limitations of RES, Criteria for assessing the potential of NCES. - Solar, Wind, Geothermal, Bio-mass, Ocean Energy Sources, comparison of these energy sources

SOLAR ENERGY CONCEPT

Solar Energy-Energy available form Sun, Solar radiation data, Solar energy conversion into heat, Flat plate and Concentrating collectors, Mathematical analysis of Flat plate collectors and collector efficiency, Principle of Natural and Forced convection, Solar engines-Stirling, Brayton engines, Photovoltaic, p-n junction, solar cells, PV systems, Stand-alone, Grid connected solar power satellite.

WIND ENERGY CONCEPT

Wind energy conversion, General formula -Lift and Drag- Basis of wind energy conversion – Effect of density, frequency variances, angle of attack, and wind speed. Windmill rotors Horizontal axis and vertical axis rotors. Determination of torque coefficient, Induction type generators- working principle.

GEOTHERMAL AND BIOMASS ENERGY

Nature of Geothermal sources, Definition and classification of resources, Utilization for electric generation and direct heating, Well Head power generating units, Basic features Atmospheric exhaust and condensing, exhaust types of conventional steam turbines. Pyrolysis of Biomass to produce solid, liquid and gaseous fuels, Biomass

gasification, Constructional details of gasifier, usage of biogas for chulhas, various types of chulhas for rural energy needs.

TODAL AND WAVE ENERGY

Wave, Tidal and OTEC energy- Difference between tidal and wave power generation, Principles of tidal and wave power generation, OTEC power plants, Operational of small cycle experimental facility, Design of 5 Mw OTEC pro-commercial plant, Economics of OTEC, Environmental impacts of OTEC. Status of multiple product OTEC systems.

TEXT BOOK

1. Ashok V Desai, Non-Conventional Energy, Wiley Eastern Ltd, New Delhi, 2003
2. K M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, New Delhi, 2003.

REFERENCES

1. Ramesh R & Kumar K U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 2004
2. Wakil MM, Power Plant Technology, Mc Graw Hill Book Co, New Delhi, 2004.
3. Non – Conventional Energy Sources. Rai.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	e-Mail ID
1	P. LOGANATHAN	Assistant Professor	EEE	loganathan@vmkvec.edu.in
2	R. SATHISH	Assistant Professor	EEE	sathish@vmkvec.edu.in

17MESE12	PRODUCT LIFE CYCLE MANAGEMENT	Category	L	T	P	Credit
		EC(SE)	3	0	0	3

Preamble

To enable the students to understand the various product life management tools & PLM concepts

Prerequisite NIL

Course Objective

1	To understand the product life cycle management of a product
2	To understand the process flow, work flow, & product data management
3	To Understand the concepts of new product development
4	To Understand the concepts of new product development
5	Product life cycle management strategy and PLM assessment.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Understand product data, information, structures and PLM concepts.	Understand
CO2.	Measure benefits of PLM implementation in daily operations, material costs, productivity of labor and quality costs.	Understand
CO3.	Apply PLM concepts for service industry and E-Business.	Apply
CO4.	Recognize tools and standards in PLM.	Understand
CO5.	Apply PLM systems in organization verticals including production, after sales, sales and marketing, and subcontracting	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S												L		
CO2	S	S	S	S						S			L		
CO3	S	M	L												
CO4	S	M	L												
CO5	S	S	M	L								L	L		

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO PRODUCT LIFE CYCLE MANAGEMENT

Definition - PLM Lifecycle model - Threads of PLM - Need for PLM - Opportunities and benefits of PLM - Views - Components and Phases of PLM - PLM feasibility study - PLM visioning - Characteristics of PLM - Environment driving PLM - PLM Elements - Drivers of PLM - Conceptualization - Design - Development - Validation - Production - Support of PLM

PRODUCT DATA MANAGEMENT (PDM) PROCESS AND WORKFLOW

Engineering vaulting - product reuse - smart parts - engineering change management - Bill of materials and process consistency - Digital mock-up and prototype development - design for environment - virtual testing and validation - marketing collateral.

COLLABORATIVE PRODUCT DEVELOPMENT

Steady one-dimensional convection and diffusion – Central, upwind differencing schemes properties of discretization schemes – Conservativeness, Boundedness, Transportiveness, Hybrid, Power-law, QUICK Schemes.

DIGITAL MANUFACTURING – PLM

Digital manufacturing - benefits manufacturing - Manufacturing the first-one - Ramp up - virtual learning curve - manufacturing the rest - production planning.

DEVELOPING A PLM STRATEGY AND CONDUCTING A PLM ASSESSMENT

Strategy - Impact of strategy - implementing a PLM strategy - PLM initiatives to support corporate objectives - Infrastructure assessment - assessment of current systems and applications.

Text Books

1	Stark, John. Product Lifecycle Management: Paradigm for 21st Century Product Realisation, Springer-Verlag, 2004.
2	Product Lifecycle Management, Michael Grieves, Tata McGraw Hill 2012

Reference Books

1	Fabio Giudice, Guido La Rosa, Product Design for the environment-A life cycle approach, Taylor & Francis 2006

Course Designers				
S.No	**Faculty Name**	**Designation**	**Department/Name of the College**	**Email id**
1	M.SARAVANA KUMAR	Asst. Prof grII	MECH./ AVIT	saravanakumar@avit.ac.in

17MESE21	IRON AND STEEL MAKING	Category	L	T	P	Credit
		EC(SE)	3	0	0	3

PREAMBLE

This course aims tounderstand the process of production of iron and steel from raw material, primary processing to refinement to special steels The student will understand the kinetics involved in the production of iron and steel. The student also gains knowledge on the refinement of steels to obtain a quality product.

PREREQUISITE- NIL

COURSE OBJECTIVES

1	Acquire the knowledge of raw materials and burden preparation
2	Understand the principles and processes of iron making
3	Understand the principles and processes of steel making
4	Acquire knowledge on various steel making processes
5	Understand and gain knowledge on production practice followed and recent development

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the problems associated with Indian raw materials and burden preparation.	Understand
CO2. Understand and apply the extraction techniques of pig iron by reduction and smelting in blast furnace from iron ores.	Apply
CO3. Understand the principles and need for development of steel making processes	Understand
CO4.Acquire knowledge on various furnaces for steel manufacturing and select suitable furnaces.	Apply
CO5. Apply the modern development in the steel and cast iron making production practice	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	S	-	-	M	L	M						L		
CO2	S	S	L	-	M	-	M						L		
CO3	L	M	M	-	-	M	S						L		
CO4	S	L	-	-	M	-	M						L		

CO5	S	M	M	-	-	-	M						L		

S- Strong; M-Medium; L-Low

SYLLABUS

RAW MATERIALS AND BURDEN PREPARATION

Iron ore classification, Indian iron ores, limestone and coking coal deposits, problems associated with Indian raw materials, Iron ore beneficiation and agglomeration, Briquetting, sintering, Nodulising and pelletizing, testing of burden materials, burden distribution on blast furnace performance.

PRINCIPLES AND PROCESSES OF IRON MAKING

Blast furnace parts, construction and design aspects, ancillary equipment for charging, preheating the blast, hot blast stoves, gas cleaning, Blast furnace operation, irregularities and remedies, Blast furnace instrumentation and control of furnace Compositional control of metal and slag in blast furnace, modern trends in blast furnace practice. Reduction of iron ores and oxides of iron by solid and gaseous reductions-thermodynamics and kinetics studyof direct and indirect reduction, Gruner‘s theorem, blast furnace reactions. C-O and Fe-C-O equilibria, Rist diagrams, Ellingham diagram, material and heat balance- Sponge Iron making.

PRINCIPLES OF STEEL MAKING

Development of steel making processes, physico-chemical principles and kinetic aspects of

steel making, carbon boil, oxygen transport mechanism, desulphurisation, dephosphorisation, Slag Theories, slag-functions, composition, properties and theories, raw materials for steel making and plant layout

STEEL MAKING PROCESSES

Open Hearth process- constructional features, process types, operation, modified processes,

Duplexing, pre-treatment of hot metal. Bessemer processes, Side Blown Converter, Top Blown

processes-L.D, L.D.A.C., Bottom blown processes, combined blown processes, Rotating

oxygen processes-Kaldo and Rotor, Modern trends in oxygen steel making processes-Electric

Arc and Induction furnace-constructional features. Steel Classifications and Standards-National and International.- Alloy Designation.

STEELS AND CAST IRON LADLE METALLURGY

Production practice for plain carbon steels, low alloy – Cast irons and ductile iron, stainless, tool and special steels, modern developments. Secondary steel making processes,continuous steel casting process – Deoxidation and teeming practice. Principle, methodsand their comparison, Killed, Rimmed and Capped steels, Degassing practices, ingotproduction, ingot defects and remedies. Recent trends in steel making technology.

Text Books:

1. Tupkary, R. H., ―Modern Iron Making‖, 4th edition, Khanna Publishers, New Delhi.
2. Tupkary, R. H., ―Modern Steel Making‖, 4th Edition, Khanna Publications, New Delhi.

Reference:

1. Biswas, A. K., ―Principles of blast furnace iron making: theory and practice‖, SBA Publications, Kolkata.
2. Bashforth, G. R., ―Manufacture of Iron and Steel‖, Vol. I, Chapman and Hall London.
3. Bashforth, G. R., ―Manufacture of Iron and Steel‖, Vol.2, 3rd Edition, Chapman & Hall, London.
4. ―Making, Shaping and Treating of Steel‖, US Steel Corporation, 11th edition.
5. AhindraGhosh and Amitchatterjee, ―Iron Making and Steel Making – Theory and Practice‖, Prentice Hall of India Private Ltd., New Delhi.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1	S.Arunkumar	Assistant Professor	Mech/VMKVEC	

17MESE25	COMPUTATIONAL FLUID DYNAMICS	Category	L	T	P	Credit
		EC(SE)	3	0	0	3

Preamble

This course introduces the finite difference methods as a means of solving different type of differential equationsthat arise in fluid dynamics. Fundamentals of numerical analysis, ordinary differential equations and partial differential equations related to fluid mechanics and heat transfer will be reviewed. Error control and stability considerations are discussed and demonstrated.

Prerequisite

1. Engineering Thermodynamics
2. Fluid Mechanics And Machinery

Course Objective

1	To understand basic properties of computational methods
2	To introduce Governing Equations of viscous fluid flows
3	To learn computational solution techniques for time integration of ordinary differential equations
4	To introduce numerical modeling and its role in the field of fluid flow and heat transfer
5	To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Discuss the basic properties of computational methods	Understand
CO2.	Discuss the Governing Equations of viscous fluid flows	Understand
CO3.	Solve problems in computational solution techniques for time integration of ordinary differential equations	Analyze
CO4.	Solve problems in numerical modeling and its role in the field of fluid flow and heat transfer	Analyze
CO5.	Determine the various discretization methods, solution procedures and turbulence modeling.	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	S	M	M	L	M	L	-	-	-	-	-	L	L	-	-
CO2	S	M	M	L	L	L	-	-	-	-	-	-	L	-	L
CO3	S	M	M	L	L	L	-	-	-	-	-	L	L	-	L
CO4	S	S	S	M	L	L	-	-	-	-	-	-	L	-	L
CO5	M	M	M	L	L	M	-	-	-	-	-	-	L	-	L

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Computational Fluid Dynamics, Advantages, Applications, Future of CFD. Problem set up-pre-process, Numerical solution – CFD solver

GOVERNING EQUATIONS FOR CFD

Introduction, the continuity equation, the momentum equation, the energy equation, the additional equations for turbulent flows, generic form of the governing equations for CFD, boundary conditions.

CFD TECHNIQUES

Derivation of finite difference equations – Simple Methods – General Methods for first and second order accuracy-Finite volume formulation for steady state One, Two and Three -dimensional diffusion problems

FLOW FIELD ANALYSIS

Finite volume methods -Representation of the pressure gradient term and continuity equation – Staggered grid – Momentum equations – Pressure and Velocity corrections – Pressure Correction equation, SIMPLE algorithm and its variants – PISO Algorithms.

TURBULENCE MODELS AND MESH GENERATION

Turbulence models, mixing length model, Two equation (k-Є) models – High and low Reynolds number models – Structured Grid generation – Unstructured Grid generation – Mesh refinement – Adaptive mesh – Software tools.

Text Books

1	Versteeg, H.K., and Malalasekera, W.,‖An Introduction to Computational Fluid Dynamics‖: The finite volume Method, Pearson Education Ltd. Third Edition – 2014.
2	Ghoshdastidar, P.S., ―Computer Simulation of flow and heat transfer‖, Tata McGraw Hill Publishing Company Ltd.,

Reference Books

1	John D. Anderson ―Computational Fluid Dynamics - The basics with Applications‖, McGrawHill International Editions.
2	Anil W. Date, -Introduction to Computational Fluid Dynamics‖, Cambridge University Press, Reprinted 2010.
3	Yogesh Jaluria & Kenneth E. Torrance, ―Computational Heat Transfer‖, CRC press, 2nd Edition.
4	John. F. Wendt, ―Computational Fluid Dynamics – An Introduction‖, Springer, Third Edition, 2013.

Course Designers

S.No	**Faculty Name**	**Designation**	**Department/Name of the College**	**Email id**
1	S.PRAKASH	Assistant Professor (Gr-II)	Mech / AVIT	prakash@avit.ac.in

17MESE34	FAILURE ANALYSIS OF MATERIALS	Category	L	T	P	Credit
		EC(SE)	3	0	0	3

Preamble

This course covers failures of materials and causes of failure, topics include types of failure in components and equipments for failure analysis.

Prerequisite

NIL

Course Objective

1	To study the fundamentals of failure analysis
2	To study introduction to failure analysis
3	To study the causes of failure in components
4	To study the types of failure in components
5	To study the methods and equipments for failure analysis

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Apply the importance of failure analysis for automotive components and Determination of failure mode.	Apply
CO2.	Identify the failure mode identification methods andCorrosion failures.	Understand
CO3.	Describe thecauses of failure in components.	Understand
CO4.	Discuss the types of failures in components.	Understand
CO5.	Indentify the methods and equipments for failure analysis.	Analyze

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12	PSO 1	PSO 2	PSO3
CO1	S	M	M	-	-	M	-	-	-	-	-	-	L	-	-
CO2	S	M	M	-	-	L	-	-	-	-	-	-	L	-	-

CO3	S	M	M	-	-	M	-	-	-	-	-	-	L	-	-
CO4	S	L	L	-	-	L	-	-	-	-	-	-	L	-	-
CO5	S	M	M	-	-	L	-	-	-	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF FAILURE ANALYSIS

Importance of failure analysis for automotive components, Steps in typical failure analysis: Collection ofbackground data (review documentation and speak with appropriate individuals), Selection of failed andunfailed samples for examination, Preliminary examination of the failed part, Non-destructive evaluation, Mechanical testing, Macroscopic examination and analysis, Microscopic examination and analysis,Determination of failure mode, Chemical analysis, Fracture mechanics considerations, Full scale testing under service conditions, Analysisof the evidence, Formulation of conclusions, Recommendations toprevent reoccurrence, Sample preparation methods for failure analysis, Selection of locations/samples forfailure analysis.

INTRODUCTION TO FAILURE ANALYSIS

Failure mode identification methods, Failure mechanisms: Fatigue failures, fractography, effect of variables: part shape, type of loading, stress concentration, metallurgical factors, etc. Wear failures, adhesive, abrasive, erosive, corrosive wear. Corrosion failures, types of corrosion: uniform, pitting, selective leaching, intergranular, crevice, etc. Elevated temperature failures, creep, thermal fatigue, micro structural instability, and oxidation.

CAUSES OF FAILURE IN COMPONENTS

Misuse or Abuse, Assembly errors, Manufacturing defects, Improper maintenance, Fastener failure, Design errors, Improper material, Improper heat treatments, Unforeseen operating conditions, Inadequate quality assurance, Inadequate environmental protection/control, Casting discontinuities. Data compilation and identification of root cause.

TYPES OF FAILURES IN COMPONENTS

Fatigue failures, Corrosion failures, Stress corrosion cracking, Ductile and brittle fractures, Hydrogen

embrittlement, Liquid metal embrittlement, Creep and stress rupture.

METHODS AND EQUIPMENTS FOR FAILURE A NALYSIS

Selection of suitable testing methods for failure analysis, Selection of metallurgical equipments for failureAnalysis, SEM-EDAX.

Text Books

1	—Understanding How Components Fail‖ by Donald J. Wulpi; ASM International Publication.

2	—Analysis of Metallurgical Failures: by Vito J. Colangelo; Francis A. Heiser Wiley Publication
3	ASM Handbook Vol.11 - Failure Analysis and Prevention, ASM International Publication, 1995.
Reference Books	
1	—Metallurgy of Failure Analysis‖ by A K. Das; by McGraw-Hill Professional Publication.
2	Metallurgical Failure Analysis by Charlie R. Brooks; Ashok Choudury; McGraw-Hill Publication.
3	raphy Principles and Practice by Voort, George F. Vander; ASM International Publication
Course Designers	

S.No	**Faculty Name**	**Designation**	**Department/ Name of the College**	**Email id**
1	C.THIAGARAJAN	ASSISTANT PROFESSOR (GRADE-II)	Mechanical/AVIT	cthiagarajan@avit.acc.in

17MESE27	POWER PLANT ENGINEERING	Category	L	T	P	Credit
		EC(SE)	3	0	0	3

Preamble

Power Plant Engineering is the subject involving study of applying the thermal engineering concepts and machineries in the process of power generation. Power Plants are the backbone of a country involving in the generation of electric power.

Prerequisite - Thermal Engineering

Course Objective

1	To understand the objectives of power plants in a country's electrical power requirement.
2	To understand the operational methods of power generation using different energy sources.
3	To provide the knowledge of instrumentation involved in the operation and control of power plants
4	To estimate the cost and economics of power generation in different types of power plants.
5	To inculcate the knowledge of environmental impact of power plants on the society.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Understand the methods of power generation using different energy sources	Understand
CO2.	To state the instrumentation and control systems for a power plant	Understand
CO3.	To calculate the cost of power generation for a typical power plant	Apply
CO4.	To infer the environmental impacts of power plants on the society	Apply
CO5.	Prepare a layout for different power plants	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	S	-	-	-	-						M	M	M
CO2	S	M	M	M	M	-	-						M	S	M
CO3	M	S	S	S	-	-	-						M	M	S
CO4	M	S	S	S	M	M	S						M	M	S
CO5	S	S	S	S	S	S	-						M	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Power Generation: Global Scenario, Present status of power generation in India, Role of private and governmental organizations, Load shedding, Carbon credits, Power reforms, concept of cascade efficiency.

General layout of modern power plant with different circuits, working of thermal power plant, coal classification, coal,ash and dust handling, selection of coal for Thermal Power Plant, FBC boilers, high pressure boiler, cogeneration power plant (with numerical)

Steam Condenser: Necessity of steam condenser, Classification, Cooling water requirements, Condenser efficiency, Vacuum efficiency, Cooling towers, air Leakage, Effects of Air Leakage on condenser performance, (Numerical Treatment)

HYDROELECTRIC AND NUCLEAR POWER PLANTS

HEPP : Introduction, Plant Layout, Site Selection, Advantages and Disadvantages of HEPP, Hydrograph , Flow duration curve ,Mass Curve, Classification of HEPP with layout.

NPP : Elements of NPP, Nuclear reactor & its types, fuels moderators, coolants, control rod, classification of NPP, N-waste disposal

DIESEL & GAS TURBINE POWER PLANT

DEPP : Plant Layout, Diesel Engine Power Plant Performance Analysis, application, selection of engine size, advantages & disadvantages of diesel power plant.

GTPP : Introduction, fuels, materials selection for GTPP, Brayton Cycle analysis, Thermal Efficiency, Work ratio, maximum & optimum pressure ratio, Actual cycle effect of operating variables on thermal efficiency, inter-cooling reheating, & regeneration cycle, Open, Closed & Semi Closed cycles Gas Turbine Plant , combined cycle plant (Numerical Treatment).

NON-CONVENTIONAL POWER PLANTS

Wind Power plant : Introduction, wind availability measurement, types of wind machines, site selection, and wind power generation.

Solar Power Plant : Introduction, components ,Types of Collectors & Solar Ponds, Low & High Temperature Solar Power Plant. Photovoltaic Power System, Heliostat

Tidal, OTEC, geothermal, magneto hydrodynamics, fuel cell, hybrid power plants, Challenges in commercialization of Non-Conventional Power Plants.

INSTRUMENTATION , ECONOMICS AND ENVIRONMENTAL IMPACT

Power Plant Instrumentation Layout of electrical equipment, generator, exciter, short circuits & limiting methods, switch gear, circuit breaker, power transformers, methods of earthing, protective devices & Control system used in power plants, Control Room.

Economics of Power Generation: Introduction, Cost of electric energy, Fixed and operating cost, (with numerical treatment), Selection and Type of generation, Selection of generation equipment, Performance and operation characteristics of power plants and Tariff methods.

Environmental impact due to power plants. Environmental aspects, introduction, constituents of atmosphere, different pollutants due to thermal power plants and their effects of human health, Environmental control of different pollutant such as particulate matter, Oxides of sulphur, nitrogen, global warming & green house effect, thermal pollution of water & its control. Noise pollution by power plants.

Text Books

1	E.I.Wakil, ―Power Plant Engineering‖, McGraw Hill Publications New Delhi
2	P.K.Nag, ―Power Plant Engineering‖, McGraw Hill Publications New Delhi
3	K K Ramalingam ,‖ Power Plant Engineering, SCITECH Publications Pvt Ltd.
4	Domkundwar & Arora, ―Power Plant Engineering‖, Dhanpat Rai & Sons, New Delhi

Reference Books

1	R.K.Rajput, ―Power Plant Engineering‖, Laxmi Publications New Delhi
2	R.Yadav , ―Steam and Gas Turbines‖ ,Central Publishing House, Allahabad
3	G.D.Rai, ― Non-Conventional Energy Sources‖ Khanna Publishers,Delhi
4	S.P.Sukhatme, ―Solar Energy‖ Tata McGraw-Hill Publications, New Delhi

Course Designers

S.No	**Faculty Name**	**Designation**	**Department/Name of the College**	**Email id**
1	N.Lakshminarayanan	Associate Professor	MECH / AVIT	nlakshminarayanan@avit.ac.in
2	K.Surendar Babu	Associate Professor	MECH / AVIT	surendrababu@avit.ac.in

17ECEC04	DSP with FPGA	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE This course provides the students, the knowledge about implementation of Communication blocks on FPGA. It provides both the fixed point and floating point representation of data used for implementation. It considers algorithms and techniques for the optimal way of implementing the communication system blocks efficiently on FPGA.

PREREQUISITE – Signals and Systems

COURSE OBJECTIVES

1	To program FPGA device.
2	To discriminate floating point arithmetic for other arithmetic logic.
3	To implement FIR and IIR filters using pipelining and parallel processing
4	To design communication blocks using different types of FFT algorithms

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explore the design flow of FPGA and programming language.	Analyze
CO2. Compute simple FPGA logic using floating point arithmetic, MAC and SOP units	Apply
CO3. Implement FIR and IIR Filters using distributed arithmetic, pipelining and/or parallel processing	Apply
CO4. Examine the different types of FFT algorithms including Cooley-Tukey, Winograd and Good-Thomas.	Analyze
CO5. Design communication blocks for modulation, demodulation, convolution codes	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	L	-	-	-	-	M	-	M	M	L	L
CO2	S	S	L	M	M	-	-	-	-	M	-	M	M	L	-
CO3	S	S	M	M	L	-	-	-	-	L	-	M	L	L	L
CO4	S	S	M	M	-	-	-	L	-	L	-	M	M	L	-
CO5	S	M	M	M	-	-	-	L	-	L	-	M	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

FPGA Technology

Introduction to FPGA, FPGA Design flow, Programming languages, programming technology

Basic Building Blocks

Number Representation, Binary adders, Binary dividers, Floating point arithmetic, MAC & SOP unit

Digital filter implementation

FIR filter - Theory and structure, Filter Design, Constant coefficient, FIR Design, IIR filter - IIR theory, Coefficient computation, Implementation detail, Fast IIR filter

Fourier Transform

DFT algorithms, Goertzel algorithm, Hartley transform, Winograd DFT, Blustein chirp−z transform, Rader algorithm, FFT algorithms, Cooley-tukey, Good thomas, Winograd FFT

Communication blocks

Error control codes, Linear block code, Convolution codes, Modulation and Demodulation, Adaptive filters, LMS, RLS, Decimator and Interpolator, High Decimation Rate filters.

Text Books

1. Uwe.Meyer-Baese, ―Digital Signal Processing with Field Programmable Gate Arrays‖, Springer, Third edition, May 2007.
2. Keshab K. Parhi, ―VLSI Digital Signal Processing systems, Design and implementation‖, Wiley, Inter Science, 1999.

Reference Books

1. John G. Proakis, ―Digital Communications,‖ Fourth Ed. McGraw Hill International Edition, 2000.
2. Michael John Sebastian Smith, ― Applications Specific Integrated Circuits‖, Pearson Education, Ninth Indian reprint,13th edition,2004.
3. Sophocles J. Orfanidis, ―Introduction to Signal Processing‖, Prentice Hall, 1996

COURSE DESIGNERS

1	**Dr.T.SHEELA**	sheela@vmkvec.edu.in
2		
3		

17ECEC06	MEMS & SENSORS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

In recent years, MEMS have revolutionized the semiconductor industry, with sensors being a particularly buoyant sector. Smart MEMS and Sensor Systems presents readers with the means to understand, evaluate, appreciate and participate in the development of the field, from a unique systems perspective.The combination of MEMS and integrated intelligence has been put forward as a disruptive technology. The full potential of this technology is only evident when it is used to construct very large pervasive sensing systems.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	Understand the fundamental concept of MEMS and their relevance to current industry/scientific needs
2	Gain the physical knowledge underlying the operation principles and design of microsystems;
3	Build an understanding of microscale physics for use in designing MEMS applications
4	Understand the basic principles of MEMS sensors and actuators (mechanical, electrical, piezoresistive, piezoelectric, thermal, microfluidic)
5	Design the process flow of a basic MEMS device, such as an inertia sensor (accelerometer), given a fabrication process description.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Knowledge on the basics of MEMS and mechanics for MEMS Design	Understand
CO2. Ability to apply the basic knowledge of MEMS in different fields	Apply
CO3. Apply the MEMS for different applications.	Apply
CO4. Use concepts in common methods for converting a physical parameter into an electrical quantity	Apply
CO5. Locate different type of sensors used in real life applications and paraphrase their importance	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	-	L	-	-	-	-	-	-	M	L	-	-
CO2	S	S	M	M	M	-	-	-	-	-	-	M	M	-	-
CO3	S	S	M	M	L	M	-	-	-	-	-	M	M	-	-
CO4	S	S	S	-	L	S	-	-	-	-	-	M	L	M	-
CO5	S	M	S	S	S	S	M	-	-	-	-	M	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

OVERVIEW AND INTRODUCTION Introduction to Design of MEMS, Overview of Micro electromechanical Systems, Materials for MEMS: Silicon, silicon compounds, polymers, metals ,Micro fabrication, Micromachining: Bulk Micromachining, Surface Micromachining, High Aspect-Ratio (LIGA and LIGA-like) Technology; Packaging: Microsystems packaging, Essential packaging technologies, **S**election of packaging materials

MECHANICS FOR MEMS DESIGN Elasticity, Stress, strain and material properties, Bending of thin plates, Spring configurations, torsional deflection, Mechanical vibration, Resonance, Thermo mechanics – actuators, force and response time, Fracture and thin film mechanics.

MEMS APPLICATION Case studies – Capacitive accelerometer, Peizo electric pressure sensor, Microfluidics application, Modeling of MEMS systems, CAD for MEMS.

INTRODUCTION AND DISPLACEMENT MEASUREMENT Sensors - Basic requirements of a sensors- Classification of sensors- Static and Dynamic characteristics of sensors- Displacement Sensors- Linear and Rotary displacement sensors-Potentiometer, Capacitive and Inductive type displacement sensor- position sensors- Optical encoder, Photoelectric sensor, Hall Effect Sensor.

MICRO SENSORS AND ACTUATORS Micro Sensors: Principles and examples, Force and pressure micro sensors,position and speed micro sensors, acceleration micro sensors, chemical sensors,biosensors, temperature micro sensors and flow micro sensors. Micro Actuators: Actuation principle, shape memory effects-one way, two way and pseudo elasticity. Types of micro actuators- Electrostatic, Magnetic, Fluidic, Inverse piezo effect, other principles.

Text Books

1.N. P. Mahalik, ‐MEMS‖,Tata McGraw hill, Sixth reprint, 2012.
2.Stephen Santeria,‖ Microsystems Design‖, Kluwer publishers, 2000.

3. Sensor & transducers, D.Patranabis, 2nd edition, PHI

Reference Books

1. 1 Nadim Maluf,‖ An introduction to Micro electro mechanical system design‖, ArtechHouse, 2000.
2. Mohamed Gad-el-Hak, editor,‖ The MEMS Handbook‖, CRC press Baco Raton,2000.
3.. Tai Ran Hsu,‖ MEMS & Micro systems Design and Manufacture‖ Tata McGraw Hill, New Delhi, 2002.
Liu,‖MEMS‖, Pearson education, 2007..

4. Instrument transducers, H.K.P. Neubert, Oxford University press.

COURSE DESIGNERS

1	**Mrs.A.Malarvizhi**	malar.ece06@gmail.com
2		
3		

17ECEC21	ADVANCED ROBOTICS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE Advanced Robotics will explore in great depth areas relevant to not only industrial robotics but service robots (i.e. robots outside a factory environment particularly mobile robots) and the application of this technology to real world environments e.g. driverless vehicles, unmanned aerial vehicles and tele-robots. Students will also master robot kinematics and dynamics.

PREREQUISITE –

COURSE OBJECTIVES

1	To gain knowledge in robotic elements
2	To explore the kinematics of serial and parallel robotics
3	To know the motion of robot in various coordinates and surfaces

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Discriminate various robotic elements like sensors and actuators	Analyze
CO2. Analyze the kinematics of serial robot such as the direct and inverse kinematic problems	Apply
CO3. Analyze the kinematics of parallel robotics	Apply
CO4. Investigate the motion of robot in various coordinates	Analyze
CO5. Explore the motion of robot in several surfaces like flat surface, uneven terrain	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	L	-	-	-	-	M	-	M	M	L	L
CO2	S	L	L	M	M	-	-	-	-	M	-	M	M	L	-
CO3	M	M	M	M	L	-	-	-	-	L	-	M	L	L	L
CO4	S	S	M	M	-	-	-	L	-	L	-	M	M	L	-
CO5	S	M	M	M	-	-	-	L	-	L	-	M	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

Elements of robots -- joints, links, actuators, and sensors

Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and

external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.

Kinematics of serial robots

Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.

Kinematics of parallel robots

Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-from and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.

Motion planning and control

Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of constrained manipulators, Cartesian control, Force control and hybrid position/force control, Advanced topics in non-linear control of manipulators.

Modeling and analysis of wheeled mobile robots

Introduction and some well known wheeled mobile robots (WMR), two and three-wheeled WMR on flat surfaces, Slip and its modeling, WMR on uneven terrain, Design of slip-free motion on uneven terrain, Kinematics, dynamics and static stability of a three-wheeled WMR‘s on uneven terrain, Simulations using Matlab and ADAMS.

Reference Books

1. Ghosal, A., Robotics:Fundamental Concepts andAnalysis, Oxford UniversityPress, 2nd reprint, 2008.
2. Fu, K., Gonzalez, R. and Lee, C.S. G., Robotics: Control, Sensing, Vision andIntelligence¸McGraw- Hill, 1987

COURSE DESIGNERS

1	**N.MANIKANDA DEVARAJAN**	manikandadevarajan@vmkvec.edu.in
2		
3		

17ECEC22	INNOVATIVE PROJECT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE This course is an introductory course on Innovative Project. It focuses on providing you with the knowledge and fundamental understanding of Creativity, Innovation, and some contemporary approaches to innovation including design thinking. The course will cover seminal models, key principles and methods and techniques in innovation and design thinking, including their applications.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To Develop Creativity and Innovation
2	To Recognize the significance of innovation
3	To Examine the approaches of innovation practiced by various organizations

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Discuss both individual and contextual factors that are linked to creativity	Analyze
CO2. Discuss key concepts and principles that guide innovative practices	Analyze
CO3. Discuss the need for and significance of adopting a design thinking mindset	Analyze
CO4. Explain design thinking practices and their applications	Apply
CO5. Apply the design thinking principles and process	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	L	-	-	-	-	M	-	M	M	L	L
CO2	S	L	L	M	M	-	-	-	-	M	-	M	M	L	-
CO3	M	M	M	M	L	-	-	-	-	L	-	M	L	L	L
CO4	S	S	M	M	-	-	-	L	-	L	-	M	M	L	-
CO5	S	M	M	M	-	-	-	L	-	L	-	M	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Group Case Studies/Assignments
   a. Overall understanding of the case/assignment
   b. Highlighting innovations and various approaches adopted
   c. Clarity and coherence of presentation
2. Group Project
   a. Overall, application of Innovation and Design thinking process
   b. Originality of ideas from the modernization
   c. Quality and relevance of final prototype
   d. Preparation of Project Report
   e. Preparation and Submission of Projects to funding agencies

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.T.Muthumanickam	Professor & Head	ECE	muthumanickam@vmkvec.edu.in

17ECEC23	INTRODUCTION TO MACHINE VISION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE To introduce the students the concepts behind machine vision and object recognition techniques

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To understand the fundamental of digital image processing
2	To understand the concepts of edge detection, segmentation and texture analysis
3	To understand the concepts of image analysis
4	To understand the concepts of 3D vision and motion
5	To get introduced to the concepts behind pattern recognition schemes

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the basic operation of imaging techniques in the computers	Remember and Understand
CO2: Analyze the basic processing techniques of image processing	Analyze
CO3: Study and analyze the pattern of computer understandings of structures.	Evaluate
CO4: Understand and study the 3D create new standards for securing the data	Create
CO5: Evaluate the various real time computer vision systems.	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	M	L	S	-	-	-	-	-	-	-	-	L	-	-	-
CO3	S	S	M	-	L	-	-	-	-	-	-	L	-	-	-
CO4	S	M	M	-	S	-	-	-	-	-	-	S	-	-	-
CO5	S	M	L	-	M	-	-	-	-	-	-	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

LEVEL VISION – INTRODUCTION TO IMAGE PROCESSING 9

Fundamental steps in digital image processing – Components of an image processing system –Image sampling and quantization – Basic relationships between pixels – Basic intensity transformation functions – Fundamentals of spatial filtering – Basics of filtering in frequency domain – Filtering in spatial and freuency domains.

LOW LEVEL VISION - EDGE DETECTION, SEGMENTATION & TEXTURE 9

Thresholding Techniques, Edge Detection, Corner and Interest Point Detection, Mathematical Morphology, Texture.

INTERMEDIATE LEVEL VISION 9

Binary Shape Analysis, Boundary Pattern Analysis, Line Detection, Circle and Ellipse Detection, the Hough Transform and Its

Nature, Pattern Matching Techniques.

3D VISION AND MOTION **9**

The Three-Dimensional World, Tackling the Perspective n-point Problem, Invariants and Perspective, Image Transformations and Camera Calibration, Motion.

REAL TIME PATTERN RECOGNITION SYSTEMS **9**

Automated Visual Inspection, Inspection of Cereal Grains, Surveillance, In-Vehicle Vision Systems, Statistical Pattern Recognition.Image Acquisition, Real-Time Hardware and Systems Design Considerations.

Text Books

1. Digital Image Processing‖, Rafael C Gonzalez & Richard E Woods, Pearson Education International, Third Edition, 2008, ISBN 0 13 168728-x, 978-0-13-168728-8.
2. ―Computer and Machine Vision: Theory, Algorithms, Practicalities‖, E R Davies, Fourth Edition, 2012, Academic Press, Elsevier.

Reference Books

1. Digital Image Processing, Bernd Jahne, Springer -Verlag, Fifth Edition, 2002, ISBN 3-540 - 67754 - 2.
2. The Essential Guide to Image Processing", Al Bowik,2009, Elsevier Inc, ISBN 978-0-12-374457-9.
3. Machine Vision Algorithms and Applications, C Steger, M Ulrich, & C Wiedemann, First Edition, Wiley VCH, 2006, ISBN 3527407340.

COURSE DESIGNERS

1	P. Subramanian	subramanian@avit.ac.in

17MBHS10	LEAN START-UPS MANAGEMENT	Category	L	T	P	Credit
		HSS	3	0	0	3

PREAMBLE:

Lean start-ups Management is an approach to building new businesses based on the belief that entrepreneurs must investigate experiment, test and iterate as they develop products. It is a methodology for developing businesses and products, which aims to shorten product development cycles and rapidly discover if a proposed business model is viable; this is achieved by adopting a combination of business-hypothesis- driven experimentation, iterative product releases, and validated learning.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the Lean Startups Management basics.
2. To understand the different managerial activities/stages involved in lean startups of Management
3. To understand the lean startups approaches and problem solving in startups.
4. To impart the lean six sigma concepts and its application in startups management.
5. To impart the various issues , and entrepreneurial traits.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Explain the concept of lean startups, objectives and functions of lean starts-ups management.	Understand
CO2: Analyze startups management stages/process and its execution in business.	Apply
CO3: Analyze the lean startups approaches and its application to reduce the problems in lean startups business.	Apply
CO4: Reduce project completion cycle times and results by using lean six sixma methodologies and tools.	Apply
CO5: Assess the entrepreneurial problems and its traits.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	-	-	-	-	M	S	S	-	M	-	-		
CO2	S	S	S	M	M	M	-	-	-	-	-	-		
CO3	S	S	S	M	M	M	-	-	-	-	-	-		
CO4	S	S	S	M	M	M	-	-	-	-	-	-		
CO5	S	S	S	M	M	M	-	-	-	-	-	-		

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction: Startup – Entrepreneur – Self Assessment – Setting Lean Startup Methods and Non-tech small business- Picking the Right type of lean startup.

Starting and Growing a business: Identification of Innovation – Idea Formation – Brain storming – Risk Assessment – Value and Growth - Startup company operations management – The build - Measure, Lean Loop.

Lean Approach and Problems Solving: Solving Business Challenges with a Lean Approach: Identify the problem - Identify the root causes - Brainstorm the solutions - Select the appropriate solution - Implement and check the impact of the solution - The Frugal Entrepreneur – Saving Money and Pay off Later Approach – Bootstrap Business.

Lean Startups and Lean Six Sigma: Lean Startup a stepping stone: vision and concept - Maximize the probability- Protect against making obvious mistakes - Attract co-creators - Attract finance - Attract Joint Ventures – Project track - Lean Six Sigma reduce costs for Startup Businesses.

Startup Issues: Niche Marketing: Meaning, Benefits – Strategy for Niche Approach – Business Startup: Difference between small business and startup – Startup Problems - Becoming an entrepreneur: Entrepreneurial Traits

Text Book:

1. Harry Altman (2017), Lean Startup: Essential Guide to Build Your Lean Startup and How to Start Step-by-step, Create Space Independent Publishing Platform.

Reference Books:

1. Osterwalder, A & Pigneur,Y. (2010) Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. Hoboken, NJ: John Wiley & Sons.
2. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Random House Digital, Inc.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. G. Palaniappan	Asso. Professor	Management Studies	Palani.sunn@gmail.com
2	Dr. G. Murugesan	Professor	Management Studies	selvasahana.m@gmail.com

17CVSE01	APPLICATION OF STATISTICAL METHODS IN CONSTRUCTION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course is designed to provide the solid foundation on topics in various statistical methods which form the basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling.

PREREQUISITE

Engineering Mathematics.

COURSE OBJECTIVES

1	To gain the knowledge of Analyze the one dimensional random variable and their properties and functions.
2	To focused on Analyze and study about the estimation theory using various methods.
3	To study about Analyze and test the hypotheses based on different distributions and attributes
4	To gain the knowledge Analyze the variance and perform randomized block and Latin square design.
5	To calculate the Analyze and work on different queuing models.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyze the one dimensional random variable and their properties and functions.	Analyze
CO2. Analyze and study about the estimation theory using various methods.	Analyze
CO3. Analyze and test the hypotheses based on different distributions and attributes	Analyze
CO4. Analyze the variance and perform randomized block and Latin square design.	Analyze
CO5. Analyze and work on different queuing models.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	M	--	--	S	--	--	--	--	--	--	--	--	--	--	--
CO2	M	--	--	S	--	--	--	--	--	--	--	--	--	--	--
CO3	M	--	--	S	--	--	--	--	--	--	--	--	--	--	--
CO4	M	--	--	S	--	--	--	--	--	--	--	--	--	--	--
CO5	M	--	--	S	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

PROBABILITY AND DISTRIBUTIONS: Probability theory and its importance: Definition of probability, Rules of Probability, The Baye‘s theorem. Random variable. Probability distribution. Mean or Expectation of Random variable. Properties of Mean of Expectation. Theoretical probability Distributions: Binomial Distribution, Poisson distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.

TESTING OF HYPOTHESIS: Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.

CORRELATION ANALYSIS: Correlation types, co-efficient. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis.

REGRESSION ANALYSIS: Regression and Multivariate Analysis, Multiple Regression Analysis on linear Regression. Use of regression analysis in resources management.

APPLICATIONS: Use of mathematical models based on probabilistic and statistical methods, simulation in risk identification, analysis and mitigation of project risks. EOQ in civil engineering, Sensitivity analysis, ABC analysis.

TEXT BOOKS:

1. John E Freund's Mathematical Statistics: (7th Ed.), Miller & Miller, Prentice-Hall
2. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009

REFERENCES:

1. Applied Statistics and Probability for Engineers---Montgomery and Runger—Wiley,India.
2. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill International Edition, 1970.
3. Sampling techniques-Cochran, Wiley Series, 2008.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE02	ENTERPRISE WIDE INFORMATION SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course is designed to provide the student with a thorough understanding of both the role that Enterprise Resource Planning Systems (ERPs) play in an organization and the challenging task of managing the Information Systems (IS) function.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To introduce Enterprise resource planning
2	To make students understand the financial accounting
3	Explain how _best business practices‘ are incorporated in an ERP
4	Execute an entire business process chain in the areas of sales, Procurement, Production and Accounting
5	To study about the Materials requirement planning, billing & work centers.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The introduce Enterprise resource planning	Apply
CO2. Definition _best business practices‘ are incorporated in an ERP	Understand
CO3. The _best business practices‘ are incorporated in an ERP	Apply
CO4. An entire business process chain in the areas of sales, Procurement, Production and Accounting	Understand
CO5. Apply appropriate methods to collect the Materials requirement planning, billing & work centers.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	L	--	--	--	--	--	-	--	--	--	--	--	--

CO2	M	M	L	L	--	M	L	--	M	--	--	--	--	--	--
CO3	M	M	M	--	--	M	L	--	M	--	M	--	--	--	--
CO4	M	M	M	M	--	M	M	--	M	--	--	--	--	--	--
CO5	L	--	M	L	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Overview - database applications -Business function vs business process-Introduction to Enterprise Resource Planning (ERP)

FINANCIAL ACCOUNTING: Financial Accounting basics – Balance sheet, Profit and Loss Statement- General Ledger, Chart of Accounts –Posting financial transaction-Controlling – Cost centers and cost elements-Allocating Costs – Assessments and distributions.

BUSINESS PROCESSES: Sales and fulfillment cycle -Master Data and its role in ERP systems -Creating customer master data, material master data and pricing conditions -Implementing a Sales Cycle

PROCUREMENT PROCESSES: Forecasting raw material requirements using sales information, production requirements, sales forecast-Raw Material procurement-Vendors and pricing conditions-Payment.

PLANNING AND CONTROL: MRP – Materials requirement planning-Independent and dependent materials requirements-Creating Production orders and schedules-Bill of Materials-Executing a Production process-Inventory and Goods movement-Routing and work centers.

TEXT BOOKS:

1. Enterprise Resource Planning, 3rd Edition, by *Bret Wagner and Ellen Monk*, ISBN: 9781423901792,2009
2. SAP R/3, Business Blueprint, 2nd Edition, by *Thomas A. Curran & Andrew Ladd*, Prentice Hall PTR, 2000, ISBN: 0-13-085340-2

REFERENCES:

1. Essentials of Business Processes and Information Systems, by Simha R. Magal and Jeffrey Word , ©2010, ISBN: 978-0-470-23059-6
2. Integrated Business Processes with ERP Systems, Preliminary Edition, by Simha R. Magal and Jeffrey Word, ISBN: 978-0-470-88424-9

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE03	MANAGEMENT AND PROJECT PLANNING IN CONSTRUCTION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To study the elements of construction project management; consisting of owners‘ perspective, organization, design and construction procedures, resource utilization and cost estimation.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	Know the types and financing of construction and changing environment of the industry.
2	Understand the organization of project management. Understand the organization of project management.
3	Know the design and construction process as an integrated system.
4	Know the labour, material and equipment utilization
5	Understand Cost Estimates and the Costs Associated with Construction Facilities.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The types and financing of construction and changing environment of the industry.	Apply
CO2. The organization of project management.	Understand
CO3. The design and construction process as an integrated system.	Apply
CO4. The labour, material and equipment utilization	Understand
CO5. Cost Estimates and the Costs Associated with Construction Facilities.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	L	--	--	--	--	--	-	--	--	--	--	--	--
CO2	M	M	L	L	--	--	--	--	M	--	--	--	--	--	--

CO3	M	M	M	L	--	--	L	--	M	--	M	--	--	--	--
CO4	S	M	M	M	--	--	L	L	M	--	--	--	--	--	--
CO5	S	M	M	--	--	--	--	--	--	--	--	L	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

Basics of Management: Modern scientific management, Management Functions, Management Styles

Project Management: Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multistoried structures, ports, tunnels, Qualities, role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management.

Project Scheduling and Project Controlling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, RPM (Repetitive Project Modeling) techniques. LOB technique, Mass haul diagrams. Precedence Network Analysis, software in Construction scheduling (MSP, primavera, Construction manager). Monitoring and Control, Crashing, Resource Leveling, Updating.

Construction Management and Work Study: Site mobilization – demobilization aspects, various Resources management based on funds availability. Co-coordinating, communicating & reporting techniques. Application of MIS to construction. Training of Construction Managers. Definition, Objectives, basic procedure, method study and work measurement, work study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams. Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse photography technique, Analytical production studies.

Safety Engineering and Administration of Incentive Schemes: Causes of Accidents on various sites, safety measures and safety policies to be adopted, determination of safety parameters, personal protective equipments. Workmen Compensation Act. Necessity, Merit rating, job evaluation, installation, modification and maintaining of incentive schemes based on implementation experience.

TEXT BOOKS:

1. Construction Planning & management By P S Gahlot & B M Dhir , New Age International Limited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
3. Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson,2012

4. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2nd Edition, 2011

REFERENCES:

1. Construction Project Management Planning, Scheduling and Controlling-Chitakara Tata McGraw Hill, New Delhi
2. Construction Management – Roy, Pilcher
3. Construction Management – O'Brien.
4. Project Management-Planning and Control---Rory Burkey 4th ed.—Wiley, India.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE04	CONSTRUCTION CONTRACTS AND ADMINISTRATION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course will create awareness on contracts for construction industry; impart knowledge on tender preparation, tendering process, laws on arbitration, arbitration procedure and laws on dispute resolution in India.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To construct contracts
2	To study the procedures of contracts
3	To understand resolution methods
4	Conditions of contracts
5	To study in detail about arbitration

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the laws on contracts for construction industry in India	Understand
CO2. Apply knowledge of contracts in preparation of contract document and tendering process	Apply
CO3. Apply appropriate methods to assess the critical factors in contracts leading to arbitration and disputes between the parties	Apply
CO4. Apply appropriate methods to assess the critical factors in contracts leading to arbitration and disputes between the parties	Apply
CO5. Understand the Objectives, general provisions of Indian Arbitration And Conciliation Act 1996	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	--	--	--	--	--	--	--	M	--	S	--	--	--	--

CO2	S	L	--	--	--	M	S	--	S	--	S	M	--	--	--
CO3	S	S	M	--	--	M	--	--	S	--	S	M	--	--	--
CO4	S	M	M	--	--	M	--	--	S	--	S	--	--	--	--
CO5	S	L	--	--	--	--	--	--	M	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

CONSTRUCTION CONTRACTS: Standard forms of contracts, methods of inviting tenders, pre-bid meetings, pre-qualification system, scrutiny of tenders and comparative statement-Contract formation, conditions of contracts, contracts with various stakeholders on a major construction projects, contract pricing by the client, project management consultants and the contractor, contract performance, contract correspondence and contract closure

CONSTRUCTION CLAIMS: Extra items and causes of claims. Types of construction claims, documentation. Settlement of claims, extension of time.

DISPUTE RESOLUTION: Causes of disputes and importance of role of various stakeholders in prevention of disputes, Alternate Dispute Resolution methods- mediation, conciliation, arbitration and Dispute Resolution Boards.

CONTRACT CONDITIONS: a) General condition and Particular conditions, conditions of Ministry of Statistics and Program Implementation- Government Of India. Model forms of contract. Role of Planning Commission.

b) ICE conditions-Introduction, FIDIC conditions- evolution of FIDIC document, types based on whether design is of employer or contractor, Design & Build contract, EPC contract, short forms of contract- Colour Code.

ARBITRATION: Indian Arbitration And Conciliation Act 1996 Difference between 1940 Act and 1996 Act. Extent of application of 1996 Act. Objectives, general provisions. Composition of the arbitral tribunal, jurisdiction of arbitral tribunal, duties, power of arbitrators

TEXT BOOKS:

1. Civil Engineering Contracts and Estimates - B. S. Patil – Universities Press- 2006 Edition reprinted, in 2009.
2. The Indian Contract Act (9 of 1872), 1872- Bare Act- 2006 edition, Professional Book Publishers.
3. The Arbitration and Conciliation Act,(1996), 1996 (26 of 1996)- 2006 Edition, Professional Book Publisher.

REFERENCES:

1. Arbitration, Conciliation and Alternative Dispute Resolution Systems- Dr. S.R. Myneni- 2004 Edition,
2. Standard General Conditions for Domestic Contracts- 2001 Edition- Published by Ministry Of Statistics and

Program Implementation, Government of India.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE05	TQM IN CONSTRUCTION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of this course to provide the knowledge of quality in a particular system.

PREREQUISITE

Total quality Management

COURSE OBJECTIVES

1	Understand quality concepts and philosophies of TQM
2	To gain knowledge about the Apply TQM principles and concepts of continuous improvement
3	To study the analyze of the quality tools, management tools and statistical fundamentals to improve quality
4	Understand the TQM tools as a means to improve quality
5	Remember and understand the quality systems and procedures adopted

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Quality concepts and philosophies of TQM	Understand
CO2. Apply TQM principles and concepts of continuous improvement	Apply
CO3. Apply and analyze the quality tools, management tools and statistical fundamentals to improve quality	Analyze
CO4. The TQM tools as a means to improve quality	Apply
CO5. The quality systems and procedures adopted	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	--	--	--	--	--	--	L	--	--	--	--	--
CO2	S	M	L	S	--	--	--	--	--	L	S	--	--	--	--

CO3	S	M	M	S	--	--	--	M	M	--	--	--	--	--	--
CO4	S	M	M	M	--	--	--	M	M	--	--	--	--	--	--
CO5	S	M	M	--	--	--	--	--	--	--	--	L	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

CONCEPTS OF QUALITY: Definition of quality as given by Deming, Juran, Crosby, difference between Quality control, Quality Assurance (QA/QC). Total quality control (TQC) and Total Quality Management (TQM), Need for TQM in construction industry. Organization necessary for implementation of quality- Quality aspects in every phase in the life cycle of Construction project.

QUALITY CONTROL TOOLS AND STATISTICAL QUALITY CONTROL: Histogram, Pareto diagram, Fishbone diagram, Quality control chart-Testing required for quality control of construction material used in RCC Work- destructive and Non destructive Test (NDT) - Statistical Quality Control- Necessity, Benchmarking, Application of dispersion methods in quality control of construction activity

DEVELOPMENT OF HUMAN RESOURCES: Training needs assessment, technical and managerial competencies necessary for achieving quality, preparation for training. Training on Project Rework Reduction Tool (PRRT) software- training for preparation of checklist necessary for RCC work, for commonly used formats

QUALITY CIRCLE: Development of quality circles, quality inspection team, inspection reports, monitoring and control, 360_ feedback for quality.

TQM ON CONSTRUCTION PROJECTS: Advantages, barriers, principles, steps in implementation, seven types of construction defects. Determining cost of poor quality including hidden cost. Quality functions deployment (QFD). Importance of third party quality audits.

TEXT BOOKS:

1. Mantri Handbook – A to Z of Construction – Mantri Publications ,2001
2. Juran_s Quality Handbook – Joseph M. Juran, A. Blanton. Godfrey – Mcgraw Hill International Edition (2004)

REFERENCES:

1. Chitkara. K.K. –Construction Project Management: Planning Scheduling and Control‖, Tata McGraw Hill Publishing Company, New Delhi, 2008.
2. Calin M. Popescu, Chotchal Charoenngam, –Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications‖, Wiley, New York, 2005.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE06	HUMAN RESOURCE MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE To Understand the most theoretical models and key concepts in Human Resources Management within in organizations.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	Understand HRD parameters
2	Understand the principle techniques concerning people management within organizations
3	To understand HRD policies
4	To calculate manpower
5	To plan for career and development

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Discuss how to strategically plan for the human resources needed to meet organizational goals and objectives	Apply
CO2. Define the process of job analysis and discuss its importance as a foundation for human resource management practice	Understand
CO3. Comprehend the human resource management and evaluative practices	Apply
CO4. Remember and understand the Techniques of manpower planning, Estimation of manpower for company project	Understand
CO5. Understand the Career & Development Planning and market surveying.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	--	--	--	--	--	--	L	--	--	--	--	--
CO2	S	M	L	S	--	--	M	--	--	L	S	--	--	--	--

CO3	S	M	M	S	--	--	M	--	--	--	--	--	--	--	--
CO4	M	L	--	--	--	--	--	--	--	--	M	--	--	--	--
CO5	M	L	S	--	--	M	--	--	--	--	M	L	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Need of HRD in the context of globalization, various HRD parameters viz. performance appraisal, potential appraisal, training rewards and recognition etc. Elements of the ICDP i.e. integrated construction development paradigm, key elements of HRD such as basic literacy, functional skills, supervisory skills, entrepreneurship skills. Personal Management – Concept of Personal Management, Role and Function of Personal Manager, Necessity of Personal Management.

TRAINING: Training of multi-skilled workforce, quality, productivity and employee relations in construction, training of engineers related to issues such as management capabilities, formation 26 of joint ventures, privatization and BOT type of systems

HRD DEPARTMENT AND HRM: Structure of department, personal office at head office and project site, personal selection, placement, training, transfer, promotion, retirement, health, welfare, working conditions, relation with other departments, workers participation in management, distinct processes associated with human resource management viz. sourcing, outsourcing, de-centering, flexi working, multi-skilling issues related with subcontracting.

MANPOWER CALCULATIONS: Techniques of manpower planning, Estimation of manpower for company project, Manpower estimation at various stages, considering Risk due to Lead – time. Remuneration – Remuneration of personal, Job evaluation, performance appraisal, merit – rating, various methods of deciding the Remuneration.

EMPLOYEE DEVELOPMENT AN RETENTION: Career & Development Planning- Approaches to Employee Career Development- Mentoring, Coaching and Succession Planning- Managing Turnover- Measuring & Monitoring Job Satisfaction- External Equity & Market Surveys

TEXT BOOKS:

1. Human Resource Management by Biswajeet Pattanayak,2005
2. Personnel Management by Monappa A. – Tata McGraw Hill, New Delhi1997
3. Nair M. R. R, ―Excellence through Human Resource Development‖, Tata McGraw Hill.,2006

REFERENCES:

1. Rao T, -HRD in the New Economic Environment‖, Tata McGraw Hill, 1994.

2. Pareck , ‐HRD in the New Millenium‖, Tata McGraw Hill,1999

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE07	ENTERPRISE RESOURCE PLANNING SYSTEM	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To understand the key technical terminologies in enterprise information systems

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To teach basics of ERP
2	To develop life cycle concepts
3	To understand and gain insight into process views of organizations and tools and techniques used to model both as-is and to-be models.
4	To Know and be able to apply key technical terminology in enterprise information systems as they apply in different ERP products and development methods
5	Key differences between the major ERP applications and issues specific to these applications their configuration and management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand and gain insight into process views of organizations and tools and techniques used to model both as-is and to-be models.	Apply
CO2. Know and be able to apply key technical terminology in enterprise information systems as they apply in different ERP products and development methods	Apply
CO3. Analyze a current architecture and perform an effective gap analysis before an ERP implementation	Analyze
CO4. Effectively describe problems typical of ERP implementation projects and translate this information and use this information to anticipate and articulate the challenges associated with post-implementation management of ERP systems.	Understand
CO5. Synthesize prior theoretical and experiential knowledge in IT development and project	Apply

management with the current literature on Enterprise System development.	

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	--	--	--	--	--	--	--	--	--	--	--	--
CO2	S	M	L	S	--	S	M	-	L	S	--	L	--	--	--
CO3	S	M	M	S	--	S	--	M	M	S	--	--	--	--	--
CO4	S	M	M	M	--	L	--	--	--	--	--	--	--	--	--
CO5	S	M	M	--	--	--	--	--	L	--	--	L	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION AND OVERVIEW: Enterprise Level and ERP Concepts - Business and IT Integration Trends Case-Review of Project Planning & Management concepts Case on ERP Project Planning-Big Bang - Adopting SAP

LIFE CYCLE CONCEPTS: Development life cycle rationale- traditional ERP life cycles - accelerated ERP life cycles -Enterprise process modeling concepts. Enterprise process modeling tools and techniques ERP Implementation Challenges and Success Factors - Business Process Reengineering (BPR and ERP) ERP Fits and Misfits Analysis

ERP REQUIREMENTS MANAGEMENT: ERP Project Team Selection, Development and Project Communications -Change Management & Control ERP Configuration and Control - Data migration and Data Cleansing -Quality Assurance - ERP Risk Management

CODING TECHNIQUES: Control -Testing Security- Coding Techniques- Defection of Error –Validating -Cost Benefit Analysis -Assessing the value and risk of Information System

INTEGRATED CONSTRUCTION MANAGEMENT: Integrated Construction Management- Information System- Project Management Information System- Functional Areas finance, Marketing Production, Personnel – levels, DSS, EIS, ES- Comparison Concepts and Knowledge representation – Managing Inter- national Information System

TEXT BOOKS:

1. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; an CRM by Khalid Sheikh, Publisher: McGraw-Hill,2011.

2. ERP and Supply Chain Management by Christian N. Madu, Publisher: CHI 4. Implementing SAP ERP Sales & Distribution by Glynn C. Williams, Publisher McGraw-Hill,2013

REFERENCES:

1. Gordon B. Davis, ―Management Information System: Conceptual Foundations Structure and Development‖, McGraw Hill 2004

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE08	SURFACE AND GROUND WATER HYDROLOGY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course is to introduce the students about the surface and groundwater hydrology and enabling the students to work professionally in the environmental engineering sector and other related industry.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand the influence of meteorology in hydrology
2	To understand the hydrological processes in surface and groundwater hydrology
3	To determine various components of aquifer characteristics
4	To determine various reservoir characteristics
5	At the end of this course students will be aware of hydrological cycle and its processes.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The students know the various methods of rainwater and runoff harvesting. Then apply the knowledge of soil erosion and sedimentation to estimate the life of the reservoir	Apply
CO2. Students are able to understand aquifer properties and its dynamics after the completion of the course. It‘s imparts exposure towards well design and practical problems of ground water aquifers.	Apply
CO3. Analyze the influence of meteorology in hydrology	Analyze
CO4. Calculate the components of aquifer characteristics	Apply
CO5. Analyze the reservoir capacity	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	L	--	--	--	--	--	--	--	--	--	--	--	--
CO2	M	M	L	--	--	--	--	--	--	--	--	--	--	--	--
CO3	S	-	M	--	--	--	--	--	--	--	--	--	--	--	--
CO4	S	-	M	--	--	--	--	--	--	--	--	--	--	--	--

CO5	S	M	M	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

HYDROLOGY AND ITS IMPORTANCE : Definition - Branches of hydrology - Role in water resources - Meteorological and Geological parameters influencing hydrology - National Water Policy

SURFACE HYDROLOGY: Hydrology cycle - Precipitation and its abstractions - Processes, measurements and analysis of precipitation, infiltration, evaporation and evapotranspiration

RUNOFF: Process - Components - Measurement of flow - Hydrograph - Unit hydrograph - Simple models for run off estimation - Stream gauging

GROUND WATER: Aquifers - Geological formations influencing ground water - Darcy's law - Permeability Conductivity - Transmissivity - Well hydraulics - Pump tests

RESERVOIRS: Types - Storage capacity and yield estimation - Rule curve of operation - Design flood and PMF

TEXT BOOKS:

1. Garg S.K. Hydrology and Water Resources Engineering, 9th Edition, Khanna Publications, 1996.

2. Linsley R.K. and Franzini J.B., Water Resources Engineering, McGraw Hill Book Co., Inc., New York, 1990.

3. Raghunath H.M., Hydrology, Wiley Eastern Limited, New Delhi, 1985.

REFERENCE BOOKS

1. Todd,D.K., Ground Water Hydrology 2nd Edition, Wiley Eastern Limited,1985.

2. Ven Te Chow, Hand book of Applied Hydrology, McGraw Hill Book Co., Inc., New York 1964

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE09	ENVIRONMENTAL IMPACT ASSESSMENT OF IRRIGATION PROJECTS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to environmental impact assessment and enabling the students to conduct and implement EIA studies in the agricultural sector and other related industry for the betterment of society

PREREQUISITE

Irrigation Engineering

COURSE OBJECTIVEGS

1	Understand the EIA studies and help in carrying out the EIA studies at various hydro and irrigation projects
2	Obtain essential skills to understand, critically read and evaluate, review and begin to conduct impact assessments and to balance and integrate environmental, social and economic needs
3	Apply Knowledge and skills in relation to the framework and procedures of environmental impact assessment
4	Use basic knowledge and skills to practice a number of selected methods used in Environmental impact assessments
5	Understand the basic critical information to guide decisions about whether some hydro and irrigation projects and policies should be rejected

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To expose the students to the need, methodology, documentation and usefulness of environmental impact assessment in water resources development	Apply
CO2. The student will appreciate the importance of environment in water resources development and understand current methods of environmental assessment.	Apply
Co3. Students will become aware of future challenges facing water resources management	Analyze
Co4. Calculate the components of environmental impacts	Apply
Co5. Analyze the environmental issues	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	L	-	M	M	-	M	-	-	-	-			
CO2	M	M	L		-	-	S	S	-	-	-	-			
CO3	S	L	L	--	M	M	-	-	-	-	-	-			

CO4	S	M	M		-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

ENVIRONMENTAL ISSUES: Water resources development and environmental issues – Environmental regulations and requirements - The EIA (Environmental Impact Assessment) notification

EIA FUNDAMENTALS: Environmental Impact Assessment (EIA) – EIA in Project Cycle – Legal and Regulatory aspects in India according to Ministry of Environment and Forests – Types and limitations of EIA – Participation of Public and Non-Governmental Organizations in environmental decision making

ENVIRONMENTAL IMPACTS: Hydrological and water quality impacts – Ecological and biological impacts – Social and cultural
impacts – Soil and landscape changes – Agro economic issues – Human health impacts – Ecosystem changes.

METHODS OF EIA : EIA team formation– Development of scope, mandate and study design – Base line survey – Check
lists – Ad hoc procedures – Network and matrix methods – Semi-quantitative methods – ICID checklist – Economic approaches – Environmental Impact Statement (EIS) preparation.

ENVIRONMENTAL MANAGEMENT PLAN: In-stream ecological waterrequirements - Public participation inenvironmental decision making – Sustainable water resources development – Ecorestoration – Hydrology and global climate change – Human ecology – Ecosystem services – Environmental monitoring programs.

TEXT BOOKS:

1. L.W. Canter, ‑Environmental Impact Assessment‖, McGraw-Hill Book Company, 1995
2. Liu and Liptak, ‑Environmental Engineer‘s Handbook‖, CRCnet Base, 2008
3. Anjaneyulu and Valli Manickam, ―Environmental Impact Assessment Methodologies‖, BS Publications, 1998.

REFERENCES:

1. Barthwal, R.R., Environmental Impact Assessment. New Age International Publishers, New Delhi. 2002.
2. .Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science London. 1999.
3. Lawrence, D.P., Environmental Impact Assessment– Practical solutions to recurrent problems, Wiley- Inter Science, New Jersey. 2003.
4. Arnel, N., Hydrology and global environmental change. Prentice Hall, Harlow. 2002.
5. Chari. B., Richa Sharma and S.A. Abbasi, Comprehensive Environmental Impact Assessment of Water Resources Projects : With Special Reference to Sathanur Reservoir Project (Tamil Nadu)/K. Discovery Pub., New Delhi, 2005.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE10	WATERSHED CONSERVATION AND MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to surface and groundwater hydrology and enabling the students to work professionally in the environmental engineering sector and other related industry.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand concept of need for Water conservation .
2	To analyze degradation of soil and water resources
3	To perform of the measures for soil and water conservation.
4	To provide a comprehensive treatise on the engineering practices for watershed management.
5	To acquire knowledge on national programs on watershed conservation and soil degradation

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students are able to develop and apply numerical model for various application along with better understanding aquifer characteristics.	Apply
CO2. Students are able to understand aquifer properties and its dynamics after the completion of the course. It's imparts exposure towards well design and practical problems of ground water aquifers.	Apply
Co3. Analyze the watershed management	Analyze
Co4. Calculate the components of aquifer characteristics	Apply
Co5. Analyze the wasteland development	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	L	-	-	-	-	-	-	-	-	-			
CO2	M	M	L		-	-	-	-	-	-	-	-			
CO3	S	M	M	--	-	-	-	-	-	-	-	-			
CO4	S	M	M		-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Watershed concept - Classification - Characteristics – Land use classifications.

SOIL CONSERVATION: Water eristic - Types of erosion - Estimation of soil loss - Conservation measures - Agricultural land, wastelands, gulley - Mechanical and agronomical options - Design details - Wind erosion and its effects - Estimation of soil loss - Prevention measures Silting of reservoirs - Catchment treatment.

WATERSHED MANAGEMENT: Basics of remote sensing technique - Data collection - Preparation of overlays use of GIS for data processing - Drought prone area program - Integrated watershed management

WATER CONSERVATION : Need for water conservation - Augmentation - Water harvesting in agricultural land and Urban lands - Traditional and new concepts

WASTELAND DEVELOPMENT : Degradation of land - Role of human and cattle - Waste land development program in India - Role of NGO - Participatory approach - Case studies

TEXT BOOKS:

1. Datta S.K., Soil Conservation and Land Management, International Book distribution, Dehra Dun, India, 1986.
2. Glenn O.Schwab et al., Soil and Water Conservation Engineering, John Wiley and Sons, New York, 1981

REFERENCES:

1. Garde R.J., Reservoir Sedimentation, INCOH Secretariat, National Institute of Hydrology, Roorkee, 1995.
2. Murthy JVS., Watershed Management in India, Wiley Eastern Limited, 1995.
3. Report of the High Level Committee on Waste Land, Development Department of Waste Land development, Ministry of Rural Areas and Employment, GOI, New Delhi, 1995

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE11	IRRIGATION SYSTEMS MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to surface and groundwater hydrology and enabling the students to work professionally in the environmental engineering sector and other related industry.

PREREQUISITE

Irrigation Engineering

COURSE OBJECTIVES

1	To inculcate the different types of irrigation systems and their performance based on service oriented approach
2	To acquire knowledge on advancements in irrigation systems
3	To analyze various irrigation system practices
4	To perform irrigation scheduling
5	To develop participatory irrigation system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Students will understand the concept of soil-water-plant relationship and can apply it to schedule irrigation. Students can design surface, drip and sprinkler irrigation systems for various crops	Apply
CO2 Students can design surface, drip and sprinkler irrigation systems for various crops	Apply
Co3. To understand the climate change phenomenon and its related issues on water, irrigation and its social implications.	Analyze
Co4. To orient towards the global climate change and its impact on water resources.	Apply
Co5. Analyse the wasteland development	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	M	M	L	S	S	-	-	-	-	-	-	-			
CO2	M	M	L		-	-	-	-	-	-	-	-			
CO3	S	M	M	S	S	-	-	-	-	-	-	-			
CO4	S	M	M		-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

IRRIGATION DEVELOPMENT IN INDIA : Importance of Irrigation in Agriculture - Historical evolution of irrigation in India – Irrigation development during pre-colonisation – Colonisation and post-colonization – Different types of Irrigation prevalent in India: Warabandi, Shejpali and South Indian systems - Focus of Irrigation in India – Command area development approach and farmers participation.

IRRIGATION SYSTEMS AND PERFORMANCE INDICATORS : Systems classification - Institutions for irrigation management–Diagnostic Analysis of Irrigation Systems -Rehabilitation and modernization – Performance indicators – Improving system performance – Conjunctive management – constraints faced.

MAIN SYSTEM MANAGEMENT : Main system components – Reservoir allocation rule, Operating rule and optimization methods to improve main system performance - irrigation scheduling – Constraints

COMMAND AREA DEVELOPMENT AND PARTICIPATORY IRRIGATION MANAGEMENT: Command area development principles – Participatory Irrigation Management and Irrigation management transfer – Constraints – Case studies

IRRIGATION POLICY AND INSTITUTIONS: Present status of irrigation policy and institutions – Irrigation related conflicts – Institutional transformation needed – Constraints in effecting institutional transformation – Irrigation financing – Water pricing – Water market – Policy changes.

TEXT BOOKS:

5. Rakesh Hooja, Management of Water for Agriculture: Irrigation, Water sheds and Drainage Rawat Publications, New Delhi, 2006.
6. Kijne, J.W., Barker, R and Molden, D, Water Productivity in Agriculture; Limits and Opportunities for improved, CABI Publishing, Walling ford, U.K, 2003.

REFERENCES:

1. Giodano. M and Villbolth K.G, The Agricultural Ground Water Revolution -Opportunities and threats to development, CABI Publishing, Walling ford, U.K, 2007

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE12	COMPUTATIONAL METHODS IN IRRIGATION MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To understand the knowledge of necessary information about the location of records, media upon which records are stored, methods of protection, and the value of individual records.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To acquire basic knowledge on various computational methods
2	To execute various models used for irrigation engineering
3	To simulate irrigation practices using computed based software
4	Application of advanced simulation techniques for irrigation practices
5	To acquire basic knowledge about estimating water quality using current methods

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Students would have knowledge of soils and crops, which they can beneficially use as specialists in irrigation water management.	Apply
CO2 Students could relate water quality and its dependence on sources of water pollution.	Apply
Co3. Students would understand and interpret water quality data for beneficial uses and in water quality models.	Analyze
Co4. On completion of this course the students will be able to solve various problems in the field of engineering employing probability and statistical methods.	Apply
Co5. Students will able to estimate water quality using current methods and make evaluation of it for beneficial uses.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	M	L	S	S	L	-	-	-	-	-	-			
CO2	M	M	L		-	-	L	L	-	-	-	-			
CO3	S	M	L	S	M	-	-	-	-	-	-	-			
CO4	M	M	L		-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

ADVANCED COMPUTING TECHNIQUES: Computing methods in water resources -Computing techniques - Solution to ordinary and partial
differential equation using Finite difference and Method of Characteristics- Numerical integration and differentiation Design of digital models - Visual programming

ARTIFICIAL INTELLIGENCE: Principle of Artificial Neural Network (ANN), Fuzzy Logic concepts and Applications –Genetic Algorithms-Heuristic Optimization techniques -Application of Artificial Intelligence to Hydrology and Crop Water Requirement model.

DIGITAL DATA MANAGEMENT: Data base structure -Data acquisition -Data warehouse -Data retrieval- Data format Attribute -RDBMS -Data analysis -Network data sharing -Statistical Analysis (SYSTAT) -Regression -factor analysis -
histogram -scatter diagram -Goodness of fit

SIMULATION SOFTWARE IN WATER RESOURCES: Surface water models (HMS) -Storm Water Management Models (SWMM) – culvert hydraulic design(HY) – River Analysis system models (HEC-RAS)- Ground Water Flow models

SIMULATION MODELS IN IRRIGATION WATER MANAGEMENT : Soil water assessment simulation models (SWAT) -Basin simulationmodels (MITSIM, VASIM) Real time operation models -Water Resources Information System, Management Information System. Decision support system for Irrigation management.

TEXT BOOKS:

1. Aliev R. A, and Aliev Rashad "Soft Computing and its Applications"World Scientific Publications Co. Pvt. Ltd. Singapore, 2001.
2. Janusz Kacprzyk Applied Decision with Soft Computing Springer, 2003
3. Carlos A. Coello, David A Van Veldhuizen, Gary B Lamont, "Evolutionary Algorithms for Solving Multi-objective problems", Springer, 2002.
4. Tayfur Gökmen "Soft computing in water resources engineering", WIT Press, Great Britain, UK, 2012.

REFERENCES:

1. Remson I, Hornberger G.M. and Moiz F.J., "Numerical methods in Sub-Surface Hydrology". Wiley Inter Science, 1985
2. Kazda, I., "Finite element Techniques in ground water flow studies (with Applications in Hydraulic and Geotechnical Engineering)", Else vier, 1990.
3. Abbott M.B, and Minns A.W. "Computational hydraulics"Ashgate, London, UK, 2007.
4. Loucks Daniel P., Jery R Stedinger and Douglas, A. Haith, Water Resources systems Planning and Analysis. Prentice Hall Inc., Englewood Clifts, New Jersey, 1981

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE13	AGRICULTURAL ECONOMICS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to computational methods in irrigation management and enabling the students to work professionally in the agricultural sector and other related industry.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand nature and scope of agricultural economics
2	To infer Monetary policy , Money supply and economic activity
3	To determine demand and supply; its applications to agricultural goods, Theory and cost of production
4	To acquire knowledge on consent of farm management and whole farm planning.
5	To understand the Role of welfare economics, welfare economics in comparison with agricultural economics.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 To provide an overall exposure on the use of economic concepts in irrigation development.	Apply
CO2 To impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.	Apply
Co3. The students will understand the economic concepts useful for overall irrigation development based on the current trends of production, consumption and farm economics.	Analyze
Co4 The students will acquaint themselves in the allocation of resources and financial analysis in the irrigation sector.	Apply
Co5. To enable the students to understand application of the latest information technology to water resources engineering	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	M	L	S	S	-	S	S	-	-	-	-			
CO2	M	L	L		-	-	S	-	-	-	-	-			
CO3	S	M	L	S	M	S	-	-	-	-	-	-			
CO4	S	L	L		-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Definition – Nature and scope of agricultural economics – Basic skills of Agricultural economist

MACRO – ECONOMICS: Monetary policy – Money supply and economic activity – Inflation and deflation – Fiscal policy – Agricultural policy – Discounting techniques

MICRO – ECONOMICS: Demand and supply; its applications to agricultural goods – Concept of elasticity – Money and financial market – Market supply function – Price determination – Theory and cost of production – Production function – Production management – Conditions of competition.

WELFARE ECONOMICS: Role of welfare economics – Welfare economics in comparison with agricultural economics – Social welfare function – Economy stabilization – Income redistribution – regional development.

FARM ECONOMICS: Concept of farm management – Whole farm planning – Farm records and budgeting – Uncertainty in farming – Farm business analysis

TEXT BOOKS:

3. Allan C.Deserpa., Micro – economic theory – Issues and applications Allyn and Bacon, Inc. Massachusetts, 1985.
4. Mithani D.M., Macro-economics-Analysis and Policy Oxford and IBH Publishing Co., New Delhi, 1981

REFERENCES:

1. Douglas James L and Robert R.Lee., Economics of Water Resources Planning McGraw Hill Co., New Delhi, 1994.
2. John W.Goodwin and Evan Drummond H.,Agricultural Economics Reston Publishing Co., Virginia, 1982.
3. Ronald D.Kay., Farm Management, Planning, control and Implementation-McGraw Hill Co., 1981.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE14	MODERNIZATION OF IRRIGATION SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to modern irrigation methods and enabling the students to work professionally in the irrigation technology and agricultural sector and other related industry.

PREREQUISITE

Irrigation Engineering

COURSE OBJECTIVES

1	To study about the nature of system modernization and rehabilitation
2	To know about the essential of system maintenance.
3	To study about the history of inflow, Operational constraints, Management constraints, Resource constraints
4	To know about deferred maintenance-causes-criteria used for taking rehabilitation.
5	To study about the case study of rehabilitation and modernization of old projects

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand various irrigation methods and techniques	Understand
CO2: Apply modern technique in irrigation management	Apply
CO3: Construct and maintain various water bodies for irrigation purposes	Apply
CO4: Posses knowledge on the various scenario for water management for irrigation purpose	Understand
CO5 : Understand case study of rehabilitation and modernization of old projects	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	-	-	-	-	-	-	-	-	-	-	S	L	-
CO2	S	M	-	-	M	-	-	-	-	-	-	-	S	M	-
CO3	S	-	S	M	-	-	-	-	-	-	-	-	S	-	S
CO4	S	-	-	M	-	-	-	-	-	-	-	-	S	-	-
CO5	S	-	-	M	-	-	-	-	-	-	-	-	S	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Irrigation system-Classification-Nature of system modernization and rehabilitation

SYSTEM MAINTENANCE: Maintenance - Essential, Catch up, Preventive and normal- Diagnostic analysis of flow, seepage, participatory rural appraisal- Rapid rural appraisal- Walk through survey- Development of maintenance program- Kudimaramath- Turnover to WUA

PROBLEM IDENTIFICATION: System Performance- History of inflow, cropping pattern , system alterations, distribution performance-Operational constraints –Management constraints-Resource constraints

REHABILITATION: Base line survey-Deferred maintenance-Causes-Criteria used for taking rehabilitation programs-software and hardware improvements-prioritization-Role of WUA-Monitoring and evaluation

CASE STUDIES: Rehabilitation and modernization programs- Periyar Vaigai Project- Walawe Project-Tank modernization project-Water resources consolidation project.

TEXT BOOKS:

1. Base Line Survey of Irrigation Command, Centre for Water Resources, Anna University, Chennai-25, 2000. Diagnostic analysis of Irrigation Systems, Volume2, Evaluation Techniques, Water Management Synthesis Project, Colorado State University, 1984.
2. Improving Irrigation (performance through the use of MIS). The case of Mahi Kadana Gujarat, India.
3. International Irrigation Management Institute and WALMI, Gujarat, 1994.

REFERENCES:

1. Lecture Notes Sixth Training of Trainers Course,volume 2 Centre for water Resources, Anna University, Chennai-25, 1997.
2. Phase II Extension Tank Modernization Project with EEC Assistance, Monitoring and Evaluation Final Report, Centre for Water resources, Anna University, Chennai, November 2000.
3. Planning and Mobilization of Farmers Organization and Turnover- Tamil Nadu Water Resources Consolidation Project –Centre for Water Resources and Ocean Management, Anna University, Chennai-25, 1997.
4. Tank Modernization Project with EEC assistance – Monitoring and Evaluation: Final Reports-Centre for Water Resources, Anna University, Chennai, November, 2000.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE15	TYPOLOGY OF NATURAL AND MANMADE DISASTERS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to agricultural economics and enabling the students to manage information throughout the total life cycle, from creation or inception, through its use, storage, retrieval, to its final disposition, are more likely to properly place disaster planning in their total management program.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To Understand basic concepts of disaster
2	To understand causes and factors controlling natural and technological disasters.
3	To distinguish between processes controlling various disasters.
4	To participate in various disaster mitigation program
5	To participate in various disaster management program

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand various factors causing disaster	Understand
CO2: Understand various types of disaster and their causes	Understand
CO3: Apply various criteria in understanding the effect of disaster	Apply
CO4: Posses knowledge on various management measures during a disaster	Apply
CO5: Participate in disaster management activities during a disaster	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO2	PSO3
CO1	S	M	-	-	-	-	S	-	-	-	-	-	S	M	-
CO2	S	-	-	-	-	-	S	-	-	-	-	-	S	-	-
CO3	S	M	-	-	-	M	-	-	-	-	M	-	S	M	-
CO4	S	-	-	-	-	-	-	-	-	-	M	-	S	-	-
CO5	S	-	-	-	-	-	M	L	-	-	M		S	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Introduction - Hazard, Risk, Vulnerability, Disaster - Meaning, Nature, Importance, Dimensions & Scope of Disaster Management - Disaster Management Cycle

NATURAL DISASTERS - GEOLOGICAL: NaturalDisasters- Meaning and nature of natural disasters, their types and effects - Hydrological Disasters - Flood, Flash flood, Drought, cloud burst - Geological Disasters- Earthquakes, Tsunamis, Landslides, Avalanches, Volcanic eruptions, Mudflow.

NATURAL DISASTERS - HYDROLOGICAL & METEOROLOGICAL Types of Natural Disasters Wind related- Cyclone, Storm, Storm surge, Tidal waves, Heat and cold Waves - Climatic Change - Global warming - Sea Level rise -Ozone Depletion.

TECHNOLOGICAL DISASTERS: Man – made Disasters Chemical disasters, biological disasters, radiological disasters, nuclear disasters - Fire – building fire, coal fire, forest fire, Oil fire-Types of Man – made Disasters - Accidents- road accidents, rail accidents, air accidents, sea accidents - Pollution - air pollution, water pollution - Deforestation, Industrial waste.

FACTORS AFFECTING DISASTER MANAGEMENT: Disaster Determinants-Factors affecting damage – types, social status, habitation pattern, physiology and climate - Factors affecting mitigation measures, prediction, preparation, communication, area and accessibility, population, physiology and climate.

TEXT BOOKS:

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.

REFERENCES:

1. Central Water Commission, 1987, Flood Atlas of India, CWC, New Delhi.
2. Central Water Commission, 1989, Manual of Flood Forecasting, New Delhi.
3. Government of India, 1997, Vulnerability Atlas of India, New Delhi.
4. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in
2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE16	CRISIS COMMUNICATION & MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to agricultural economics and enabling the students to manage information throughout the total life cycle, from creation or inception, through its use, storage, retrieval, to its final disposition, are more likely to properly place disaster planning in their total management program.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To posses knowledge on Foundational principles and theory of crisis communication
2	To understand various phases of a crisis management
3	To understand various types theoretical fundamentals in crisis management
4	To acquire knowledge on the role of culture and organizational context in crisis communication
5	To understand various crisis communication theory, crisis management approaches

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand foundational principles and theory of crisis communication	Understand
CO2: Analyze various factors involving fundamental management during crisis and recovery activities	Analyze
CO3:Evaluate various crisis phases	Evaluate
CO4: Understand role of culture and organizational context in crisis communication	Understand
CO5: Analyze various crisis communication theory, crisis management approaches	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	L	-	-	L	L	-	-	L	-	S	-	-
CO2	S	S	-	-	-	-	-	-	-	-	S	-	S	S	-
CO3	S	-	-	S	-	-	L	-	-	-	-	-	S	-	-
CO4	S	-	-	-	-	-	M	M	-	-	-	-	S	-	-
CO5	S	S	-	-	-	-	-	-	-	-	S	-	S	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Introduction- Before, During, and after crisis - How to Handle - Preparing for a Crisis - Implementing a Crisis Audit-Creating, Simulating, revising a Crisis Plan-Technology Attacks

TERM RELATED TO CRISIS: Types of Crises- Natural, Man-made, Combination -Technologies

ACTIONS TO BE TAKEN BEFORE CRISIS: Long-range preparation- reputation management - issues identification- crisis audit

ACTIONS TO BE TAKEN DURING THE CRISIS: Implementing the plan-conduct situation - prioritize actions- dos and don'ts in dealing with media-human issues in crisis situations

ACTIONS TO BE TAKEN AFTER THE CRISIS AND RECOVERY: Short-term and long-term - immediate organizational resumption - long-term recovery -updating the plan – lessons learned

TEXT BOOKS:

1. Fearn-Banks, Kathleen Crisis Communications, A Casebook Approach, 3rd Ed. (2007) Pub: Erlbaum. –Textbook‖ Cases.
2. Rumors and Cybercrises. Natural Disasters. Cultures: Foreign and Domestic. Death and Injury.Consumer-Caused Crises. The Crisis Communications Plan. Appendices

REFERENCES:

1. Central Water Commission, 1987, Flood Atlas of India, CWC, New Delhi. Central Water Commission, 1989, Manual of Flood Forecasting, New Delhi. Government of India, 1997, Vulnerability Atlas of India, New Delhi.
2. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in
2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE17	DISASTER PREPAREDNESS AND DECISION MAKING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to agricultural economics and enabling the students to understand the plan and to identify specific risks such as building and equipment hazards that can result in flooding to records storage areas, dangerous storage practices that increase the risk of fire near irreplaceable research and development records, and periodic electric storms or tornados that endanger electronically generated vital records

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To create appropriate planning, preparation and response for emergency treatment in disaster situation.
2	To understand the role of various institution in disaster management
3	To implement disaster drills and provide opportunities to participate in disastrous situation.
4	To learn efficient emergency skills for providing support to disaster survivors.
5	To coordinate disaster management activity

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the importance of preparedness in disaster management	Understand
CO2: Perform various preparedness related activities during disaster management	Apply
CO3:Understand the role of various institutions in disaster management and response activities	Understand
CO4: Prepare response plan for disaster management	Apply
CO5: Participate and coordinate disaster management activity	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	S		-	M	-	-	-	-	-	-	-	-	-
CO3	S	-	-	-	L	-	-	-	-	-	M	-	-	-
CO4	S	-	S	-	L	M	-	-	-	-	M	-	-	-
CO5	S	-	S	-	L	-	-	-	-	-	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

DISASTER PREPAREDNESS: Disaster Preparedness- concept and significance - Disaster Preparedness Measures - Institutional Mechanism for Disaster Preparedness - Disaster preparedness with special needs/ vulnerable groups - Disaster Preparedness: Policy and Programs

DISASTER PREPAREDNESS PLAN: Concept and Significance of Disaster Preparedness Plan - Disaster Preparedness Plan essentials - Community Based Disaster Preparedness plan - Prediction, Early Warnings and Safety Measures of Disaster

ROLE OF DIFFERENT ORGANIZATIONS/INSTITUTIONS: Role of Information, Education, Communication, and Training - Role of Government, International and NGO Bodies - Role of Information Technology (IT) in Disaster Preparedness - Role of Geographers on Disaster Management

DISASTER RESPONSE:Essential Components of Disaster Response, Disaster Response Plan, Resource Management- Financial, Medical, equipment, communication, Human, transportation, Food and essential commodity (Identification, Procuring, Propositioning and deployment), Directing and controlling functions - Communication, Participation & activation of Emergency Preparedness Plan, Logistics Management, Emergency support functions, Need and damage assessment

COORDINATION IN DISASTER RESPONSE:Disaster Response Plan - Communication, Participation, and Activation of Emergency Preparedness Plan - Search, Rescue, Evacuation and Logistic Management - Psychological Response and Management - Psychological Response and Management (Trauma, Stress, Rumor and Panic) - Relief and Recovery - Medical Health Response to Different Disasters

TEXT BOOKS:

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun

REFERENCES:

1. M Sharma, R.K. & Sharma, G. (2005) (edition) Natural Disaster, APH Publishing Corporation, New Delhi.
2. www.gis.development.net
3. www.iirs.nrsa.org
4. http://quake.usgs.gov.

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2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE18	VULNERABILITY MAPPING TECHNIQUES FOR DISASTERS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to agricultural economics and enabling the students to know Risk assessment is a management tool for determining the likelihood of a disaster and its financial impact on the area. A specific amount is placed on each potential disaster by calculating an Annual Loss Expectancy (A.L.E.)

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Discuss the foundational principles and theory of vulnerability mapping techniques for disasters
2	Describe the phases of a hazard and theoretical foundations of vulnerability mapping techniques for disasters
3	Understand the importance of in vulnerability mapping in cultural context
4	Understand the role of various organizations in vulnerability mapping
5	To acquire knowledge of remote sensing and GIS for risk assessment

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the importance of risk and vulnerability in disaster management	Remember
CO2: Analyze various risk techniques	Analyze
CO3:Understand vulnerability parameters and importance of organizational structure in vulnerability analysis	Apply
CO4: Apply remote sensing and GIS for Risk assessment	Apply
CO5: Possess knowledge on Indian Scenario in Risk management	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	L	-	M	M	-	M	-	-	-	S	-	-
CO2	S	S	M	-	-	-	-	-	-	-	-	-	S	S	M
CO3	S	M	-	-	-	M	M	-	-	-	-	-	S	M	-
CO4	S	S	-	L	M	-	-	-	-	-	-	-	S	S	-
CO5	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

HAZARD, RISK AND VULNERABILITY: Hazard, Risk and Vulnerability: Concept and Relationship- Understanding Risk: Concepts and Elements - Disaster Risk Reduction- Risk Analysis Techniques- People Participation in Risk Assessment

VULNERABILITY CONCEPT AND PARAMETERS: Vulnerability: Concept and Parameters- Vulnerability Analysis- Observation and Perception of Vulnerability - Vulnerability Identification

SURVIVAL: Socio-Economic Factors of Vulnerability-Vulnerability of Shanty Town- Experience of Vulnerability in India- Strategies for Survival

TECHNIQUES OF RISK AND VULNERABILITY ANALYSIS: Risk Assessments and Vulnerability Analysis Techniques, Remote Sensing and GIS Basic

CASE STUDIES: Regional planning in India - Regional planning-National & International case studies

TEXT BOOKS:

1. White, Gilbert F. and J. Eugene Hass, 1975, Assessment of Research on Natural Hazards, Cambridge, the MIT Press, MA.NOAA Coastal Services Center, –Linking People Information and Technology,:
2. –Risk and Vulnerability Assessment Tool‖.

REFERENCES:

1. http://www.csc.noaa.gov/rvat/criticaledd.html
2. www.nidmindia.nic.in

COURSE DESIGNERS

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2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE19	INDUSTRIAL HAZARDS PREVENTIVE MANAGEMENT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce students to industrial hazard and enabling them in assessing various industrial hazard and plan for safe disposal for the betterment of related industry and society.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand various industrial hazards and their effects.
2	To assess risk and hazard analysis of Industries.
3	To prepare offsite and onsite plans.
4	To understand the importance operating procedures in disaster management
5	To understand the importance of training and mock drills in disaster management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand factors affecting various technological disaster	Understand
CO2: Categorize various industrial disasters based on their occurrence	Understand
CO3:Analyze various factors affecting Risk	Analyze
CO4: Prepare onsite and offsite plans for disaster management	Apply
CO5: To participate in training and mock drills in disaster management activities	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	L	-	-	-	-	-	S	-	-
CO2	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-
CO3	S	S	-	M	-	-	-	-	-	-	-	-	S	S	-
CO4	S	M	S	-	-	-	-	-	-	-	S	-	S	M	S
CO5	S	M	-	-	-	-	-	L	S	-	S	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION : Concept, Need and Importance of Industrial Disaster Management

INDUSTRIAL HAZARDS: Chemical hazards, Biological hazards, Radiological hazards, nuclear hazards, Physical hazards, Electrical hazards, Fire hazard, Gas hazards etc..

RISK ASSESSMENT & HAZARD IDENTIFICATION: Checklist procedure, Preliminary hazard analysis, What if analysis, Failure mode effect analysis, Hazard and operability (HAZOP) studies, Hazard analysis techniques: Fault tree analysis, Event tree analysis, General outline of DOW index, Risk estimation and

management, Major hazard control. Identification of hazard, Categorization methods for elimination of hazard, Mechanical hazards.

DISASTER MANAGEMENT ONSITE PLANS: Standard operating procedures, control room, safety officer, and Different committees for Disaster management, rescue team, training, exercises and mock drills.

DISASTER MANAGEMENT OFFSITE PLANS: Dissemination of information, identification of vulnerable locations, need and damage assessment, rescue and relief plans, compensation.

TEXT BOOKS:

1. Disaster Administration and Management, Text & Case studies- SL Goel-Deep and Deep Publications.
2. Hazardous Materials Disaster Management-Arun kumar Talwar, Commonwealth Publisher.

REFERENCES:

1. Heinrich H.W. –Industrial Accident Prevention‖ McGraw-Hill Company, New York,
2. –Safety in Industry‖ N.V. Krishnan Jaico Publisher House, 1996

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2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE20	APPLICATION OF GIS & RS IN DISASTER MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To understand the knowledge of necessary information about the location of records, media upon which records are stored methods of protection, and the value of individual records.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the basic concepts of remote sensing and GIS
2	To understand the importance of file management
3	To acquire basic concept of image processing in disaster management studies
4	To participate in various disaster management activates
5	To understand use of remote sensing and GIS in solving problems in water resources through case studies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Introduce the technology and principles of Satellite Imaging	Apply
CO2. Develop the simulation models and use the latest intelligent technology and algorithms in disaster management.	Apply
CO3. Apply theoretical explanations on Image processing and extraction of data from Satellite imageries	Analyze
CO4. Perform activities using GIS platform by integrating Satellite Data with GIS Products the for Decision making	Apply
CO5. Apply remote sensing and GIS in solving problems in water resources	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	S	S	L	-	-	-	-	-	-	S	M	L
CO2	S	M	L		-	-	L	L	-	-	-	-	S	M	L
CO3	S	M	L	S	M	-	-	-	-	-	-	-	S	M	L
CO4	S	S	M	-	S	-	-	-	-	-	-	L	S	S	M
CO5	S	M	M	-	-	-	-	-	-	-	-	L	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

GEOGRAPHICAL INFORMATION SYSTEM (GIS): Definition of GIS, Concept of Space and Time, Spatial data - Map Projection and Datum - Domains of Spatial information system, Components of GIS (/Hardware, Software, Data, People and Process) - GIS Functionalities for end user / system (Data Acquisition, Data Input, Data Management, Data Analysis, Data Modeling and Data Output) - Web based GIS Technology

FILE MANAGEMENT: File management, data base management systems in GIS- data base, query, SQL statement - data manipulations and product generation, Environmental GIS, Data acquisition system using GPS, component of GPS, DGPS, Kinematic GPS, factors that affect GPS, GPS application

DIGITAL IMAGE PROCESSING: Digital image processing – image rectification and restoration, image

enhancement, contrast manipulation, multi image manipulation, image classification- supervised and unsupervised classification, data merging, Hyper spectral image analysis, introduction to image processing software.
Spatial data- field, object, computer representation of geographic information, raster representation, vector representation, point, line and polygon representation, topology, scale and resolution, sources of error and data quality, database design, convention, mapping concepts and coordinate systems- types of projection, geographic and planar, projection.

AERIAL PHOTOGRAPHY: Aerial photography, advantages, limitations, geometric characters – film, spectral sensitivity of Black and White films, color film, color infra red film - filter – Aerial film cameras, single lens frame camera, panoramic cameras, film resolution, electronic imaging, aerial videography, multi band imaging,. Elements of aerial photo interpretation, Preparation of photogeological map

REMOTE SENSING: Aerial photography, advantages, limitations, geometric characters – film, spectral sensitivity of Black and White films, color film, color infra red film - filter – Aerial film cameras, single lens frame camera, panoramic cameras, film resolution, electronic imaging, aerial videography, multi band imaging,. Elements of aerial photo interpretation, Preparation of photogeological map

TEXT BOOKS:

1. P.A. Burrough, 2007, Principles of Geographical Information System for Land Resource Assessment, Oxford University Press, p.345.
2. Tor Bernhardsen, 2009, Geographic information system an introduction, 3rd edition, Wiley student edition, p.428
3. P.A. Longley, M.F. Goodchild, D.J. Manguire, D.W. Rhino, Geographical Information System, Volume I: Principal and Technical Issues, Volume II: Management Issues and Applications, John Wiley & Sons, p432.
4. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman, 2007, Remote sensing and image interpretation, Fifth edition, Wiley student edition.
5. Agarwal, C.S. and Garg, P.K. 2000, Textbook on remote sensing in natural resources monitoring and management, Wheeler Publishing, A division of A.H.Wheeler & Co. Ltd., New Delhi

REFERENCES:

1. Seelye Martin, 2004, An introduction to Ocean Remote sensing, Cambridge
2. Lee-Lueng Fu Anny Cazenave, 2010, Satellite altimetry and earth sciences, Academic press, International geophysics series, p.432.
3. John. R. Schott, 2007, Remote sensing the image chain approach, Oxford university press, p.394.
4. Ian Heywood, 2006, An introduction to GIS, Prentice Hall, 464p.
5. Paul A. Longley, 2010, Geographic Information Systems and Sciences, John Wiley and Sons Ltd, 536p.
6. Michael f. Goodchild, 2005, Geographical Information System

COURSE DESIGNERS

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1	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in
2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE21	FINANCE AND INSURANCE IN DISASTER MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

To introduce the students to understand the finance and insurance related records that are normally used and filed as a unit that can be evaluated.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To introduce to various banking practices
2	To acquire knowledge on various rules and regulation of RBI & LIC
3	To acquire knowledge on various rules and regulation in insurance practices
4	To expertise in disaster related insurance policies
5	To participate in disaster management activities
6	To introduce to various banking practices

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand importance of banking in disaster management	Understand
CO2: Understand importance of RBI & LIC in Indian Scenario	Understand
CO3: Carryout various banking practices during emergency and crisis situation	Apply
CO4: Perform various disaster related banking practices including insurance	Apply
CO5: Advocate various insurance policies in disaster management activities	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	S	S	-	L	-	M	-	-	-	-	-	-	L	-	M
CO4	S	S	-	-	-	M	-	-	-	-	-	-	-	-	M
CO5	S	S	-s	L	-	M	-	-	-	-	S	-	L	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BANKING & FINANCE: Concept of Banking, Types of banks, Functions of banks; Tax administration; Public budgeting and finance systems; State and local finances

CENTRAL BANK / RESERVE BANK : Role and function of central bank, RBI and Monetary Policy

INTRODUCTION TO INSURANCE: Evolution and Features of Insurance, Classification of Insurance,

Conditions relating to risk, selection or Risk

LIFE INSURANCE & GENERAL INSURANCE: Principles of LIC, Privatization of Life Insurance Business, Role and performance of LIC, Non-life insurance – Fire, Automobile, Marine, Health, Rural, Social and miscellaneous insurances.

INSURANCE POLICIES FOR DISASTER MANAGEMENT: Evaluation of risk funding and risk transfer policies; Catastrophe insurance pool; Reserve funds and contingent credit policies; Role of Government and market participants; Insurance policy design; Fiscal cost of relief and reconstruction; Grants and low interest loan for reconstruction

TEXT BOOK

1. Money, Banking & Public Finance – T.N.Hajela- Ane Books Pvt. ltd-8th Edition.
2. Banking and Financial Markets in India – BhasinNiti-New Century Publications-1947 to 2007.
3. Banks & Institutional Management- Vasant Desai-Himalaya PublishingHouse-1st Edition.
4. Banking theory and practices – K.C.Shekhar, LekshmyShekhar – Vikas Publishing House-19th Edition.

REFERENCES:

5. Insurance principles & practice –M.N.Mishra, S.B.Mishra -S.Chand Publication- 17th Edition
6. Life Insurance in India- H. Sadhak (Response Books) 1stEdition
7. Insurance in India- P.S.Palande, R.S.Shah, M.L.Lunawat (Response Books) 6th Edition
8. National Disaster Response Plan, NCDM, New Delhi, 2001.

COURSE DESIGNERS

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1	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in
2	Mr. S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in

17CVSE22	ADVANCED SYSTEM DYNAMICS MODELING IN TRANSPORTATION ENGINEERING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To provide advanced level of knowledge in System Dynamics Modeling in Transportation Engineering

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To gain knowledge the simulation techniques in System Dynamics Modeling in Transportation Engineering
2	To learn subsystems modelling
3	To learn system dynamic modelling
4	Learn alternative view of dynamic modelling
5	To analyze case studies on dynamic modeling of transport systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students would have understood the simulation techniques used in Transportation Engineering	Understand
Co2. Students would have understood subsystems modelling	Apply
Co3. Students would have understood system dynamic modelling	Apply
Co4. Students would have understood alternative view of dynamic modelling	Apply
CO5. Students would have analyses case studies on dynamic modeling of transport systems	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	-	--	--	--	--	--	--	--	--	--	--	--
CO2	S	M	L	S	--	--	--	--	--	--	--	--	--	--	--

CO3	S	M	S	S	--	--	--	--	--	--	--	--	--	--	--
CO4	S	S	M	M	--	--	--	--	--	--	--	--	--	--	--
CO5	S	M	S	-	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

COMPLEXITY AND SYSTEMS THINKING: Change – Complexity and Interdependency – Systems thinking – Floundering – Level of abstractions - Tools and Transitions in Systems Thinking – Synthesis and Organizational Learning

ADVANCED MODELING EFFORTS: Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity – Harmonic Analysis.Steady State Modeling – Discrete vs. Continuous – Generic infrastructures –Subsystems – Sensitivity parametering - Case Studies

ADVANCED SIMULATING TECHNIQUES: Graphical Bulletin function – Conveyor flows – Converter – Flow substitutes – Connector – Normalizing Inputs – Generic flow activities – Case Studies

MODELING PROCESS: System Dynamics Modeling challenges – Steps in Modeling Process – Guidelines – Model Boundary– Modeling soft variables – Quantification vs. Measurement

SOPHISTICATED DYNAMICS MODELING: Need – Isolation Process – Demand Expansions – Cycle functions – Sensitivity Analysis – Alternative view of Dynamic Modeling

TEXT BOOKS:

1. Pratab Mohapatra K.J. et al., "Introduction to System Dynamics Modeling", University Press, Hyderabad, 1994

2. Thirumurthy A.M., Environmental Facilities and Urban Development in India – A System Dynamics Model for Developing Countries, Academic Foundations, India, 1992

REFERENCES:

3. Technical Manual on An Introduction to Systems Thinking – STELLA Research Software, High Performance Systems Inc., Hannover, 1996

4. Advanced Manual on An Introduction to Systems Thinking – STELLAII Research Software, High Performance Systems Inc., Hannover, 2002

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S. ARVINDAN	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in
2	Dr. D. S. VIJAYAN	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE23	ENVIRONMENTAL IMPACT ASSESSMENT OF TRANSPORTATION PROJECTS I	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To expose the students to the need, methodology, documentation and requirements of environmental and social impact assessment of Transportation Projects..

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Provides an exposure to various Environmental Laws and importance of EIA on Transportation Projects with respect to noise, air pollution, visual intrusion etc
2	Students would have understood the impact of Transportation projects on the environment and are able to develop and implement mitigation measures.
3	They will also know about the legal requirements of Environmental Assessment for projects
4	Students would have understood Impact of Traffic on Environment and Energy Efficiency strategies
5	Students would have understood Measures for Air and Noise Pollution Policies

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Provides an exposure to various Environmental Laws and importance of EIA on Transportation Projects with respect to noise, air pollution, visual intrusion etc.,	Analyze
CO2. Students would have understood the impact of Transportation projects on the environment and are able to develop and implement mitigation measures	Analyze
CO3. They will also know about the legal requirements of Environmental Assessment for projects	Apply
CO4. Students would have understood Impact of Traffic on Environment and Energy Efficiency strategies	Apply
CO5. Students would have understood Measures for Air and Noise Pollution Policies	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	-	M	L	S	-	-	-	-	-	-	-	-			
CO3	-	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

ENVIRONMENTAL STANDARDS IN URBAN AREAS AND EIA Laws concerned with protection of the environment such as Environmental Protection Act, Air and Noise Pollution Act, Motor Vehicle Act, Town and Country Planning Act, Development Control Regulation, Coastal Regulation Zone

MEASUREMENT AND POLLUTION PREDICTION: Stability and equilibrium of plane frames - perfect frames - types of trusses - analysis of forces in truss members - Method of joints - Method of tension coefficients - Method of section Measurement of Air and Noise Pollution, Land Acquisition, Rehabilitation, Collection, Compilation and Presentation of Pollution and Impact Data, Measuring Impact before construction, at the time of construction and after construction, Prediction, Modeling and Validations.

ENVIRONMENTAL QUALITY AND MANAGEMENT Importance of EIA, Environmental Appraisal, EIA Statement, Vehicle and Traffic Noise, Ambient Noise Level, Heath Effects, Vibration – Damage to building, Exhaust Emission – Pollutant, Health effects, Air Pollution, Urban Ambient Air Quality Standards, Effects on Human being

ENVIRONMENTAL MAINTENANCE AND LEGAL SYSTEMS: Impact of Traffic on Environment – Network Pattern, Urban Growth Indicators of Environmental Quality, Energy use, Fuel Economy in Transportation, Energy Efficiency strategies

MITIGATIVE MEASURES AND POLICIES Mitigate Measures for Air and Noise Pollution Policies and Strategies, Involvement of Stakeholders, Public Participation, And Institutional Arrangements.

TEXT BOOKS:

1. Larry W Canter, "Environmental Impact Assessment", McGraw Hill Publishers, 1996.

2. RaoV.Kolluru; "Environmental Strategies Handbook", McGraw Hill Publishers, 1994.

3. David Banister; "Transport Policy and Environment" E&FN Spain, 1999

REFERENCES:

3. World Bank; "the Impact of Environmental Assessment – A Review of World Bank Experience, Washington, 1997.

4. World Bank; Road and the Environment, Washington, 1997.

COURSE DESIGNERS

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2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE24	INTELLIGENT TRANSPORTATION SYSTEMS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

- To learn the fundamentals of ITS.
- To study the ITS functional areas
- To have an overview of ITS implementation in developing countries

PREREQUISITE

NIL

COURSE OBJECTIVES

1	The Students should be able to Understand the sensor and communication technologies.
2	The Students should be able to Apply the various ITS methodologies
3	The Students should be able to Define the significance of ITS under Indian conditions
4	The Students should be able to understand Dynamic Traffic Assignment
5	The Students should be able to understand advanced traveler and information system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The Students should be able to Understand the sensor and communication technologies.	Understand
CO2. The Students should be able to Apply the various ITS methodologies	Apply
CO3. The Students should be able to Define the significance of ITS under Indian conditions	Understand
CO4. The Students should be able to Understand the Dynamic Traffic Assignment	Understand
CO5. The Students should be able to Understand the advanced traveler and information system	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO2	Co1	S	M	L	-	-	-	-	-	-	-	-	-		
CO3	CO 2	S	-	L	S	-	-	-	-	-	-	-	-		
CO4	CO 3	S	-	M	S	-	-	-	-	-	-	-	-		
CO5	CO 4	S	M	M	M	-	-	-	-	-	-	-	-		

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO INTELLIGENT TRANSPORT SYSTEM Definition – Role and Responsibilities – Advanced Traveler Information System – Fleet Oriented ITS Services – Electronic Toll Collection – Critical issues – Security – Safety

ITS ARCHITECTURE AND HARDWAREITS Architecture Framework – Hardware Sensors – Vehicle Detection – Techniques –Dynamic Message Sign – GPRS – GPS – Toll Collection.

INTERSECTION MANAGEMENT: Video Detection – Virtual Loop - Cameras - ANPR – IR Lighting – Integrated Traffic Management –Control Centre – Junction Management Strategies

ADVANCED TRANSPORT MANAGEMENT SYSTEM: ATMS – Route Guidance – Issues - Travel Information – Pre Trip and Enroute Methods – Historical –Current – Predictive Guidance – Data Collection – Analysis – Dynamic Traffic Assignment (DTA) –Components – Algorithm

ADVANCED TRAVELLER AND INFORMATION SYSTEM: ATIS Concepts – Smart Route System – Data Collection – Process – Dissemination to Travelers – Evaluation of Information – Value of Information – Business Opportunities

TEXT BOOKS:

1. Intelligent Transport Systems, Intelligent Transportation Primer, Washington, US, 2001
2. Henry F.Korth, and Abraham Silberschatz, Data Base System Concepts, McGraw Hill, 1992
3. E.Turban, ‖Decision Support and Export Systems Management Support Systems", Maxwell Macmillan, 1998

REFERENCES:

3. Sitausu S.Mittra, "Decision Support Systems – Tools and Techniques", John Wiley, New York, 1986
4. Cycle W.Halsapple and Andrew B.Winston, "Decision Support Systems – Theory and Application", Springer Verlog, New York, 1987

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in
2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE25	LOGISTICS IN TRANSPORTATION ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To Provide an understanding on Freight Transport, Modeling, Location of the Facility and its Management

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Provides an understanding on Freight Transport, Modeling, Location of the Facility and its Management
2	Students will have a knowledge on the principles and practice of Freight Transport Modeling and provision of the Facilities
3	Students will have a knowledge on the Distribution System, Vehicle Routing and Scheduling
4	Students will have a knowledge on the Intermodal Transportation
5	Students will have a knowledge on the Toll Plaza Analysis

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Provides an understanding on Freight Transport, Modeling, Location of the Facility and its Management	Understand
CO2. Students will have a knowledge on the principles and practice of Freight Transport Modeling and provision of the Facilities	Apply
CO3. Students will have a knowledge on the Distribution System, Vehicle Routing and Scheduling	Understand
CO4. Students will have a knowledge on the Intermodal Transportation	Understand
CO5. Students will have a knowledge on the Toll Plaza Analysis	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			

CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

LOGISTICS: Introduction – Trade Logistics Service, Freight Costs – Freight Demand Models

FREIGHT TRANSPORT: Econometric Models for Freight Forecasting – Input Output Models – Regional Network Systems – Graph Theory Application in Network Planning

DISTRIBUTION MANAGEMENT: Supply Chain – Warehousing – Facility Location, Inventory – Mode Choice – Distribution System, Vehicle Routing and Scheduling

LOGISTICS MANAGEMENT: Logistics out sourcing – IT Application in Freight Logistics – Technology in Logistics Management – Intermodal Transportation

APPLICATION IN FREIGHT TRANSPORT: Commercial Fleet Management, Toll Plaza Analysis

TEXT BOOKS:

1. Blanchard ST.Benjamen, "Logistics Engineering and Management", Prentice Hall, Inc, Eaglewood Cliffs, New Jersey 07632, 1986
2. Coyle J.J.Bardi JE, "The Management of Business Logistics", West Publishing Company, New York, 1984
3. Daganzo F.C and Newell FG, Vol.19B, No.5, pp.397-407, Physical Distribution from a Warehouse; Vehicle Coverage and Inventory Levels, Transportation Research, 1985
4. Edwin Bacht J.A., "Geography of Transportation and Business Logistics", Wm C Brown Company Publishers, Dubuque, IOWA, 1970
5. Herron P.David, "Managing Physical Distribution for Profit", Harvard Business Review, 1979

REFERENCES:

1. Khanna K.K., "Physical Distribution Management", Logistical Approach, Himalaya Publishing House, Bombay, 1985

2. Planning Commission, Government of India, Total Transport System Study – Report on Commodity Flows, Railways, Highways and Coastal Shipping, (Interim) by RITES, New Delhi, 1987

3. Shapiro D. Roy and Heskett L.James, "Logistics Strategy-Cases and Concepts", Wesg Publishing Company, New York, 1985

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
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2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE26	PAVEMENT MANAGEMENT SYSTEM	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the concepts of design, evaluation and performance of existing and new flexible and rigid pavements with due emphasis on systems approach and performance prediction models.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To introduce the concepts of design, evaluation and performance of existing and new flexible and rigid pavements with due emphasis on systems approach and performance prediction models.
2	Students will have a knowledge on the evaluation of pavement performance
3	Students will have a knowledge on the design objectives and constraints
4	Students will have a knowledge on the Techniques for developing prediction models
5	Students will have a knowledge on the Repair of pavement defects

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students will have a knowledge on the concepts of design, evaluation and performance of existing and new flexible pavements with due emphasis on systems approach and performance prediction models.	Understand
CO2. Students will have a knowledge on the evaluation of pavement performance	Apply
CO3. Students will have a knowledge on the design objectives and constraints	Understand
CO4. Students will have a knowledge on the Techniques for developing prediction models	Apply
CO5. Students will have a knowledge on the Repair of pavement defects	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

PAVEMENT MANAGEMENT PROCESS Historical background – general nature and applicability of systems methodology – basic components of Pavement Management System –Network and Project level of PMS - PMS functions- planning pavement investments

EVALUATION AND PERFORMANCE: General concepts – economic and functional evaluation – evaluation of pavement performance – evaluation of structural capacity – pavement distresses – condition surveys – safety evaluation

DESIGN STRATEGIES: Framework for pavement design – design objectives and constraints – basic structural response models – characterization of physical design inputs – generating alternative pavement design – economic evaluation of alternative design – analysis of alternative design strategies – selection of optimal design strategy.

PERFORMANCE PREDICTION MODELS: Techniques for developing prediction models – AASHO, CRRI and HDM models – computer applications – Identification of alternatives –deterioration modeling- priority programming Methods

REHABILITATION: Repair of pavement defects – maintenance of flexible and rigid pavements – bituminous and cement concrete overlays – system analysis,

TEXT BOOKS:

3. Ralph Haas, W.Ronald Hudson and John Zaniewski, Modern Pavement Management, Kreigar Publishing Company, New York, 1994

4. M.Y.Stalin, Chapman and Hall Pavement Management for Airports, Roads and Parking Lots , New York, 1992

REFERENCES:

5. Michael Sargious, Pavements and Surfacing for Highways and Airports, AppliedScience Publishers

Limited, London, 1975

COURSE DESIGNERS

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2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE27	REMOTE SENSING AND GIS IN TRANSPORTATION DEVELOPMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Introduce the students, the recent techniques of Remote Sensing and GIS and I Its application in Traffic and Transportation Engineering

PREREQUISITE

NIL

COURSE OBJECTIVES

1	The Students would have knowledge on the basics of remote sensing
2	The Students would have knowledge on the basics of gis techniques and their application in the transport sectors
3	The Students would have knowledge on the data structures and analysis
4	The Students would have knowledge on the basic applications in transportation
5	The Students would have knowledge on the Advanced Traveler Information System

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The Students would have knowledge on the basics of remote sensing	Apply
CO2. The Students would have knowledge on the basics of gis techniques and their application in the transport sectors	Apply
CO3. The Students would have knowledge on the data structures and analysis	Analyze
CO4. The Students would have knowledge on the basic applications in transportation	Apply
CO5. The Students would have knowledge on the Advanced Traveler Information System	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			

CO2	S	M	-	-	-	-	-	-	-	-	-	-			
CO3	S	M	-	-	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO REMOTE SENSING: Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body – Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Electromagnetic Radiation – EMR Spectrum

INTRODUCTION TO GIS: Basic Concept and Components – Hardware, Software – Data Spatial and non-spatial – Geo-referencing – Map Projection – Types of Projection – Simple Analysis – Data retrieval and querying
DATA STRUCTURES AND ANALYSIS: Database – Raster and Vector data structures – Data storage – Run length, Chain and Block coding – Vector data storage – Topology – GIS Modelling - Raster and Vector data analysis – Buffering and overlaying techniques – Network Analysis – Spatial Analysis

BASIC APPLICATIONS IN TRANSPORTATION: Highway and Railway Alignment, location of transport terminals and roadside facilities, bus stops – Route optimization – Bus route rationalization – Accident analysis – Applications of Aerial Photography and Satellite Imageries

ADVANCED APPLICATIONS: GIS as an integration technology – Integration of GIS,GPS and Remote Sensing Techniques – Advanced Traveler Information System (ATIS) – Automatic Vehicle Location System (AVLS)

TEXT BOOKS:

1. Anji Reddy, "Remote Sensing and Image Interpretation", John Wiley and Sons Inc. New York, 1987.
2. M.G.Srinivas, "Remote Sensing Applications", Narosa Publishing House, 2001.
3. Burrough P.A, "Principles of GIS for Land Resources Assessment", Oxford Publication, 1994.

REFERENCES:

6. Jeffrey Star and John Ester, Geographical Information System – An Introduction, Prentice Hall Inc., Englewood Cliffe, 1990.
7. Marble, D.F, Calkins, H.W and Penquest, Basic Readings in GIS, Speed System Ltd., New York, 1984.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in
2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

17CVSE28	URBAN TRANSPORTATION INFRASTRUCTURE– PLANNING AND DESIGN	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Helps in Design of Intersections, Interchanges, Parking and Terminal Facilities to be provided inan urban area

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Helps in Design of Intersections, Interchanges, Parking and Terminal Facilities to be provided inan urban area
2	The students would have gained knowledge on Rail Infrastructure Management
3	The students would have gained knowledge on Design of Grade Separators and intersections
4	The students would have gained knowledge on Design of Multi-Storey and Surface Parking facility
5	The students would have gained knowledge on Design and Case Studies of Inter Modal Transfer Facilities

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The students would have gained knowledge on Rail Infrastructure Planning, Operation and Management.	Apply
CO2. The students would have gained knowledge on Rail Infrastructure Management.	Understand
CO3. The students would have gained knowledge on Design of Grade Separators and intersections	Apply
CO4. The students would have gained knowledge on Design of Multi Storied and Surface Parking facility	Apply
CO5. The students would have gained knowledge on Design and Case Studies of Inter Modal Transfer Facilities	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	-	L	S	-	-	-	-	-	-	-	-			
CO3	S	-	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	-	-	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF INTERSECTION DESIGN: Basic considerations – simplicity – uniformity – Manoeuvre Elements – Separation of conflict points – Design Elements – Design Speed – Intersection Curves – Super elevation for curves at Intersection – Intersection Sight Distance

DESIGN OF AT-GRADE INTERSECTIONS: Capacity and LOS, Design of Rotary and Signalised Intersections, Vehicle Actuated Signals, Signal Co-ordination, Area Traffic Control System (ATCS), Pedestrian Planning at Grade Intersections

DESIGN OF GRADE SEPARATED INTERSECTIONS: Design of Grade Separators – Principles , Design Criteria – Layout Design, GAD Preparation – Pedestrian Foot Over-bridge and Subway Design – Pedestrian Planning for Grade Separated Intersections

PARKING FACILITIES : Parking – Demand – Characteristics – Space Inventory – Accumulation – Duration – Turn over – Index – Design of Multi Storey and Surface Parking facility

DESIGN OF TERMINAL FACILITIES: Bus Terminus – Design Principles – Design Elements – Design and Case Studies of Inter Modal Transfer Facilities – Design – Case Studies of Bus and Rail Terminals.

TEXT BOOKS:

1. Robert F Baker, (Edition) "Hand Book of Highway Engineering, Van Nostrand Reinhold Company, New York, 1975

2. Kanna, S.K. and Justo, C.E.G. "Highway Engineering, Nemchand.

REFERENCES:

1 .New Jersy, "Transportation and Traffic Engineering Hand Book, Institute of Transportation Engineers, Prentice Hall, INC, 1982

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COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	S. Arvindan	Asst.Prof	AVIT	arvindsivasuriyan@avit.ac.in
2	Dr. D. S. Vijayan	Asso.Prof	AVIT	vijayan@avit.ac.in

		Category	L	T	P	Credit
17CVSE29	**PRINCIPLES OF VALUATION**	EC	3	0	0	3

PREAMBLE

To introduce the students to understand about the importance and need of valuation, concepts of valuers and appraisers, to know about the depreciation, the market value and depreciated replacement cost

PREREQUISITE : Nil

COURSE OBJECTIVES

1	To learn about the importance, need and advantages of valuation.
2	To develop the knowledge regarding concept of land and property.
3	To understand about the different types of assets and properties.
4	To know about the price, cost, market and value.
5	To study about the Depreciated Replacement Cost (DRC)

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Remember the importance, need and advantages of valuation.	Remember
CO2 Understand the knowledge regarding concept of land and property.	Understand
CO3 Understand about the different types of assets and properties.	Understand
CO4 Remember the price, cost, market and value.	Remember
CO5 Remember the Depreciated Replacement Cost (DRC)	Remember

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO	S	M	L	S	-	-	-	-	-	-	-	-			

2															
CO 3	S	M	M	S	-	-	-	-	-	-	-	-			
CO 4	S	M	M	M	-	-	-	-	-	-	-	-			
CO 5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Importance Of Valuation – Need Of Valuation – Do‘s And Don‘ts In Valuation – Advantages Of Valuation.

LAND AND PROPERTY CONCEPTS: Valuation of Land – Property - personal property - Property Valuers - Asset Valuers – Appraisers - Price changes over time result from specific and general effects of economic and social forces.

REAL ESTATE, PROPERTY, AND ASSET CONCEPTS: Real Estate - Real Property - Personal Property- Current Assets - Non-Current Assets - Property, Plant, and Equipment - Other Non-Current Assets – Depreciation.

PRICE, COST, MARKET AND VALUE : Price – Cost – Market and Value - Professional , Valuers - The Market Value**VALUATION APPROACHES :**Valuation Approaches - Cost Approach - Sales Comparison Approach- 3 Income Capitalization Approach- Depreciated Replacement Cost (DRC

TEXT BOOKS:

1. Principles of Valuation Paperback – Import, 27 May 2009 by John Armatys,neerG ekiM& mahksA lihP

2. Valuation of Real Properties, PB by Rangwala.

REFERENCES:

1. Economics and Property, by Danny Myer

2. Advanced Valuation for Secured Lending by Banks and Financial Institutions, by Syamales Datta

3. Valuation of Immovable Properties under Direct Taxes, by Girish C. Gupta

4. Real Estate Investment: A Strategic Approach, by Andrew Baum.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE30	REAL ESTATE MANAGEMENT & ECONOMICS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to understand about the concept of management in real-estate and implementation procedure, how to use real estate in urban development, regulatory laws and about the developers and promoters and how to do management of housing and Ownership and tenancies in real estate.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand about the Concept of management in real-estate development and administration.
2	To learn about the Housing Finance Development Corporation and other financial institutions.
3	To understand about the developers and promoters and regulatory laws for construction.
4	To study about the Management of different types of housing and public buildings.
5	To learn about the Ownership and tenancies in real estate.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO5. Understand about the Concept of management in real-estate development and administration.	Understand
CO6. Remember about the Housing Finance Development Corporation and other financial institutions.	Remember
CO7. Understand about the developers and promoters and regulatory laws for construction	Understand
CO8. Remember about the Management of different types of housing and public buildings	Remember
CO9. Remember about the Ownership and tenancies in real estate.	Remember

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Concept of management in real-estate development and administration; aims, objects and practices renewal of leases and alternate methods for efficient estate management.

REAL ESTATE IN URBAN DEVELOPMENT: Urban development finance with particular reference to real-estate: role of Housing Finance Development Corporation and other financial institutions and agencies.

DEVELOPERS, PROMOTERS AND LAWS: Private development enterprises by developers and promoters; regulatory laws for construction of multi-storied buildings, transfers and administration.

MANAGEMENT OF HOUSING: Management of co-operative housing, apartment housing, corporate housing and public buildings

OWNERSHIP IN REAL ESTATE: Ownership and tenancies in real estate: effect of rent control and other laws. Methods of fixing rent, rigidity and flexibility

TEXT BOOKS:

1) Michael Thorncroft, Principles of Estates Management

2) W.A Leach, Urban Estates Management Vol. I and II

REFERENCES:

1) John P. Macey, Housing Management, Estate Gazettes.

2) Lichfield, Economics of Planning development

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE31	REAL ESTATE HUMAN RESOURCE MANAGEMENT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to understand about the strategic HRM, human resource environment, recruitment and retention strategies, performance management strategies and global hr strategies

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To study about the various types of strategies and HR plans and policies
2	To understand about the Global environment; Global competition and Global sourcing of labour
3	To learn about the recruitment process outsourcing, employee empowerment and employee involvement
4	To study about the performance management strategies
5	To know about the global HR strategies

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Remember the various types of strategies and HR plans and policies	Remember
CO2. Understand about the Global environment; Global competition and Global sourcing of labor	Understand
CO3. Remember the recruitment process outsourcing, employee empowerment and employee involvement	Remember
CO4. Remember the performance management strategies	Remember
CO5. Understand the global HR strategies	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO STRATEGIC HRM: Definition, need and importance; Introduction to business and corporate strategies; Integrating HR strategies with business strategies; Developing HR plans and policies.

HUMAN RESOURCE ENVIRONMENT : Technology and structure; Workforce diversity; Demographic changes Temporary and contract labour; Global environment; Global competition Global sourcing of labour; WTO and labour standards

RECRUITMENT AND RETENTION STRATEGIES: Online recruitment; Employee referrals; Recruitment process outsourcing Head hunting; Executive education; Flexi timing; Telecommuting Quality of work life; Work - life balance; Employee empowerment Employee involvement; Autonomous work teams

PERFORMANCE MANAGEMENT STRATEGIES Defining key result areas (KRA); Result based performance Linking performance to pay; Merit based promotions

GLOBAL HR STRATEGIES: Introduction to global HR strategies; Developing HR as a value added function

TEXT BOOKS:

1. Strategic HRM – Jeffery Mello, Thompson publication, New Delhi

2. Strategic HRM – Charles Greer, Pearson education Asia, New Delhi

3. Strategic HRM - Michael Armstrong, Kogan page, London

REFERENCES:

1. Strategic HRM – Agarwal, Oxford university press, New Delhi

2. Human resource management – Garry dessler, PHI, New Delhi

COURSE DESIGNERS

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2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE32	LAWS FOR ACQUISITION AND CONTRACT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to understand about the Legislative laws and its application, Salient features of the Indian Constitution, features of local Government, types of contract and its application and Land Acquisition Act.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To study about laws, Legislative enactments and Judicial precedents.
2	To understand about features of the Indian Constitution, legal system and fundamental rights.
3	To learn about types of Government, revenue system, etc.
4	To study about types of contract and its guidelines, valuation etc.
5	To learn about the contract and conveyance, Land Acquisition Act and Rent control laws.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the laws and Judicial precedents	Understand
CO2. Understand about the Indian Constitution, legal system and fundamental rights.	Understand
CO3. Learn about types of Government, revenue system, etc.	Remember
CO4. Understand about types of contract and its guidelines, valuation etc.	Understand
CO5. Remember about the contract and conveyance, Land Acquisition Act and Rent control laws.	Remember

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			

CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

ELEMENTARY JURISPRUDENCE: Law – its origin, source and ramifications. Legislative enactments – subordinate legislation – Judicial precedents.

INDIAN LEGAL SYSTEM: Salient features of the Indian Constitution, fundamental rights: directive principles of the state policy. Executive, Legislature and the judiciary Centre – State relationship.

LOCAL GOVERNMENT: Types – Rural and Urban, constitutional provisions, powers and functions Sources of revenue: Tax and fee, Municipal Finance, essential civil service.

CONTRACT AND TORT: Laws of contract and tort: formation of a contract, parties; void, voidable and unenforceable contract; contingent contract; misrepresentation and fraud-effect thereof termination of contract; remedies for breach; performance of contract; indemnity and guarantee; law of agency; general principles of tort; tort affecting valuation.

CONVEYANCING: Outline procedure for sale of immovable property: contract and conveyance; preliminary inquiries open contract; contract by correspondence. Acquisition and requisition of immovable property – enactments. Land Acquisition Act, 1894 (1 to 1894). Provisions for acquisition of land under the municipal laws. Law of arbitration and conciliation: salient features. Rent control laws.

TEXT BOOKS:

1) M.J.Sethna, Jurisprudence, Lakhani Book Depot. Lamington Road, Bombay – 400 007

2) Durga Das Basu, Introduction to Constitution of India, Lakshmi Publications (P) Ltd., (1998), Kolkatta

3) B.S. Sinha, Law of Torts, Eastern Book Company, 34 Lal Baugh, Lucknow – 226 001.

REFERENCES:

1) N.M. Tripathi, Indian Contract Act (Students Edition), Mulla Publishers, Princess Street, Bombay 400 002.

2) Building Bye-law of Muncipal Corporation of Ahmedabad, Bombay, Delhi & Madras.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE33	REAL ESTATE FINANCE & MARKETING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To introduce the students to understand about the financial management, capital budgeting: process and techniques, market-led strategic management, strategic marketing analysis and application to different business sectors.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To study about the evolution of finance, business ethics and social responsibility, time value of money concept.
2	To learn about the decisions, process and techniques of capital budgeting
3	To study about the relationship with corporate vision of marketing strategy
4	To understand about the identification of attractive markets and industry or business analysis
5	To study about the application to different business sectors and constraints in marketing strategy

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Understand the evolution of finance, business ethics and social responsibility, time value of money concept.	Understand
CO2 Remember the decisions, process and techniques of capital budgeting	Remember
CO3 Remember the relationship with corporate vision of marketing strategy	Remember
CO4 Understand the identification of attractive markets and industry or business analysis	Understand
CO5 Remember the application to different business sectors and constraints in marketing strategy	Remember

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

FINANCIAL MANAGEMENT: An Overview. Evolution of finance, The Basic Goal: Creating Shareholder Value, Agency Issues, Business Ethics and Social Responsibility, Time value of money concept.

STRATEGIC INVESTMENT DECISIONS: Capital Budgeting Decisions – Capital Budgeting: Process and Techniques - Payback period, Accounting rate of return, NPV, IRR, MIRR, Profitability index, Discounted payback period, Estimation of cash flows, NPV vs. IRR, Risk analysis in Capital Budgeting - Sensitivity analysis, Certainty Equivalent Approach, Calculation of RADR, Real options.

OVERVIEW OF MARKETING STRATEGY: Relationship with Corporate Vision, Mission and Objectives. Market-led strategic management.

STRATEGIC MARKETING ANALYSIS: Identification of attractive markets, Industry/business analysis and sustaining competitive advantage.

INTEGRATION OF MARKETING STRATEGIES: Application to different business sectors – FMCG, Industrial, & Services. Constraints in marketing strategy implementation. Periodical assessment.

TEXT BOOKS:

1. Bhalla V.K. (2009). Financial Management. New Delhi: Anmol Publications

2. Brealey, R. R., Myers. S., Allen, F., & Mohanty, P. (2009). Principles of corporate finance (8th ed.). New Delhi: Tata McGraw Hill.

3. Brigham, E F., & Davis, P. (2009). Intermediate financial management (10th ed.). USA: South Western

REFERENCES:

1. Brigham, E. F., & Houston, J. F. (2007). Fundamentals of financial Management (11th Ed.). USA: Thomson.
2. Chandra, P. (2008). Financial management (7th ed.). New Delhi: McGraw Hill.
3. Hickman, K. A., Hunter, H. O., & Byrd, J. W. (2008). Foundations of corporate finance (2nd ed.). USA South Western.
4. Horne, V. (2008). Fundamentals of financial Management (12th ed.). New Delhi: Pearson Education.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE34	VALUATION & DOCUMENTATION WRITING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to understand about the essential structure of a report, purpose and properties of valuation and to consequences of report.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To learn about the various methods of Essential structure of a report.
2	To know about the different types of structure in valuation.
3	To understand the purpose of valuation
4	To learn the procedure of report writing as per court of law
5	To understand about the pattern of the examination

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Remember the various methods of Essential structure of a report.	Remember
CO2. Understand the different types of structure in valuation.	Understand
CO3. Understand the purpose of valuation	Understand
CO4. Remember the procedure of report writing as per court of law	Remember
CO5. Understand the pattern of the examination	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			

CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Essential structure of a report

STRUCTURE OF A REPORT : The general structure of a report

PURPOSE OF VALUATION: Details required according to the purpose of valuation - Details required according to the type of properties

REPORT WRITING: Consequences of report – Writing a report – Negotiations, Negligence and leading expert evidence in court of law.

GENERAL PRACTICES: Practice and Examination

TEXT BOOKS:

1) Joseph C. Mancuso, Mastering Technical Writing.

2) Matt Young, The Technical Writer‘s handbook.

3) P.T.Hardikkar, Report writing, Academic Book Center (2006), Ahmedabad.

REFERENCES:

1) Arlen C. Mills, MAI, Communicating the Appraisal, /The individual condominium or PUD Unit Appraisal Report.

2) S. Sreenivas Rao, Hand book for writers and editors, academic Book Centre, 10 Walkeshwar, Ambawadi, Ahmedabad 380 015.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

17CVSE35	QUALITY CONTROL AND ASSURANCE IN REAL ESTATE	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To introduce the students to understand about the quality, strategic planning, and competitive advantage in real estate, principles of total quality management, customer relationship management techniques, quality control and quality assurance and benefits of control charts and applications

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To study about the concept of quality, planning and quality and market share
2	To learn about the elements and benefits of total quality management
3	To understand about the customer satisfaction measurement techniques and customer relationship management techniques.
4	To learn about the quality control and quality assurance
5	To know about the benefits of control charts and applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the concept of quality, planning and quality and market share	Understand
CO2. Remember the elements and benefits of total quality management	Remember
CO3. Understand the customer satisfaction measurement techniques and customer relationship management techniques.	Understand
CO4. Remember the quality control and quality assurance	Remember
CO5. Understand the benefits of control charts and applications	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			

CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

QUALITY, STRATEGIC PLANNING, AND COMPETITIVE ADVANTAGE: Brief History -Definitions of Quality. Quality in Manufacturing and Service Systems. Quality and Price - Quality and Market Share - Quality and Cost - Quality & Competitive Advantage.

PRINCIPLES OF TOTAL QUALITY MANAGEMENT: Introduction - Elements of Total Quality Management - Malcolm Baldrige National Quality Award Criteria. Benefits of Total Quality Management. The Deming Management Philosophy – The Juran Philosophy – The Crosby Philosophy.

CUSTOMER FOCUS: The Customer-Driven Quality Cycle - Quality Function Deployment –Customer Satisfaction Measurement Techniques – Customer Relationship Management Techniques.

QUALITY CONTROL AND QUALITY ASSURANCE Concept of Quality Control – Concept of Process Variation – Acceptance Sampling – Sampling Inspection Vs. 100% Inspection – Attributes and variable sampling plans – OC Curves – Producer and Consumer Risk – AQL, RQL, TQL, AOQL and AOL. (10%)

STATISTICAL PROCESS CONTROL : Control Charts – X-R, P, np and C Charts – Benefits of Control Charts and Applications

TEXT BOOKS:

1. Quality Control - Dale H Besterfield – Pearson Education
2. Total Quality Management – S. Sundarrajan
3. Quality Control & Total Quality Management – Jain

REFERENCES:

1. The essence of Total Quality Management – Hansen & Ghare
2. Managing for Total Quality – Logothetic
3. Quality Problem Solving – Smith
4. ISO 9000 – Kairon

5. Manuals of various standards

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in
2.	Mrs.Vaidevi	AP Fr II	AVIT	vaidevic@ avit.ac.in

		Category	L	T	P	Credit
17CVSE36	**RENEWABLE ENERGY SYSTEMS**	EC	3	0	0	3

PREAMBLE

Energy formula and unit, various forms of energy, renewable energy, non renewable energy, Energy consumption of a building, Energy consumption of any industrial site, Energy efficiency calculation.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the different type of energy.
2	To learn about the principle, reconstruction and the uses of solar thermal energy.
3	To understand the basics and advancement in Ocean and Geothermal Energy.
4	To learn about Sustainable energy for all-planning aspect-action.
5	To understand the concepts of Renewable Energy Policy.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. List and generally explain the main sources of energy and their primary applications in the world.	Apply
CO2. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.	Analyze
CO3. Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.	Analyze
CO4. Convert units of energyto quantify energy demands and make comparisons among energy uses, resources, and technologies.	Apply
CO5. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	M	-	-	-	L	-	-	-	-			
CO3	S	L	M	M	-	-	L	-	M	L	-	-			
CO4	S	M	M	M	-	-	-	-	-	L	-	-			
CO5	S	L	M	-	-	-	M	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Types of energy- solar energy- nuclear energy- wind energy- thermal energy- geo thermal energy- fossil fuels-hydroelectric energy- Energy reserves of India- Energy intensity- Energy efficiency- Renewable energy sources-green house effect

SOLAR THERMAL ENERGY: Solar thermal water heating- solar distillation-solar pumping systems-solar thermal power plant- solar collectors- thermal storage-solar pond- solar pumping systems-solar cooker-solar air condition and refrigerator-energy efficient buildings- assessment of solar radiation- solar photovoltaic system

OCEAN, HYDRO AND GEOTHERMAL ENERGY: Wave and tidal energy, ocean thermal energy conversion - principle, types, power plants- small, mini and micro hydro power plants. Exploration of geothermal energy, geothermal power plants. Introduction to direct energy conversion systems – fuel cells and magneto hydrodynamic power generations

SUSTAINABLE ENERGY : Sustainable energy for all-planning aspect-action area- implementation road map-mobilizing action- Sustainable energy futures, global scenarios, promising technologies, development pathways, clean coal and carbon technologies, electric vehicles, energy fluctuation and energy storage, distributed generation and smart grids.

RENEWABLE ENERGY POLICY: Renewable energy policies, including feed-in tariffs, portfolio standards, policy targets, tax incentives, and biofuels mandates. International policies for climate change and energy security. Economic analysis and comparisons, Life cycle analysis, financial analysis, cost of conserved energy, and externalities. Cost assessment of supply technologies versus energy-efficiency.

TEXT BOOKS:

7. Rai .G .D, –Non-Conventional Energy Sources‖, Khanna Publishers, 4th edition, New Delhi, 2009.
8. John E Freund's Mathematical Statistics: (7th Ed.), Miller & Miller, Prentice-Hall

9. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009

4. Roland Wengenmayr, Thomas Buhrke,‖ Renewable energy: Sustainable energy concepts for the future‖, Wiley-VCH, 1st edition, 2008.

REFERENCES:

5. –Fundamentals of Renewable Energy Systems‖. D. Mukherjee, S. Chakrabarti

6. Godfrey Boyle, –Renewable energy‖, Oxford University Press, 2nd edition, 2010

7. Hans-Josef Fell, –Global cooling strategies for climate protection‖, CRC Press, 2012.

4. Ottmar Edenhofen, –Renewable energy sources and climate change mitigation‖, Cambridge University Press, 2011.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	R. Abirami	Asst. Prof-I	AVIT	abirami.civil@avit.ac.in
2	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE37	THERMAL INSULATION INSTALLATION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

One must understand the concept of thermal insulation, need for thermal insulation, materials, safety hazards for a thermal insulation, OSHA standards, Building regulations, MEP works

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the Purpose and need of Insulation.
2	To learn about the various types of thermal insulation materials.
3	To understand the basic need for Insulation and Refractoriness.
4	To learn about properties of Thermal Insulation Materials.
5	To understand the concepts of Insulation Installation For Residential Housing.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Identify the correct tools for installation of specific thermal insulation processes	Apply
CO2. Identify the correct materials required for installation of specific thermal insulation and address any defects with materials	Apply
CO3. Identify potential installation faults and carry out corrective actions where applicable	Apply
CO4. Ensure installation area is cleaned in accordance with contractual, health and safety and organizational requirements	Apply
CO5. Demonstrate good practice in relation to the health and safety of the individual, other workers and visitors	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	M	-	-	-			
CO2	S	M	L	M	-	M	-	-	L	L	-	-			
CO3	S	L	M	M	-	L	L	-	-	-	M	-			

CO4	S	M	L	L	-	-	-	-	-	L	-	-			
CO5	S	M	M	L	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Thermal insulation, Purpose of Insulation, Need for insulation, Benefits of insulation, Feasibility in insulation, Procedure for proving insulation, heat energy transfer, heat radiation, types and Applications.

THERMAL INSULATION MATERIALS: Types, mineral wool- Rock or slag, fiber glass, polyurethane foam, polystyrene, cellulose, cellular plastics, plastic fibers, natural fibers, insulating concrete, reflective surface, insulation board.

INSULATION AND REFRACTORIES: Insulation and Refractories: Insulation-types and application, Economic thickness of insulation, Heat savings and application criteria, Refractory-types, selection and application of refractories, Heat loss.

PROPERTIES OF INSULATION MATERIALS : Mechanism of heat transfer, thermal conductivity, surface emissivity, insulation thickness, density, specific heat capacity, thermal bridging, Insulations used as buildings, factors affecting insulation performance, compaction effects, moisture, air infiltration, other properties, fire performance, corrosion, moisture absorption, summary.

INSULATION INSTALLATION FOR RESIDENTIAL HOUSING: Installation tips, thermal bridging, vapour barriers, roof ventilation, gaps, bulk insulation, reflective insulation, roof and ceiling insulation, external wall insulation, flooring insulation, Advantages and disadvantages.

TEXT BOOKS:

1. ―Thermal insulation, materials and systems for energy conservation in the _80s‖ by Govan, Greson, Mc Allister.
2. ―Insulation materials, testing and applications‖, Mc Elroy/ Kimpflen.
3. ―An assessment of Thermal insulation Materials and system for building Applications‖, prepared by Brookhaven National Laboratory.

REFERENCES:

1. ―Thermal Insulation Materials and systems‖ by Powell/ Matthews editors
2. ―Thermal insulation handbook for the Oil, gas, and petrochemical Industries‖, Alireza Bahadori.
3. Sustainable Energy Authority Victoria (SEAV). 2006. Energy smart housing manual, Ch. 7, Insulation

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	R. Abirami	Asst .Prof-I	AVIT	abirami.civil@avit.ac.in
2.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE38	SUSTAINABLE URBAN SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

GIS (geographic information systems) which enables students to process real urban datasets, script and perform spatial analyses, interpret results, and produce visualization. To draw the sketch of urban area in software like CAD. Student must learn to get the plan of urban area from town and country planning authorities.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the Sustainability urban systems.
2	To learn about the principle global Sustainable in urban system.
3	To understand the basics ecological and environmental Sustainability.
4	To gain the knowledge about public transport and urban development
5	To understand the concepts of sustainable urban water management.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Identify and support the good practices in green and efficient urban development and planning.	Apply
CO2. Review policies and foster technologies used to promote energy efficiency and reduced GHG emissions from buildings and transportation.	Apply
CO3. Review policies and foster technologies necessary to ensure healthy water and sanitation services.	Apply
CO4. Examine policies and foster technologies necessary for the effective collection, disposable, and possible re-use of waste and in promoting circular economy	Apply
CO5. Examine, track, and analyze sustainability metrics and indicators for urban centers	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3

CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	L	-	-	-	-	-	-	-	-			
CO3	S	L	M	M	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	S	-	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO SUSTAINABLE URBAN SYSTEM: Sustainability definition, need for sustainability for urban system, land use and urban design issues, sustainability of structures, Design procedure for urban system.

GLOBAL SUSTAINABILITY : Urban sustainability, natural systems in crisis, climate change causes and effects, Urbanisation, sustainable urban development, complex urban systems, Urban planning strategy.

ECOLOGICAL AND ENVIRONMENTAL SUSTAINABILITY: Urban ecology and restoration, soil, water and air; energy and materials use, sustainable communities, Urban Planning issues.

PUBLIC TRANSPORT & URBAN DEVELOPMENT: Sustainable construction techniques, Planning roadways, railways in urban area, Planning national highways which connect various cities, various types of transportation in urban city.

SUSTAINABLE URBAN DRAINAGE SYSTEMS: Introduction to sustainable urban water management, technical approaches to reducing water use, Control systems for surface runoff, filter strips and swales, permeable surfaces, paving, ponds and wet lands.

TEXT BOOKS:

1. Sustainable Urban Metabolism‖ by Paulo Ferrao, John E. Fernandez
2. –The Urban Climatic Map: A methodology for sustainable Urban Planning‖ by Edward Ng, Chao Ren.
3. –Local Sustainable Urban Development in a global world‖ by Lauren C. Heberie, Susn M. Opp.

REFERENCES:

1. –Pathways to Urban Sustainability: Research and Development on urban systems‖ by National Research council Policy and Global Affairs Science and technology for Sustainability Program Committee on the challenge of developing Sustainable Urban Systems.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	R. Abirami	Asst .Prof-I	AVIT	abirami.civil@avit.ac.in
2.	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE39	ENERGY AUDITING IN SPECIAL STRUCTURES	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Before starting the course one must be able to define the energy audit and its types. Sources of energy, forms of energy and understand the clear concept of special structures.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the detail energy audit system.
2	To learn about the Energy resources & electricity consumption.
3	To study about the various other sources for production of electricity.
4	To gain the knowledge about various types of energy audit.
5	To learn about the Estimation of energy economy of the building.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Identify and describe the energy conservation opportunities in industrial and commercial systems.	Apply
Co2. Apply energy auditing techniques	Apply
Co3. Describe the energy rate structures.	Apply
Co4. Examine the economic evaluation of energy conservation solutions.	Apply
CO5. Use computers to monitor and control energy use.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			

CO2	S	M	L	L	-	-	-	-	-	-	-	-			
CO3	S	M	M	L	-	-	-	-	-	-	-	-			
CO4	S	M	L	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Energy Audit, standard energy audit, detail energy audit, stepwise procedures for energy audit, common energy conservation measures, electrical systems, HVAC systems, Compressed air systems, Energy management controls, Indoor Water Management, New technologies, Case studies.

ENERGY SOURCES AND UTILITY RATE STRUCTURES: Energy resources, electricity consumption, service level, Bill based on 4 RTP rates, home energy audit, Energy efficiency.

ENERGY SAVING TECHNIQUES: Household- use of CFL, solar panels for usage of electricity. Industrial- usage of various other sources for production of electricity such as coal, hydro energy and solar panels huge size. Comparison of energy saving techniques to conventional method of electricity production.

ENERGY AUDIT: Define energy audit, macro audit, micro audit, developing an audit plan, defining audit resources, energy analysis methodology, systematic approach, energy management opportunities, Electricity from purchase to end-use, units of energy.

SPECIAL STRUCTURES: Estimation of energy economy of the building, control and regulation methods. Special structures – more energy consumption than conventional buildings- comparative study. Case study of few energy audit in special structures.

TEXT BOOKS:

1. ‑Energy Audit of building Systems: An Engineering Approach‖, Second Edition by Monoef Krarti
2. ‑Energy management handbook‖ by Wayne C. Turner.
3. ‑Green energy Audit of buildings: A guide for a sustainable energy audit of Buildings‖, by Giuliano Dall O.

REFERENCES:

1. Energy savings toolbox- An energy audit manual and tool.
2. Studies on the structure of the industrial economy : Report on energy audit of paper industry

3. –An energy audit of Kindergartens to improve their energy efficiency‖, by Nikolay et.al, St. Petersburg, Russia.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	R. Abirami	Asst. Prof-I	AVIT	abirami.civil@avit.ac.in
2	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE40	LIFE CYCLE ASSESSMENT FOR COMPLEX SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Life cycle modeling of products, industrial processes, and infrastructure/building systems; material and energy balances for large interdependent systems; environmental accounting; and life cycle costing. These methods, based on ISO 14000 standards, are used to examine emerging technologies, such as bio based products, building materials, building integrated photovoltaics, and alternative design strategies, such as remanufacturing, dematerialization, LEED, and Design for Environment: Student teams complete a life cycle assessment of a product or system chosen from industry.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the Life cycle assessment & goals.
2	To learn about the History, methodology and benefit of LCA.
3	To study about the various process of data collection in LCI.
4	To gain the knowledge about Green sustainable materials & biocompatible materials.
5	To learn about the LCA on Residential building, Industrial buildings and bridges.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Articulate the value of a Life Cycle Analysis (LCA)	Apply
CO2. Outline the steps to conduct an attributional LCA.	Apply
CO3. Describe common environmental impacts associated with a life cycle inventory of processes.	Apply
CO4. Approach complex problems with a systems thinking approach.	Analyze
CO5. Conduct a life cycle assessment.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	L	-	-	-	-	-	-	-	-			
CO3	S	M	M	L	-	-	-	-	-	-	-	-			
CO4	S	S	M	L	-	-	-	-	-	-	-	-			
CO5	S	M	L	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Life cycle assessment- goals- purpose- life cycle impact assessment- life cycle inventory- life cycle energy analysis-LCA and environmental systems- risk assessment methods- environmental risk assessment.

DATA COLLECTION AND METHODOLOGY: Environmental data collection, History of LCA, LCA methodology, LCA benefits and drawbacks.

LCI DATABASES: Unit process, data and LCI databases, inventory data and LCIA, LCA interpretation, key points of good LCA and examples, Chemical release in environment.

GREEN SUSTAINABLE MATERIALS: Green sustainable materials, biocompatible materials for future construction- straw, grass Crete, rammed earth, hemp Crete, bamboo, recycled plastic, wood, mycelium, ferrock, ashcrete, timbercrete, and design for sustainability.

CASE STUDIES: Case studies – LCA on Residential building, Industrial buildings and bridges.

TEXT BOOKS:

1. Life cycle of Structural Systems: Design, Assessment, Maintenance and Management, edited by Hitoshi Furuta, Dan M. Frangopol, Mitsuyoshi Akiyama.
2. Eco-efficient Construction and Building Materials: Life Cycle Assessment, by Fernando Pachecco-Torgal, Luisa F. Cabeza, Joao Labrincha, Aldo Giuntini de Magalhaes

REFERENCES:

1. Life-Cycle Civil Engineering: Proceedings of the International Symposium, by Fabio Biondini, Dan Frangopol

2. Integrated life cycle assessment of concrete structures: State-of-the-art Report, by Federation International du beton

3. NPTEL Notes by Dr. Brajesh Kr. Dubey, Associate Professor in IIT Kharagpur.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	R. Abirami	Asst. Prof-I	AVIT	abirami.civil@avit.ac.in
2	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE41	INFRASTRUCTURE PROJECT DEVELOPMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To study the elements of construction planning and scheduling and to apply appropriate tools and techniques like networks and coding systems. To study the elements of quality control and safety of construction projects. To study the monitoring of projects through cost control.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the Concepts environment relationship with focus on issues of population
2	To learn about the Application of ecological principles in sustainability.
3	To study about the Land capability and suitability analysis in location and planning of urban.
4	To gain the knowledge about Urban interference in hydrological cycle.
5	To study about the Concepts of effects of air pollution and solid wasted is posalin cavities.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand infrastructure organizations	Apply
CO2. Prepare infrastructure master plan	Analyze
CO3. Schedule infrastructure project activities	Analyze
CO4. Prepare project development plan	Apply
CO5. Prepare tender documents for infrastructure project contract	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			

CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			
CO5	S	M	M	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INFRASTRUCTURE: Definitions of infrastructure, Governing Features, Historical overview of Infrastructure development in India, Infrastructure Organizations & Systems.

INFRASTRUCTURE PLANNING: Typical infrastructure planning steps, Planning and appraisal of major infrastructure projects, Screening of project ideas, Life cycle analysis, Multi-criteria analysis for comparison of infrastructure alternatives, Procurement strategies, Scheduling and management of planning activities, Infrastructure Project Budgeting and Funding, Regulatory Framework, Sources of Funding.

PROJECT MANAGEMENT IN CONSTRUCTION: Introduction to project management processes - Initiating, Planning, Executing, Controlling, and Closing processes; Project Integration Management - Project plan development, Project plan execution, and Overall change control; Project Scope Management - Initiation, Scope planning, Scope definition, Scope verification, and Scope change control.

CONTRACTS AND MANAGEMENT OF CONTRACTS: Engineering contracts and its formulation, Definition and essentials of a contract, Indian Contract Act 1872, types of contracts and clauses for contracts, Preparation of tender documents, Issues related to tendering process, Awarding contract.

AIR QUALITY & SOLID WASTE MANAGEMENT: Sources, types and effects of air pollution and solid wasted is posalinc activities, urban industrial processes and land use and transportation implications in air and solid waste pollution; norms, standards, laws, organizations and policies in urban air quality control and solid waste management; example stabilized organic fraction best practices.

TEXT BOOKS:

1. A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006.
2. J. Parkin and D. Sharma, Infrastructure planning, Thomas Telford, London, 1999.
3. P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi, 2009.

REFERENCES:

1. J. Kelly, S. Male and D. Graham, Value management of construction projects, Blackwell Publishing, Oxford, 2003.
2. Vasant Desai, ―Project Management‖, Himalaya Publishing , 1st Edition, 2010
3. James C. Van Horne, John M. Wachowicz, –Fundamentals of Financial Management‖,
4. PHI, 2nd Edition, 2000 Ronald W Hudson, –Infrastructure Management: integrating design, Construction, maintenance, rehabilitation and renovation‖, MGH, 1st Edition, 1997.

COURSE DESIGNERS

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2	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVSE42	GREEN BUILDING AND ENERGY EFFICIENT BUILDING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Before starting with this course one must get a clear knowledge on the basics of green building, learning the plan details of HVAC for a building, energy efficient modeling.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study about the Development & Plan Implementation.
2	To learn about the fundamentals of electric power systems and building electric wiring.
3	To study about the Bioclimatic design and concepts.
4	To gain the knowledge about Water conservation & water management systems.
5	To learn about the Key components of remodelling project.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe what green building	Apply
CO2. Understand the benefits and advantages of green building practices	Apply
CO3. Identify and describe green systems and features in residential and commercial buildings	Analyze
CO4. Define what makes up a healthy building	Apply
CO5. Describe green and sustainable materials and practices	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-			
CO2	S	M	L	M	-	-	-	-	-	-	-	-			
CO3	S	M	M	L	-	-	-	-	-	-	-	-			
CO4	S	M	M	M	-	-	-	-	-	-	-	-			

CO5	S	M	L	-	-	-	-	-	-	-	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

GREEN BUILDING BASICS AND PRACTICES: Site Design / Development & Plan Implementation, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality and Homeowner Education, Operation, Maintenance & Practices. Assessment of building design and construction, emission of CO2, SO2, and NO2 of building materials, elements, and construction process.

ENERGY MANAGEMENT SYSTEM OF BUILDINGS: The objective of the course is to provide students the necessary tools to control, monitor and optimize the building's facilities, mechanical and electrical equipment for comfort, safety, and efficiency. It starts with the fundamentals of electric power systems and building electric wiring and then works through building automation systems (BAS) principles. The course allows students to acquaint applying BAS to commercial HVAC equipment, lighting systems, fire systems and security/observation systems.

LOW ENERGY ARCHITECTURE, PASSIVE BUILDING DESIGN: Solar geometry, climate/regional limitations, natural lighting, passive design and sustainability initiatives, insulating and energy storing material. Bioclimatic design and concepts. Case studies will be used extensively as a vehicle to discuss the success/failure of ideas and their physical applications.

WATER MANAGEMENT, BUILDING METHODS & MATERIALS : Water conservation, water management systems, water efficient landscaping, green roofing, rainwater harvesting, sanitary fixtures and plumbing systems, wastewater treatment and reuse, and process water strategies. AAC (Aerated Auto clave Concrete), ICF (Insulated Concrete Forms), new Advanced Framing & Insulation Techniques, SIPs (Structural Insulated Panels), Straw Bale and Pumice-crete Rammed Earth, Timber Frame, Straw Clay, and Earth ship buildings.

ENERGY EFFICIENT REMODELING : Key components of remodeling projects-windows, walls, roofs, heating and ventilation, insulation, tighten up the building envelope, Advances in building technology and materials, Incorporate active and passive solar into the home or commercial building, Mistakes to avoid, various improvements cost

TEXT BOOKS:

1. Kibert, C. J. –Sustainable Construction: Green Building Design and Delivery,‖ Second Edition, New York: John Wiley & Sons, Inc., 2008.
2. Thermal analysis and design of passive solar buildings by A. K. Athienitis and Mat Santamouris.
3. Passive building design by N.K. Bansal, G. Hauser, and G. Minke

REFERENCES:

1. McDonough, W. and Braungart, M. –Cradle to Cradle: Remaking the Way We Make Things,‖ New York: Farrar, Straus and Giroux, 2002

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	R. Abirami	Asst. Prof-I	AVIT	abirami.civil@avit.ac.in
2	Dr.S.P.Sangeetha	HOD-Civil	AVIT	sangeetha@avit.ac.in

17CVES43	INFRASTRUCTURE PLANNING AND URBANIZATION PROCESS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of Demonstrate knowledge of and a critical understanding of, statistical methodologies and Show an awareness of how different statistical models and techniques can be applied to financial problems

PREREQUISITE

Nil

COURSE OBJECTIVES

1	This course is designed to provide a general understanding of various issues caused by the Infrastructure.
2	Students can be able to approach a design aspect of the exact urban infrastructure requirements
3	They can appreciate the planning methodology after the successful learned from the core
4	We can suggest and comprehend the challenges in the construction Industry exactly the Infrastructure Maintenance
5	The major emphasis in this course will be on water supply, sewerage, storm water drainage, roads and solid water management.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Demonstrate knowledge of, and a critical understanding of, statistical methodologies (including the main concepts and methods of inference and modelling)	Apply
CO2. Understand and apply a range of statistical techniques based on the main theories and concepts which comprise the syllabus, including the central limit theorem	Apply
CO3. Show an awareness of how different statistical models and techniques can be applied to financial problems	Apply
CO4. Appreciate the Knowledge gained by the Fire Fighting Techniques in the Urban Infrastructure Buildings	Understand
Co5. Ability to understand the procurement process required in the field of power requirements and the communication Networks	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO2	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO3	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO4	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--
CO5	L	S	M	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Concepts of basic needs, formation of objectives and standards. Data requirements for programme planning of urban networks and service; feasibility planning studies for structure the infrastructure systems General Introduction to Infrastructure and its components and overview of the course contents.

SOLID WASTE DISPOSAL AND MANAGEMENT: Resource recovery, technology options and determination of type and choice of systems as related to land use, density, economic levels and location of urban industrial and commercial activity areas.Quantity of sewage, quantity of storm water, run off, time of concentration, design of sewers, flow diagrams, laying of sewers, sewer appurtenances. Design and layout of sewerage system.Project Management (Need Assessment, Structure, MIS, Project Management Packages (Brief Introduction to MSPROJ/WINPROJ).Integrated Infrastructure Planning:

WATER SUPPLY: Planning water supply; resource analysis quality of water system design; technological choices of alternatives Issues related to the choice of centralized city water supply versus decentralized systems. Water demand (Context, Need Assessment and Planning requirements) - data to be collected, rate of demand, variations in rate of demand and effects of variations on design. Measurements of water qualities, forecasting demand. Conveyance and distribution system - General considerations, methods of distribution, service reservoirs, systems of supply, methods of lay out distribution pipes, wastage of water and permissible factors.

FIRE FIGHTING: Planning for fire protection, services and space standards. Prevention fire requirements, fire classification of construction, firefighting, fittings and fixtures and design for tall building and neighborhood lay out fire hazards, water demand calculations.

OTHER INFRASTRUCTURE: Concepts and theories for design and operation of electricity networks, power generation (conventional andnon-conventional)communicationnetworksliketelephonefacilities,WLL,cableTV,Fibreopticand other broadband

communications networks,etc.

TEXT BOOKS:

3. John E Freund's Mathematical Statistics: (7th Ed.), Miller & Miller, Prentice-Hall
4. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009

REFERENCES:

1. Applied Statistics and Probability for Engineers---Montgomery and Runger—Wiley,India.

2. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill International Edition, 1970
3.Sampling techniques-Cochran, Wiley Series, 2008.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES44	URBAN ENVIRONMENTAL MANAGEMENT AND LAW	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of knowledge of Building Laws & Principles of Management designed to provide the student with a thorough understanding of both the role that Enterprise Resource Planning Systems

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	This course is designed to provide the student with a thorough understanding of both the role that Enterprise Resource Planning Systems (ERPs).
2	It is also plays an organization growth towards learned technologies
3	This makes a key role importance in the challenging task of managing the Information Systems (IS) function
4	Production unit has huge scope on ERP and cost cutting elemental tools helps a huge amount of savings in terms of large scale business industry
5	Audit is the important key note which is upholding tool for this ERP so that it can stand the marketing gain and losses into simple balance sheet

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe the role of an ERP in carrying out business processes in a company	Apply
Co2. Explain how _best business practices' are incorporated in an ERP	Apply
Co3. Execute an entire business process chain in the following areas ➢ Sales ➢ Procurement ➢ Production ➢ Accounting	Apply
Co4. Strategize pricing, production and sales in a competitive commodity market	Apply
CO5. Analyze sales data in an ERP to dynamically respond to changing market conditions to maximize profits	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	M	-	-	-			
CO2	S	M	L	M	-	M	-	-	L	L	-	-			
CO3	S	L	M	M	-	L	L	-	-	-	M	-			
CO4	S	M	L	L	-	-	-	-	-	L	-	-			
CO5	S	M	M	L	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO URBAN GOVERNANCE: Meaning Of Governance And Government; Scope Of Governance, Evolution Of Concept Of Governance; Theories Of Local Government; History Of Urban Local Bodies In India, Evolution Of Modern Urban Local Governments During British Rule; Decentralization Of Local Government; Recommendations Of Various Committees; Politics And Progress Of Decentralization.

GOVERNANCE AND THE GOVERNMENT: Government, governing and governance; Determinants and indicators of good governance; Citizens charter and other instruments; Decision making processes; Need for openness and transparency; People's participation, collaborative management; Local governance

GOVERNANCE FOR URBAN MANAGEMENT: Evolution of development and management systems; Scope of development management at the National, state and local levels; Hierarchy of urban settlements; Institutions and organizations; Stake holders, their perceptions and role in urban management

GOVERNANCE AND URBANIZATION Processes of urbanization, developmental conflicts, resource constraints, systems deficiencies; Urban poverty and exclusion from development process; Sustainable development; Impact of globalization and economic reforms; Social diversities; Defects in planning approaches, multiplicity of organizations and authorities.

GOVERNANCE IN POST 74TH AMENDMENT SCENARIO: Planning, governance and spatial strategy; Best practices of planning and quality of governance

TEXT BOOKS:

1. Enterprise Resource Planning, 3rd Edition, by *Bret Wagner and Ellen Monk*, ISBN: 9781423901792, ©2009
2. SAP R/3, Business Blueprint, 2nd Edition, by *Thomas A. Curran & Andrew Ladd*, Prentice Hall PTR, ©2000, ISBN: 0-13-085340-2

REFERENCES:

1. Essentials of Business Processes and Information Systems, by *Simha R. Magal and Jeffrey Word* , ©2010, ISBN: 978-0-470-23059-6
2. Integrated Business Processes with ERP Systems, Preliminary Edition, by *Simha R. Magal and Jeffrey Word*, ISBN: 978-0-470-88424-9

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES45	SUSTAINABILITY IN BUILT ENVIRONMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of elements of construction planning and scheduling and to apply appropriate tools and techniques like networks and coding systems.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study the elements of construction planning and scheduling and to apply appropriate tools and techniques like networks and coding systems.
2	To study the elements of quality control and safety of construction projects.
3	To study the monitoring of projects through cost control
4	Appreciate the global requirements on the importance of water management in the Urban Infrastructure
5	Supplying the filtered air is main important aspect in case of the buildings

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To monitor cost control through project management	Apply
Co2. Schedule, monitor and control construction projects	Apply
Co3. Apprehend the knowledge gained on the liability assets and immovable assests	Understand
Co4. Knowledge about the Quality and Quantity management of non-renewable sources without that we cannot produce anything i.e. water	Understand
Co5. Understand the solid disposal safety and understand the Quality of air sent from the industry as waste disposal has to be meant for Ecosystem importance	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	S	M	M	S	-	-			
CO2	S	M	L	S	-	-	S	M	M	M	-	-			
CO3	-	-	-	M	-	-	L	M	-	L					
CO4	L	L	M	-	M	-	L	-	-	L					
CO5	-	-	M	-	-	M	-	-	M	-					

S- Strong; M-Medium; L-Low

SYLLABUS

CONCEPT AND ISSUES: Changing perspectives in man- environment relationship with focus on issues of population, urbanization, resource depletion and pollution; limits to growth which is a sustainable economy; growth and environmental imperatives of developing vs developed countries; definitions, concepts and parameters in sustainable development with particular reference to Brundtland Commission,

METHODS AND TECHNIQUES Application of ecological principles in sustainability: energy and resource cycles, food webs, ecological pyramids and evolution and succession of natural ecosystems; Carrying Capacity based planning: concept, parameters and indicator measures, models and case studies in urban and regional development; Environmental Impact and Strategic Environmental Assessment for urban areas; Ecological Foot print Analysis of cities; Sustainable Lifestyle Assessment and behavioral modifications at house hold levels.

LAND, AND ENERGYRESOURCES Land capability and suitability analysis in location and planning of urban land uses; implications of urban form, density, land use pattern and transportation system in land and energy conservation

ROLE OF WATER Urban interference in hydrological cycle, with particular reference to water pollution, water resources, drainage and natural ecosystems; urban water treatment, recycling and harvesting; use of non-conventional energy sources in urban development.

AIR QUALITY & SOLID WASTE MANAGEMENT: Sources, types and effects of air pollution and solid waste disposal in cavities, urban industrial processes and land use and transportation implications in air and solid waste pollution; norms, standards, laws, organizations and policies in urban air quality control and solid waste management; examples of best practices.

TEXT BOOKS:

1. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
2. Construction Project Management Theory & practice --- Kumar NeerajJha, Pearson, 2012

REFERENCES:

1. Professional Construction Management Barrie-Paulson-McGraw Hill Institute Edition, 2011.
2. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2nd Edition, 2015.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES46	CONSTRUCTION & CONTRACT SAFETY MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods quality aspects in a construction project economic, financial and management, legal and administrative aspects.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To study the quality aspects in a construction project
2	To study in detail the quality control tools
3	Management aspects of the traffic flow control and social activities
4	Slum board clearance and improvement aspects schemes has to be understand allotments for the building bylaws

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Maintain the quality aspects in a construction Projects	Apply
CO2. Learnt the Quality control tools	Apply
CO3. Appraise the social aspects of conservation, traffic and management issues	Apply
CO4. Slum board clearance and improvement schemes has to be understand the bylaws for the allotment has to be apprehended	Understand
CO5. Implement urban renewal programs archaeological facts tend to be considered for the conservation of sites in India and abroad	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	M	L	M	L	-	-	-			
CO2	S	M	L	S	-	-	-	M	L	M	L	-			

CO3	M	L	M	-	-	S	S	-	M	L	M	-			
CO4	M	L	M	-	-	S	S	-	M	L	M	-			
CO5	-	S	-	-	M	L	M	L	-	-	S	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Overview and introduction of the basic concepts of conservation; values, attitudes and principles for judging the conservation importance of sites, areas and related Typology; scope and basic technique of urban conservation; Urban renewal as a part of metropolitan plan; identification of urban renewal areas; conservation, rehabilitation and redevelopment urban renewal policies and strategies

ECONOMIC, FINANCIAL AND MANAGEMENT ASPECTS: Economic and spatial implications of urban renewal programs, mobilization of resources; incentive zoning-management of urban renewal areas

CONSERVATION AND DEVELOPMENT: Economic and social aspects of conservation, traffic and management issues; Conservation policies- case studies

SLUMS: Clearance and improvement schemes, planning aspects, land management, social economic issues, public participation, government schemes and their critical evaluation

LEGAL AND ADMINISTRATIVE ASPECTS: National and international experience in implementing urban renewal programs; Legal and administrative aspects, archaeological acts / charters pertaining to conservation, development and conservation; Case studies of proposals for urban conservation of sites / areas in India and abroad

TEXT BOOKS:

5. Mantri Handbook – A to Z of Construction – Mantri Publications ,2001
6. Juran_s Quality Handbook – Joseph M. Juran, A. Blanton. Godfrey – McGraw Hill International Edition (1998)

REFERENCES:

3. Chitkara. K.K. –Construction Project Management: Planning Scheduling and Control‖, Tata McGraw Hill Publishing Company, New Delhi, 2008.
4. Calin M. Popescu, Chotchal Charoenngam, –Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications‖, Wiley, New York, 2005.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES47	ICT BASED CITY AND INFRASTRUCTURE PLANNING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of changing scenario in the spatial order of cities and regions as well as the emergence of virtual societies in the world social networks among communities across the city, country and globe demand for paradigm shift in the spatial planning outlook and governance edge

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To make students aware and exposed to changing scenario of virtual societies in the world
2	The spatial order of cities like drinking water provision, transportation, sanitation facility etc.,
3	The students will be in a position to understand the use and power of emerging new technologies
4	Social networks among communities across the city, country and globe
5	Paradigm shift in the spatial planning outlook and governance edge.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Students are able to cope up with the application technology	Apply
CO2. Students understand its impact on the infrastructure Planning and development at the house, neighborhood and city levels.	Analyze
CO3. Appraise the spatial order of cities like drinking water provision, transportation, sanitation facility etc.,	Analyze
CO4. Building smart cities and smart communities with the help of Social networks among communities across the city, country and globe	Apply
CO5. Ability to Understand the Paradigm shift in the spatial planning outlook and governance edge.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	M	M	S	M	M	-			
CO2	-	L	-	-	M	M	M	-	-	L	-	-			
CO3	-	-	L	L	L	-	L	M	M	M	M	M			
CO4	M	M	-	L	-	L	-	L	L	L	-	M			
CO5	-	L	-	M	M	-	-	L	-	L	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING VS TECHNOLOGY: Tradition to modernity – Spatial planning and technology interface - Socio-economic planning and technology interface – Planning cities and local technologies - Technological innovations and responsive city planning - Planning responsive technology Vs technology responsive planning.

CITIES-TECHNOLOGY-INFRASTRUCTURE: Transportation and technology, water, sanitation and technology, energy efficient technology for home, street, neighborhoods and city - Telecommunication, health and education – Security and safety for buildings and people in cities.

TECHNO CITIES: Digital cities, virtual cities, technology parks - Smart planning and infill development – Planning, design and communication system - Socio-economic and environmental Impact of techno cities..

GOVERNANCE: Role of law and technology, administration and organization, industry and corporate, communities and people in building smart cities and smart communities.

CASE STUDIES: Best practices in India and around the world.

TEXT BOOKS:

1. Brkovic, M. B., _Planning in the Information Age: Opportunities and Challenges of e-Planning, CORP, 2004

2. City Government of Naga, _The Naga City Citizen Chartes- A Guide Book of City Government Services. 2004

REFERENCES:

1. Elizabeth, S. Frans, V. _IDENSITY: Planning Paradigms for the Information Communication Age‘, Isocarp Congress, 2001.

2. Intelligent Community forum, _Innovation and Employment in the Intelligent Community‖, Intelligent Community forum, 2012

3. Komakech, D., _Achieving More Intelligent Cities‖, Municipal Engineer, 2005.

COURSE DESIGNERS

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2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES48	URBAN FINANCE	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of institutional mechanism in place for the governance at the local level and their functional and financial powers, capabilities and opportunities to prepare financial operating plans for the municipal bodies and suggest appropriate approaches and financial resources for implementation of various city level projects.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To give an understanding to the students of the institutional mechanism
2	The Student must be able to appreciate the knowledge in place for the governance at the local level
3	The systematic approaches from the government local bodies and their functional relationships between the government and the people has to appraised
4	The financial powers of the local government implementation in the infrastructure development
5	Government rural bodies development and implication capabilities and opportunities which is available in the local government bodies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. The students will gain necessary skills to prepare the kind of five year plan has to be adopted and created for the people scope of knowledge	Apply
CO2. Students can acquire the sufficient knowledge in the field of Financial Management for the regulatory bodies	Understand
CO3. Acknowledge the learned values for the sake of Privatization in the Civil Services	Apply
CO4. Funds from various appropriate approaches for the city enrichment implementation towards the growth	Apply
CO5. Financial resources for implementation of various city level	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	M	M	M	M	L	-	-			
CO2	S	S	M	L	-	M	L	M	-	-	S	L			
CO3	S	S	-	-	L	L	-	-	-	-	S	L			
CO4	M	L	M	-	-	M	L	M	-	L	L	-			
CO5	-	-	-	S	-	-	-	-	-	L	L	-			

S- Strong; M-Medium; L-Low

SYLLABUS

AN OVER-VIEW: Organization of local self governments - The 74th CAA-context and implications - Election of local body governments-need and process - Urbanization process and its Impacts on civic services - Urban development through Five Year Plans - Status of civic services in urban Sector - Investment requirements - Limitation of funds in government and private Sectors.

MUNICIPAL FINANCE: Nature and composition of income and expenditure - Limitations and need for revenue enhancements - Expenditure control methods and mechanisms - Budgetary allocation from central and state governments for urban development - Assistance from foreign donors and multilateral agencies - Non traditional sources of funding – Market access – Pool finance-prerequisite - Conditions for accessing non-traditional funds.

ADDITIONAL FUNDING SOURCES : Types of partnership approaches - Privatization of civic services - Public private partnership Mechanisms - Types of contracts and ownerships - Emerging cost- effective technology interventions - User charged projects – Pricing of services.

RESOURCES BASED ON ACHIEVEMENT OF URBAN REFORMS : Role of state government and urban local bodies - City‘s challenge fund - Urban Reforms implications on resources - Incentive fund - State level pooled - Finance development fund.

INSTITUTIONAL CAPACITY ENHANCEMENT: Better finance management and management process – Accounting and budgeting, Asset management and receivables management - Cost centre approach – Financial operating plan - City corporate plan - Development of urban indicators – Computerization and management information system.

TEXT BOOKS:

1. Narayanan, Access to Market Fund, EDATEN
2. Course Materials for Training Finance Officers of ULBs by TNUDP II at Anna Institute of Management, Chennai – Administrative Staff College, Hyderabad – HSMI, HUDCO, New Delhi.

REFERENCES:

1. Broadbent, _Planning and Profit in the Urban Economy‘, Meuthen & Co. Ltd, U.K. 1997.
2. Edward J. Blakely, _Planning Local Economic Development‘, SAGE Publications, New Delhi, 1994

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2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVES49	URBAN DESIGN PROJECT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of institutional mechanism in place for the governance at the local level and their functional and financial powers, capabilities and opportunities to prepare financial operating plans for the municipal bodies and suggest appropriate approaches and financial resources for implementation of various city level projects.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	Read a lot of new theories and ideas
2	Connect disparate ideas and literatures
3	Brainstorm how these ideas affect our interests.
4	Be present for, contribute to, and participate in excellent discussions
5	At the end of this course students will be conversant with Urban Infrastructure Challenges at Present in India

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learnt a knowledge about Infrastructure and Needs for an Infrastructure	Understand
Co2. How to manage Infrastructure Projects by using different ideas and literatures	Understand
Co3. Privatization effects in Infrastructure has been understood clearly	Understand
Co4. Case Studies has been understood for to avoid future Problems	Apply
CO5. Analyse the framework and Mitigation Managements in the Sustainable development	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	-	S	S	M	L	M	L	M	L	M	L	-			
CO1.	S	M	L	-	M	M	M	M	M	L	-	-			
CO2.	-	M	L	M	L	M	-	S	-	S	L	L			
CO3.	L	L	-	L	M	L	M	L	M	L	-	-			
CO4.	M	L	M	L	-	S	-	-	-	L	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

AN OVERVIEW OF BASIC CONCEPTS RELATED TO INFRASTRUCTURE: Introduction to Infrastructure, An overview of the power, water supply, sanitation, road, rail, air, port, telecommunications, urban & rural infrastructure sectors in India.

INFRASTRUCTURE PROJECT: A Historical overview of Infrastructure Privatization-Benefits, Problems. Challenges in Privatization of water supply: A case study of Cochabamba, Bolivia. Challenges in Privitization of Power: Case study from the Philipines. Privitization of Infrastructure in India: Case study of the Tirupur Water supply project. Privitization of Road Transportation Infrastructure in India.

CHALLENGES TO SUCCESSFUL INFRASTRUCTURE PLANNING AND IMPLEMENTATION: Mapping and Facing the Landscape of Risks in Infrastructure Projects. Economic and Demand Risks: The case of the Vadodhara-Halol Expressway. Political Risks-I: The case of the Chand-Cameroon Pipeline. Political Risks-II: The Dabhol Powerplant case study. Socio-Environmental Risks-I: The case of Bujagali Dam in Uganda, Socio-Environmental Risks-II: The case of Conoco‘s Oil Exploration in South America. Cultural risks in International Infrastructure Projects. Legal and Contractual Issues in Infrastructure. Challenges in Construction and Maintenance of Infrastructure.

PRIVATE INVOLVEMENT IN INFRASTRUCTURE: A Historical overview of Infrastructure Privatization-Benefits, Problems. Challenges in Privatization of water supply: A case study of Cochabamba, Bolivia. Challenges in Privitization of Power: Case study from the Philipines. Privitization of Infrastructure in India: Case study of the Tirupur Water supply project. Privitization of Road Transportation Infrastructure in India.

STRATEGIES FOR SUCCESSFUL INFRASTRUCTURE PROJECT IMPLEMENTATION: Risk Management Framework for Infrastructure Projects. Shaping the Planning phase of Infrastructure Projects to

mitigate risks. Designing Sustainable Contracts, Introduction to Fair process and Negotiation. Negotiating with multiple Stakeholders on Infrastructure Projects. Sustainable development f Infrastructure. Information technology and Systems for successful Infrastructure Management. Innovative Design and Maintenance of Infrastructure Facilities. Infrastructure Modelling and Life Cycle Analysis Techniques

TEXT BOOKS:

1. Introduction to Urban Planning, –Anthony James catanese, James C. snyder‖
2. Urban Infrastructure in Transition: Networks, Buildings and Plans, ― Timothy Moss, Simon Marvin‖
3. Narayanan, Access to Market Fund, EDATEN
4. Course Materials for Training Finance Officers of ULBs by TNUDP II at Anna Institute of Management, Chennai – Administrative Staff College, Hyderabad – HSMI, HUDCO, New Delhi.

REFERENCES:

1. Broadbent, _Planning and Profit in the Urban Economy‘, Meuthen& Co. Ltd, U.K. 1997.
2. Edward J. Blakely, _Planning Local Economic Development‘, SAGE Publications, New Delhi, 1994

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2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17CVSE50	ENVIRONMENTAL IMPACT ASSESSMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in understanding the importance of EIA and gives knowledge in environmental impact prediction and mathematical modeling for the impact prediction.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Study about the importance of EIA and EIS, and LCA assessments.
2	Study the components of EIA and the software tools used in the EIA.
3	Gain the knowledge in environmental impact prediction and mathematical modeling for the impact prediction.
4	Know about the awareness Environmental management plan and the Risk assessment.
5	To gain knowledge on EIA, report writing for various industries.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basic concepts and importance of EIA and its documentation.	Understand
CO2. Follow the steps of EIA process and will be able to access the EIA software tools.	Understand/Apply
CO3. Work on the impact prediction, and mathematical modeling while preparing EIA assessment.	Analyze/Apply
CO4. Gain knowledge in pollution control laws and will be able to implement it in working sectors.	Remember
CO5. Prepare the EIA report for various industries.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1.	S	M	L	-	-	-	-	-	-	-	-	-			
CO2.	S	M	L	S	-	-	-	-	-	-	-	-			
CO3.	S	M	M	S	-	-	-	-	-	-	-	-			
CO4.	S	M	M	M	-	-	-	-	-	-	-	-			
CO5.	S	M	M	-	-	-	-	-	-	-	-	M			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Environmental Impact Assessment (EIA) - Environmental Impact Statement - EIA in Project Cycle - Legal and Regulatory aspects in India according to Ministry of Environment and Forests - Types and limitations of EIA - Cross sectoral issues and terms of reference in EIA - Participation of Public and Non-Governmental Organizations in environmental decision making.

COMPONENTS AND METHODS: Components of EIA - Processes - screening - scoping setting - analysis - mitigation. Matrices - Networks - Checklists - Connections and combinations of processes - Cost benefit analysis - Analysis of alternatives - Software packages for EIA - Expert systems in EIA.

PREDICTION, ASSESSMENT OF IMPACTS AND REPORTING: Prediction tools for EIA - Mathematical modeling for impact prediction - Assessment of impacts - air - water - soil - noise - biological - socio-cultural environments - Cumulative Impact Assessment - Documentation of EIA findings - planning - organization of information and visual display materials - Report preparation.

ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT PLAN: Environmental Management Plan - preparation, implementation and review - Mitigation and Rehabilitation Plans - Policy and guidelines for planning and monitoring programs - Post project audit - Ethical and Quality aspects of Environmental Impact Assessment. Hazard identification - Risk characterization - Risk based decision making - HAZOP analysis - Emergency Preparedness Plans - Design of risk management programs.

CASE STUDIES: Case studies related to the following sectors - Infrastructure - Mining - Industrial - Thermal Power - River valley and Hydroelectric - Nuclear Power

TEXT BOOKS:

1. Canter, L.W., Environmental Impact Assessment, McGraw-Hill, New York, 1996.

2. Lawrence, D.P., Environmental Impact Assessment - Practical solutions to recurrent problems, Wiley-Interscience, New Jersey, 2003.

REFERENCES:

1. John G. Rau and David C. Wooten, "Environmental Impact Analysis", McGraw-Hill Book Company, 1980.

2. Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science London. 1999.

3. Biswas, A.K., and Agarwala, S.B.C. Environmental Impact Assessment for Developing Countries, Butterworth Heinemann, London. 1994.

4. The World Bank Group, Environmental Assessment Source Book Vol. I, II and III. The World Bank, Washington, 1991.

5. Kolluru Rao et.al "Risk assessment and management handbook", McGraw-Hill Inc., 1996.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C. Nivetha	Assistant Professor	AVIT	nivethachandru92@gmail.com
2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE51	INSTRUMENTAL MONITORING OF ENVIRONMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in understanding the basics of instrumental measurements of environment and gives knowledge about chromatography, Electro and radio analytical methods.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Understand the basics of instrumental measurement and its preliminary corrections while doing the experiments
2	Gain knowledge on various spectroscopic instruments
3	Gain knowledge on chromatographs and working principles of various types of chromatographs.
4	Gain knowledge on basic and working principle of Electro and radio analytical methods.
5	Understand the principle behind continuous monitoring and the various instruments used for continuous monitoring.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Perform the experiments individually for various environmental parameters	Understand
CO2. Work on the various spectrographic instruments used for environmental quality monitoring.	Understand/Analyze
CO3. Work with various chromatographs in environmental quality monitoring areas.	Understand/Analyze
CO4. Use and access various electro and radio instruments in various environmental quality monitoring area.	Apply
CO5. Understand the principles behind continuous monitoring, for analyzing the various gaseous emissions and water.	Understand/Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	S	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			
CO3	S	M	L	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	S	-	-	-	-	-	-	-	-			
CO5	S	M	M	S	-	-	-	-	-	-	-				

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Instrumental Methods, Selection of method, Precision and Accuracy, Errors in measuring signals, Noise/signal ratio, base line drift, Indicator tubes.

SPECTROSCOPIC METHODS: Electromagnetic radiation, matter radiation interactions, Colorimetry and spectrophotometry, fluorimetry, nephelometry and turbidimetry, flame photometry Atomic Absorption Spectrometry (AAS), Atomic Emission Spectrometry (AES) - Inductively coupled plasma (ICP) and Direct Current Plasma (DCP) spectrometry. ICP - MS (Mass spectrometry).

CHROMATOGRAPHIC METHODS: Classical methods, Column, Paper and thin layer chromatography (TLC), Gas Chromatrography (GC), GC-MS, High performance liquid chromatography (HPLC) and Ion chromatrography (IC).

ELECTRO AND RADIO ANALYTICAL METHODS: Conductometry, potentiometry, coulometry, amperometry polarography, Neutron Activation Analysis (NAA), X-ray Fluorescence (XRF) and X-ray Diffraction (XRD) methods**.**

CONTINUOUS MONITORING INSTRUMENTS: Non-dispersive infra-red (NDIR) analyzer for CO, chemiluminescent analyzer for NOx, Fluorescent analyzer for SO2, Auto analyzer for water quality using flow injection analysis; permeation devices.

TEXT BOOKS:

1. Ewing "Instrumental Methods of Chemical Analysis", 5th Edition., McGraw-Hill, New York, 1995

REFERENCES:

1. Willard, H., Merritt, L., Dean, D.A. and Settle. F.A. "Instrumental methods of analysis, 7th Edition, Worlds Worth, New York, 2004

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2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE52	INDOOR AIR QUALITY	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in understanding the indoor air quality, its pollution level and how to control it.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Understand the knowledge on indoor activities and its pollution levels
2	Know about air pollution in indoor environments with respect to various buildings.
3	Gain knowledge on control of air pollutants
4	Understand the concepts and tools used in air pollution control.
5	Understand the knowledge on various air pollutants and its sources along with its control technologies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Assess the levels of indoor air pollution.	Understand
Co2. Design the air circulation and ventilation of various buildings prior to ambient air quality standards.	Understand/Analyze
Co3. Use the air pollution control measures of arresting air pollutants in various buildings.	Apply
Co4. Use the concepts and tools in designing the ambient air pollutant control measures.	Understand/Apply
CO5. Implement pollution control technologies while designing the buildings.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	S	-	-	-	-	-	-	-	-			
CO2	S	M	L	S	-	-	-	-	-	-	-	-			

CO3	S	M	M	S	-	-	-	-	-	-	-	-			
CO4	S	M	M	S	-	-	-	-	-	-	-	-			
CO5	S	M	L	S	-	-	-	-	-	-	-				

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Indoor activities of inhabitants - residence time. Levels of many pollutants in indoor and outdoor air. Design and operation of buildings for improvements of public health. IAQ policy issues; sustainability; indoor air quality as a basic human right

INDOOR AIR POLLUTANTS : Air pollutants in indoor environments, private residences, offices, schools, sand public buildings, factors that govern pollutant indoors concentrations, including ventilation. Characteristics, Consequences

CONTROL OF POLLUTANTS: Control of several pollutant classes, such as radon, toxic organic gases, combustion byproducts, and microorganisms such as molds and infectious bacteria. Case study by an exploration of public policy related to indoor air.

CONCEPTS AND TOOLS : Concepts and tools; exposure, material-balance models, statistical models Ventilation

INDOOR AIR POLLUTION FROM OUTDOOR SOURCES: Indoor air pollution from outdoor sources; particulate matter and ozone; Combustion byproducts; Radon and its decay products. Volatile organic components: odors and sickbuilding syndrome, Humidity Bio-aerosols: infectious disease transmission. Special indoor environments; A/C units in indoor, museums-labs; museums-labs, Measurement methods, Control technologies, Control strategies.

TEXT BOOKS:

1. Thad Godish, Indoor air and Environmental Quality, CRC Press, 2000

REFERENCES:

1. Nazaroff W.W and L Alvarez-Cohen, Environmental Engineering Science Wiley sons, New York, 2001. 2. Moroni Marco, Seifert Bernd and Lindell Thomas, Indoor Air Quality: A Comprehensive Reference Book, Elsevier Science, Vol. 3, 1995.

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2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE53	**ENVIRONMENTAL POLICIES AND LEGISLATIONS**	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in gaining knowledge about various environmental policies and legislations and various articles related to environmental law and powers and responsibilities of pollution control board.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Understand the various Sections and subsections of civil and criminal law.
2	Study the importance of fundamental rights and directive principles of our constitution
3	Study the various articles related to environmental law and powers and responsibilities of pollution control board.
4	Know about the awareness of various pollution and control laws related to water and air.
5	To gain knowledge on EIA, Ecolabelling, hazardous and biomedical waste handling.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe the importance of civil and criminal law related to environmental legislation	Understand
CO2. Gain knowledge on fundamental rights and directive principles of our constitution.	Remember/Understand
CO3. Understand the various environmental issues and handle the real time problems in industries.	Understand/Apply
CO4. Gain knowledge in pollution control laws and implement it in working sectors.	Understand/Apply
CO5. Understand and manage biomedical, hazardous waste, Ecolabelling, and EIA.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	-	-	-	-	-	-	-	-			
CO2	S	M	L	L	-	-	-	-	-	-	-	-			
CO3	S	M	M	L	-	-	-	-	-	-	-	-			
CO4	S	M	M	L	-	-	-	-	-	-	-	-			
CO5	S	M	L	L	-	-	-	-	-	-	-	M			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Basics of jurisprudence - Environmental law relation with other disciplines - Criminal law - Common Law - Relevant sections of the Code of Civil Procedure, Criminal Procedure Code - Indian Penal Code

INDIAN CONSTITUTION AND ENVIRONMENT : Introduction - Fundamental Rights - Directive Principles of State Policy - Article 48 (A) and 51- A(g) Judicial enforceability - Constitution and Resources management and pollution control - Indian Forest Policy (1990) - Indian Environmental Policy (1992).

ADMINISTRATIVE REGIME & LEGAL REGIME: Administrative regulations - constitution of Pollution Control Boards Powers, functions, Accounts, Audit etc. - Formal Justice Delivery mechanism Higher and Lower of judiciary - Constitutional remedies writ jurisdiction Article 32, 226 136 special reference to Mandamus and Certiorari for pollution abatement - Equitable remedies for pollution control.

POLLUTION CONTROL LAWS : Administrative regulation under recent legislations in wear pollution control. Water (prevention & control of pollution) Act 1974 as amended by Amendment Act 1988. Water (prevention and control of pollution) Rules 1975 Water (prevention & Control or Pollution) Cess Act. 1977 as amended by Amendment Act 1987 and relevant notifications.

ENVIRONMENTAL (PROTECTION) ACT 1986: Relevant notifications in connection with Hazardous Wastes (management and handling) Biomedical wastes (management and handling), Noise pollution, Eco-labeling, and E.I.A.

TEXT BOOKS:

1. Environmental, A., Divan and Noble M. Environmental Law and Policy in India (cases, Materials and Statutes) 1991 Tripathi Bombay.

REFERENCES:

1. Constitution of India Eastern Book Company Lucknow 12th Edition. 1997.

2. Constitutional Law of India - J.N. Pandey 1997 (31st Edition) Central Law Agency, Allahabad.

3. Administrative Law U.P.D. Kesari 1998. Universal Book Trade, Delhi.

4. Environmental Law H.N. Tiwari, Allahabad Law Agency 1997.

5. Environmental Policy. Forest Policy, Bare Acts - Government Gazette Notification.

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2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE54	SUSTAINABLE DEVELOPMENT AND ENVIRONMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in understanding about sustainable development and environment.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Be acquainted with the concept of sustainable development based on global environmental issues.
2	Be familiar with social, economical and environmental dimensions of sustainable development.
3	Gain knowledge on achieving sustainability using performance indicators.
4	Learn the steps of action plan for implementation of sustainable development.
5	Be familiar with the contribution of developed countries on sustainable development.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop knowledge on sustainable development concepts	Understand
CO2. Describe social, economical and environmental issues of sustainable development.	Understand/apply
CO3. Be aware of the performance indicators to asses‘ sustainable development.	Remember/Understand
CO4. Identify the steps in action plan for implementation of sustainable development.	Analyze
CO5. Relate to the integrated approach for resource protection and management.	Understand/apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	-	S	-	-	-	-	-	-			
CO2	S	M	L	L	-	S	-	-	-	-	-	-			
CO3	S	M	M	L	-	S	-	-	-	-	-	-			

CO4	S	M	S	L	-	S	-	-	-	-	-	-			
CO5	S	M	L	L	-	M	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

CONCEPT OF SUSTAINABLE DEVELOPMENT: Environment and Development - Population, Poverty and Pollution - Global and Local environmental issues - Resource Degradation - Greenhouse gases - Desertification - Industrialization - Social insecurity, Globalization and environment. History arid emergence of the concept of sustainable development - Objectives of Sustainable Development

COMPONENTS AND DIMENSIONS OF SUSTAINABLE DEVELOPMENT : Components of sustainability - Complexity of growth and equity - Social, economic and environmental dimensions of sustainable development - Environment - Biodiversity - Natural Resources - Ecosystem integrity - Clean air and water - Carrying capacity - Equity, Quality of Life, Prevention, Precaution, Preservation and Public participation-structural and functional linking of developmental dimensions

FRAMEWORK FOR ACHIEVING SUSTAINABILITY: Operational guidelines - Interconnected prerequisites for sustainable development - Empowerment of Women, Children, Youth, Indigenous People, Non-Governmental Organizations, Local Authorities, Business and Industry - Science and Technology for sustainable development - Performance indicators of sustainability and Assessment mechanism - Constraints and barriers for sustainable development.

SUSTAINABLE DEVELOPMENT OF SOCIO-ECONOMIC SYSTEMS : Demographic dynamics of sustainability - Policies for socio-economic development - Strategies for implementing eco-development programs - Sustainable development through trade - Economic growth - Action plan for implementing sustainable development - Urbanization and Sustainable Cities - Sustainable Energy and Agriculture - Sustainable Livelihoods.

SUSTAINABLE DEVELOPMENT AND INTERNATIONAL RESPONSE: Role of developed countries in the development of developing countries - International summits - Stockholm to Johannesburg - Rio Principles - Agenda 21 - Conventions - Agreements - Tokyo Declaration - Doubling statement - Transboundary issues - Integrated approach for resource protection and management.

TEXT BOOKS:

1. Jeffry Sayer and Campbell, B., The Science of Sustainable Development: Local Livelihoods and the Global Environment (Biological Conservation, Restoration & Sustainability), Cambridge University Press, London, 2003.

REFERENCES:

1. Kirkby, J., O'Keefe, P. and Timberlake, Sustainable Development, Earthscan Publication; London, 1993.

2. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publications, London, 1998. 3.

Bowers, J., Sustainability and Environmental Economics - An Alternative Text, Longman London, 1997.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	C. Nivetha	Assistant Professor	AVIT	nivethachandru92@gmail.com
2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE55	REMOTE SENSING AND GIS FOR ENVIRONMENTAL APPLICATION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in gaining knowledge about remote sensing and GIS for environment application.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Be acquainted with the concepts of Remote sensing, EMR interaction with Environmental issues.
2	Be familiar with remote sensing platform systems, its satellites and sensors.
3	Gain knowledge on data processing using image processing software.
4	Gain knowledge on GIS and GIS software.
5	Be familiar with monitoring environment using remote sensing and GIS.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop knowledge on concept of remote sensing.	Understand
CO2. Be aware of remote sensing platforms and sensors.	Understand
CO3. Identify the steps in Image processing software.	Apply
CO4. Relate the problems in GIS software.	Apply
CO5. Describe the environmental application using remote sensing and GIS.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	-	-	-	-	-	-	-	-			
CO2	S	L	M	L	M	-	-	-	-	-	-	-			
CO3	S	M	M	L	M	-	-	-	-	-	-	-			

CO4	S	S	M	L	-	-	-	-	-	-	-	-			
C05	S	-	M	-	M										

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF ELECTRO MAGNETIC RADIATION: Concepts of Remote Sensing - Energy sources and radiation principles, Energy interactions in the atmosphere - Spectral reflectance of earth surface features.
REMOTE SENSING PLATFORMS: Aerial Photographs, Photographic Systems - Visible, Infra Red and Microwave sensing - Active and passive sensors - Satellites and their sensors, Indian Space Program - Satellite data products

DATA PROCESSING: Photogrammetry - Satellite data analysis - Visual Interpretation, Interpretation equipments - Digital Image Processing - Image rectification, enhancement, classification, data merging and biophysical modeling - Image Processing software.

GEOGRAPHIC INFORMATION SYSTEM : Introduction to GIS concepts - Data base structure - Data analysis - GIS software

REMOTE SENSING AND GIS APPLICATIONS: Management and monitoring of environment, conservation of resources, coastal zone management - Limitations.

TEXT BOOKS:

1. Lillesand, T.M. and Kiefer, R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York, 2004.

REFERENCES:

1. Burrough, P.A. and McDonnell, R.A., Principles of Geographic Information Systems, Oxford University Press, New York, 2001.

2. Lintz, J. and Simonet, Remote Sensing of Environment, Addison Wesley Publishing Company, New Jersey, 1998.

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2	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVSE56	WASTE WATER MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in understanding about various methods of wastewater treatment and management.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Be familiar with the concept of aerobic and anaerobic treatment of waste water.
2	Be acquainted with the origin of various units of Aerobic treatment of waste water.
3	Be acquainted with the design and concepts of various units of Anaerobic treatment of waste water.
4	Gain knowledge on sludge treatment and disposal.
5	Understand the operations, maintenance and management of sewage treatment plants.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe the concept of aerobic and anaerobic treatment of waste water.	Understand
CO2.Develop knowledge on the design of various unit of Aerobic treatment of waste water.	Understand/Apply
CO3. Develop knowledge on the design of various unit of Anaerobic treatment of waste water.	Understand/Analyze
CO4. Identify the ways of treatment of sludge and its disposal.	Analyze
CO5. Be aware of the operation, maintenance and management of sewage treatment plants.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	-	-	-	-	-	-	-	-			

CO2	S	M	L	M	-	-	-	-	-	-	-	-			
CO3	S	M	M	M	-	-	-	-	-	-	-	-			
CO4	S	M	M	L	-	-	-	-	-	-	-	-			
CO5	S	M	L	M	-	-	-	-	-	-	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Objectives of biological treatment - significance - aerobic and anaerobic treatment - kinetics of biological growth - Factors affecting growth attached and suspended growth - Determination of Kinetics coefficients for organics removal - Biodegradability assessment - selection of process.

AEROBIC TREATMENT OF WASTEWATER: Design of sewage treatment plant units - screen chamber, Grit chamber with proportional flow weir, sedimentation tank - Trickling filters, Rotating Biological contactor, activated sludge process & variations, aerated lagoons, waste stabilization ponds - nutrient removal systems - natural treatment systems - Disinfected disposal options - reclamation and reuse - Flow charts, layout, hydraulic profile - Recent advances.

ANAEROBIC TREATMENT OF WASTEWATER: Attached and suspended growth, Design of units - UASB, up flow filters, Fluidized beds - Septic tank and disposal - Nutrient removal systems - Layout and Hydraulic profile - Recent advances.

SLUDGE TREATMENT AND DISPOSAL: Design of Sludge management facilities, sludge thickening, sludge digestion, Biogas generation, sludge dewatering (mechanical and gravity) - upgrading existing plants - ultimate residue disposal - Recent Advances.

OPERATIONS, MAINTENANCE, MANAGEMENT AND CASE STUDIES: Operational problems - Trouble shooting, Planning, Organizing and Controlling of plant operations - capacity building, Case studies on sewage treatment plants - sludge management facilities**.**

TEXT BOOKS:

1. Metcalf & Eddy, Inc. "Wastewater Engineering, Treatment and Reuse, Third Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2003.

REFERENCES:

1. Arceivala, S.J., Wastewater treatment for pollution control, TMH, New Delhi, 1998.

2. Manual on "Sewerage and Sewage Treatment" CPHEEO, Ministry of Urban Development, GOI, New Delhi, 1999.

3. Qasim, S.R, Wastewater Treatment Plant, Planning, Design & Operation Technomic Publications, New York, 1994.

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