VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University under section 3 of the UGC Act 1956)

(AICTE APPROVED AND NAAC ACCREDITED)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUER SCIENCE AND ENGINEERING

2017 REGULATION

Programme:

B.E / B.Tech - ARTIFICIAL INTELLIGENCE & DATA SCIENCE

Full Time (4 Years)

STRUCTURED CHOICE BASED CREDIT SYSTEM (SCBCS)

CURRICULUM AND SYLLABUS

(Semester I to VIII)

Credit Requirement for the Course Categories

Sl. No.	Category of Courses	Credits to be earned Min.
01	**A. Foundation Courses (FC)**	**65**
	i. Humanities and Sciences (English and Management Courses)	12
	ii. Basic Sciences (Maths, Physics and Chemistry Courses)	24
	iii. Engineering Sciences (Basic Engineering Courses)	29
02	**B. Core courses (CC) relevant to the chosen Programme of study.**	**49**
03	**C. Elective Courses (EC)**	**30**
	i. Programme Specific (Class Room or Online)	18
	ii. Open Elective (Class Room or Online)	12
04	**D. Project + Internship + Industry Electives (P + I + I)**	**15**
	i. Project	9
	ii. Internship	3
	iii. Industry Supported Courses	3
05	***E. Employability Enhancement Courses + Co - Curricular Courses + Extra Curricular Courses**	**9**
	i. Employability Enhancement Courses (Personality Development Training, Participation in Seminars, Professional Practices, Summer Project, Case Study etc.)	3
	ii. Co - Curricular Courses (NCC, NSS, Sports, Games, Drills and Physical Exercises)	3
	iii. Extra Curricular Courses (MOOCS / SWAYAM / NPTEL /)	3
06	****F. Mandatory Non Credit Courses** (Induction training, Environmental Sciences, Indian Constitution, Essence of Indian Knowledge Tradition)	Non Credit
Minimum Credits to be earned		**159**

*** Mandatory, Credits would be mentioned in Mark sheets but not included for CGPA Calculations. For overall CGPA calculations, a student has to earn minimum 159 credits in Categories A to D.**

**** Mandatory Non Credit Courses, shall not be considered for eligibility criterion prescribed for promotion, award of class,calculation of CGPA, However a pass in the above course is mandatory for the completion of the program and award of degree.**

CURRICULUM

B.E / B.Tech. - ARTIFICIAL INTELLIGENCE & DATA SCIENCE

SEMESTER
I TO VIII

B.E/ B.TECH.
ARTIFICIAL INTELLIGENCE & DATA SCIENCE
SEMESTER I TO VIII

CATEGORY A – FOUNDATION COURSES - HSS, BS AND ES COURSES - CREDITS (65)

(i) HUMANITIES AND SCIENCES (ENGLISH AND MANAGEMENT SUBJECTS) - CREDITS (12)

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.	17EGHS02	ENGLISH LANGUAGE LAB	ENGLISH	FC (HSS)	0	0	4	2	NIL
3.	17EGHS81	BUSINESS ENGLISH	ENGLISH	FC (HSS)	3	0	0	3	NIL
4.	17MBHS01	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	MANAGEMENT	FC (HSS)	3	0	0	3	NIL
5.	17EGHS82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	ENGLISH	FC (HSS)	0	0	2	1	NIL
6.	17YMHS82	YOGA AND MEDITATION	PHYSICAL EDUCATION	FC (HSS)	0	0	4	2	NIL
(iii) BASIC SCIENCES (BASIC ENGINEERING COURSES) - CREDITS (24)									
1.	17MABS01	ENGINEERING MATHEMATICS	MATHEMATICS	FC (BS)	2	2	0	3	NIL
2.	17MABS09	MATHEMATICS FOR COMPUTER ENGINEERS	MATHEMATICS	FC (BS)	2	2	0	3	NIL
3.	17MABS14	NUMERICAL METHODS AND NUMBER THEORY	MATHEMATICS	FC (BS)	2	2	0	3	NIL
4.	17MABS15	PROBABILITY AND QUEUING THEORY	MATHEMATCS	FC (BS)	2	2	0	3	NIL
5.	17MABS22	MATHEMATICS FOR MACHINE LEARNING	MATHEMATCS	FC (BS)	2	2	0	3	ENGINEERING MATHEMATICS
6.	17MABS23	MATHEMATICS FOR DATA SCIENCE	MATHEMATCS	FC (BS)	2	2	0	3	ENGINEERING MATHEMATICS
7.	17MABS24	STATISTICAL FOUNDATION	MATHEMATCS	FC (BS)	2	2	0	3	ENGINEERING MATHEMATICS
8.	17PCBS02	PHYSICAL SCIENCES PART A. ENGINEERING PHYSICS PART B. ENGINEERING CHEMISTRY	PHYSICS & CHEMISTRY	FC (BS)	4	0	0	4	NIL
9.	17PHBS05	SMART MATERIALS	PHYSICS	FC (BS)	3	0	0	3	NIL
10.	17PCBS81	PHYSICAL SCIENCES LAB PART A. REAL AND VIRTUAL LAB IN PHYSICS PART B. ENGINEERING CHEMISTRY LAB	PHYSICS & CHEMISTRY	FC (BS)	0	0	4	2	NIL
(iii) ENGINEERING SCIENCES (BASIC ENGINEERING COURSES) - CREDITS (29)									
1.	17EEES03	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING A. BASIC	EEE & ECE	FC(ES)	4	0	0	4	NIL

		ELECTRICAL ENGINEERING B. BASIC ELECTRONICS ENGINEERING							
2.	17CMES02	BASICS OF CIVIL AND MECHANICAL ENGINEERING	CIVIL & MECH	FC(ES)	4	0	0	4	NIL
3.	17CSES01	ESSENTIALS OF COMPUTING	CSE	FC(ES)	3	0	0	3	NIL
4.	17CSES05	PROGRAMMING IN PYTHON	CSE	FC(ES)	3	0	0	3	NIL
5.	17CSES83	PROGRAMMING IN PYTHON LAB	CSE	FC(ES)	0	0	4	2	NIL
6.	17EEES82	ENGINEERING SKILLS PRACTICES LAB A. BASIC ELECTRICAL ENGINEERING B. BASIC ELECTRONICS ENGINEERING	EEE & ECE	FC(ES)	0	0	4	2	NIL
7.	17CMES81	ENGINEERING SKILLS PRACTICE LAB A.BASIC CIVIL ENGINEERING B.BASIC MECHANICAL ENGINEERING	CIVIL & MECH	FC(ES)	0	0	4	2	NIL
8.	17MEES84	ENGINEERING GRAPHICS (THEORY + PRACTICE)	MECH	FC(ES)	1	0	4	3	NIL
9.	17CSES06	PROGRAMMING IN C	CSE	FC(ES)	3	0	0	3	NIL
10.	17CSES85	PROGRAMMING IN C LAB	CSE	FC(ES)	0	0	4	2	NIL

B.E/ B.TECH.
ARTIFICIAL INTELLIGENCE & DATA SCIENCE
SEMESTER I TO VIII

CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME - CREDITS (49)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17CSCC01	DATA STRUCTURES	CSE	CC	3	0	0	3	NIL
2.	17CSCC20	DATA STRUCTURES LAB	CSE	CC	0	0	4	2	NIL
3.	17CSCC04	COMPUTER ARCHITECTURE	CSE	CC	3	0	0	3	NIL
4.	17CSCC02	OBJECT ORIENTED PROGRAMMING	CSE	CC	3	0	0	3	NIL

5.	17CSCC21	OBJECT ORIENTED PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
6.	17CSCC06	DESIGN AND ANALYSIS OF ALGORITHM	CSE	CC	3	0	0	3	DATA STRUCTURES
7.	17CSCC23	ALGORITHM LAB	CSE	CC	0	0	4	2	DATA STRUCTURES
8.	**17AICC01**	PROBLEM SOLVING USING PYTHON PROGRAMMING (Theory + Practice)	CSE	CC	3	0	2	4	NIL
9.	17CSCC03	DATABASE MANAGEMENT SYSTEM	CSE	CC	3	0	0	3	NIL
10.	17CSCC22	DATABASE MANAGEMENT SYSTEM LAB	CSE	CC	0	0	4	2	NIL
11.	17CSCC09	JAVA PROGRAMING	CSE	CC	3	0	0	3	NIL
12.	17CSCC26	JAVA PROGRAMING LAB	CSE	CC	0	0	4	2	NIL
13.	17CSCC07	OPERATING SYSTEM	CSE	CC	3	0	0	3	NIL
14.	17CSCC24	OPERATING SYSTEM LAB	CSE	CC	0	0	4	2	NIL
15.	17CSCC08	COMPUTER NETWORKS	CSE	CC	3	0	0	3	NIL
16.	17CSCC25	COMPUTER NETWORKS LAB	CSE	CC	0	0	4	2	NIL
17.	17CSCC18	RICH INTERNET APPLICATION	CSE	CC	3	0	0	3	JAVA PROGRAMMING
18.	17CSCC31	RICH INTERNET APPLICATION DEVELOPMENT LAB	CSE	CC	0	0	4	2	JAVA PROGRAMMING LAB
19.	17CSCC16	CLOUD COMPUTING	CSE	CC	3	0	0	3	COMPUTER NETWORKS
20.	**17AICC02**	INFORMATION SECURITY	CSE	CC	3	0	0	3	COMPUTER NETWORKS
21.	17CSCC15	C# AND .NET APPLICATION DEVELOPMENT	CSE	CC	3	0	0	3	JAVA PROGRAMMING
22.	17CSCC30	C# AND .NET APPLICATION DEVELOPMENT LAB	CSE	CC	0	0	4	2	JAVA PROGRAMMING
23.	**17AICC03**	UNIX INTERNALS (Theory + Practice)	CSE	CC	3	0	2	4	NIL
24.	17CSCC14	ARTIFICIAL INTELLIGENCE	CSE	CC	3	0	0	3	NIL
25.	**17AICC04**	ARTIFICIAL INTELLIGENCE LAB	CSE	CC	0	0	4	2	NIL
26.	17CSEC27	SOFT COMPUTING	CSE	CC	3	0	0	3	ARTIFICIAL INTELLIGENCE
27.	**17AICC05**	MACHINE LEARNING	CSE	CC	3	0	0	3	ARTIFICIAL INTELLIGENCE
28.	**17AICC06**	MACHINE LEARNING LAB	CSE	CC	0	0	4	2	ARTIFICIAL INTELLIGENCE
29.	**17AICC07**	DEEP LEARNING	CSE	CC	3	0	0	3	ARTIFICIAL INTELLIGENCE
30.	**17AICC08**	DEEP LEARNING LAB	CSE	CC	0	0	4	2	ARTIFICIAL INTELLIGENCE
31.	17CSCC13	DATA WAREHOUSING AND DATA MINING	CSE	CC	3	0	0	3	DATABASE MANAGEMENT SYSTEM
32.	**17AICC09**	FOUNDATION OF DATA SCIENCE	CSE	CC	3	0	0	3	NIL

33.	**17AICC10**	BIG DATA ANALYTICS	CSE	CC	3	0	0	3	DATABASE MANAGEMENT SYSTEM
34.	**17AICC11**	BIG DATA ANALYTICS LAB	CSE	CC	0	0	4	2	DATA WAREHOUSING AND DATA MINING
35.	**17AICC12**	DATA ANALYTICS USING PYTHON	CSE	CC	3	0	0	3	PROGRAMMING IN PYTHON
36.	17CSCC05	SOFTWARE ENGINEERING	CSE	CC	3	0	0	3	NIL
37.	17CSCC10	OBJECT ORIENTED ANALYSIS AND DESIGN	CSE	CC	3	0	0	3	OBJECT ORIENTED PROGRAMMING
38.	17CSCC27	CASE TOOLS LAB	CSE	CC	0	0	4	2	OBJECT ORIENTED ANALYSIS AND DESIGN
39.	17CSCC17	CYBER SECURITY	CSE	CC	3	0	0	3	NIL
40.	17CSCC32	DESIGN PATTERNS	CSE	CC	3	0	0	3	NIL
41.	**17AICC13**	DATA SCIENCE USING R PROGRAMMING (Theory + Practice)	CSE	CC	3	0	2	4	DATABASE MANAGEMENT SYSTEM

B.E/ B.TECH.
ARTIFICIAL INTELLIGENCE & DATA SCIENCE
SEMESTER I TO VIII

CATEGORY C – ELECTIVE COURSES - CREDITS (30)

(i) PROGRAMME SPECIFIC (CLASS ROOM OR ONLINE) - CREDITS (18)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	**17AIEC01**	NEURAL NETWORKS	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
2.	17CSEC13	HUMAN COMPUTER INTERACTION	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
3.	**17AIEC02**	NATURAL LANGUAGE PROCESSING	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
4.	**17AIEC03**	REINFORCEMENT LEARNING	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
5.	**17AIEC04**	BIGDATA SECURITY	CSE	EC(PS)	3	0	0	3	BIG DATA ANALYTICS
6.	**17AIEC05**	DATA VISUALIZATION TECHNIQUES	CSE	EC(PS)	3	0	0	3	DATA WAREHOUSING AND DATA MINING
7.	17CSEC05	CLOUD COMPUTING SECURITY	CSE	EC(PS)	3	0	0	3	CLOUD COMPUTING
8.	17CSEC07	DATA CENTRE VIRTUALIZATION	CSE	EC(PS)	3	0	0	3	DATABASE MANAGEMENT SYSTEM
9.	17CSEC02	AGILE METHODOLOGIES	CSE	EC(PS)	3	0	0	3	SOFTWARE ENGINEERING
10.	17CSEC04	BIO METRICS	CSE	EC(PS)	3	0	0	3	INFORMATION SECURITY
11.	17CSEC24	OPEN SOURCE SYSTEMS	CSE	EC(PS)	3	0	0	3	NIL

12.	17CSEC17	KNOWLEDGE BASED DECISION SUPPORT SYSTEM	CSE	EC(PS)	3	0	0	3	NIL
13.	17CSEC14	INFORMATION RETRIEVAL TECHNIQUES	CSE	EC(PS)	3	0	0	3	DATA MINING AND DATA WAREHOUSING
14.	17CSEC16	IT INFRASTRUCTURE MANAGEMENT	CSE	EC(PS)	3	0	0	3	NIL
15.	17CSEC33	VIRTUALIZATION TECHNIQUES	CSE	EC(PS)	3	0	0	3	NIL
16.	**17AIEC06**	INTRODUCTION TO DRONES	CSE	EC(PS)	3	0	0	3	NIL
17.	**17AIEC07**	BIO SYSTEMS WITH AI	CSE	EC(PS)	3	0	0	3	NIL
18.	**17AIEC08**	INTRODUCTION TO DIGITAL SYSTEM	CSE	EC(PS)	3	0	0	3	NIL
19.	**17AIEC09**	EMBEDDED PROGRAMMING	CSE	EC(PS)	3	0	0	3	NIL
20.	**17AIEC10**	PROBLEM IDENTIFICATION AND DESIGN THINKING	CSE	EC(PS)	3	0	0	3	NIL
21.	**17AIEC11**	INTRODUCTION TO ROBOTICS	CSE	EC(PS)	3	0	0	3	NIL
22.	**17AIEC12**	DIGITAL IMAGE PROCESSING	CSE	EC(PS)	3	0	0	3	NIL
23.	**17AIEC13**	THEORY OF COMPUTATION	CSE	EC(PS)	3	0	0	3	NIL
24.	**17AIEC14**	GENETIC ALGORITHMS &FUZZY LOGIC SYSTEMS	CSE	EC(PS)	3	0	0	3	NIL
25.	**17AIEC15**	OPTIMIZATION IN MACHINE LEARNING	CSE	EC(PS)	3	0	0	3	NIL
26.	**17AIEC16**	PATTERN RECOGNITION AND MACHINE LEARNING	CSE	EC(PS)	3	0	0	3	NIL
27.	**17AIEC17**	KERNEL METHODS FOR MACHINE LEARNING	CSE	EC(PS)	3	0	0	3	NIL
28.	17CSEC06	CRYPTOGRAPHY AND NETWORK SECURITY	CSE	EC(PS)	3	0	0	3	NIL
29.	17CSEC10	GAME THEORY	CSE	EC(PS)	3	0	0	3	ENGINEERING MATHEMATICS
30.	**17AIEC18**	COMPUTER VISION	CSE	EC(PS)	3	0	0	3	NIL
31.	17CSEC09	ETHICAL HACKING	CSE	EC(PS)	3	0	0	3	NIL
32.	17CSEC11	GREEN COMPUTING	CSE	EC(PS)	3	0	0	3	NIL
33.	17CSEC15	INTERNET SECURITY & COMPUTER FORENSICS	CSE	EC(PS)	3	0	0	3	CYBER SECURITY
34.	17CSEC19	MOBILE COMPUTING	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS
35.	17CSEC21	NANO TECHNOLOGY	CSE	EC(PS)	3	0	0	3	PHYSICAL SCIENCES
36.	17CSEC32	VIRTUAL REALITY	CSE	EC(PS)	3	0	0	3	NIL

B.E/ B.TECH.
ARTIFICIAL INTELLIGENCE & DATA SCIENCE
SEMESTER I TO VIII

(ii) OPEN ELECTIVE CREDITS(CLASS ROOM OR ONLINE) - (12)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17MBHS04	TOTAL QUALITY MANAGEMENT	MANAGEMENT	EC(OE)	3	0	0	3	NIL
2.	17MBHS03	ENGINEERING MANAGEMENT AND ETHICS	MANAGEMENT	EC(OE)	3	0	0	3	NIL
3.	17MBHS05	MARKETING TECHNIQUES FOR ENGINEERS	MANAGEMENT	EC(OE)	3	0	0	3	NIL
4.	17CVEC07	DISASTER MITIGATION AND MANAGEMENT	CIVIL	EC(OE)	3	0	0	3	NIL
5.	17EEEC22	SCADA	EEE	EC(OE)	3	0	0	3	NIL
6.	17EEEC03	COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS	EEE	EC(OE)	3	0	0	3	NIL
7.	17EEEC21	NON CONVENTIONAL ENERGY SOURCES	EEE	EC(OE)	3	0	0	3	NIL
8.	17MEPI04	NON DESTRUCTIVE TESTING	MECHANICAL	EC(OE)	3	0	0	3	NIL
9.	17MESE17	MODERN MANUFACTURING METHODS	MECHANICAL	EC(OE)	3	0	0	3	NIL
10.	17ECCC07	MICROCONTROLLERS & ITS APPLICATIONS	ECE	EC(OE)	3	0	0	3	NIL
11.	17MBHS02	FINANCE AND ACCOUNTING FOR ENGINEERS	MANAGEMENT	EC(OE)	3	0	0	3	NIL
12.	17MBHS09	INTELLECTUAL PROPERTY RIGHTS AND ALTERNATE DISPUTE RESOLUTION	MANAGEMENT	EC(OE)	3	0	0	3	NIL
13.	17ATEC14	COMPUTER CONTROLLED VEHICLE SYSTEMS	AUTOMOBILE	EC(OE)	3	0	0	3	NIL
14.	17CVSE55	REMOTE SENSING AND GIS FOR ENVIRONMENTAL APPLICATION	CIVIL	EC(OE)	3	0	0	3	NIL
15.	17CVEC03	GEOGRAPHICAL INFORMATION SYSTEM	CIVIL	EC(OE)	3	0	0	3	NIL
16.	17CVSE02	ENTERPRISE WIDE INFORMATION SYSTEMS	CIVIL	EC(OE)	3	0	0	3	NIL
17.	17CVSE47	ICT BASED CITY AND INFRASTRUCTURE PLANNING	CIVIL	EC(OE)	3	0	0	3	Nil
18.	17EESE03	ARTIFICIAL INTELLIGENCE APPLICATION TO POWER SYSTEMS	EEE	EC(OE)	3	0	0	3	NIL
19.	17BMCC03	BIOSENSORS AND TRANSDUCERS	BME	EC(OE)	3	0	0	3	NIL

20.	17BMEC06	APPLIED NEURAL NETWORKS AND FUZZY LOGICSYSTEMS IN MEDICINE	BME	EC(OE)	3	0	0	3	NIL
21.	17BMSE17	BRAIN COMPUTER INTERFACE	BME	EC(OE)	3	0	0	3	NIL
22.	17BMSE18	ROBOTICS & AUTOMATION IN MEDICINE	BME	EC(OE)	3	0	0	3	NIL
23.	17ECCC04	SIGNALS AND SYSTEMS	ECE	EC(OE)	3	0	0	3	NIL
24.	17ECCC01	SEMICONDUCTOR DEVICES	ECE	EC(OE)	3	0	0	3	NIL
25.	17ECCC15	ANALOG & DIGITAL COMMUNICATION	ECE	EC(OE)	3	0	0	3	NIL
26.	17EEEC20	MATHEMATICAL MODELLING AND SIMULATION	EEE	EC(OE)	3	0	0	3	NIL
27.	17BMSE16	WEARABLE TECHNOLOGY	BME	BM(OE)	3	0	0	3	NIL
28.	17ECSE21	WIRELESS SENSOR NETWORKS AND IOT	ECE	EC(OE)	3	0	0	3	NIL
29.	17ECSE22	WIRELESS TECHNOLOGIES FOR IOT	ECE	EC(OE)	3	0	0	3	NIL
30.	17ECSE07	SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEMS	ECE	EC(OE)	3	0	0	3	NIL
31.	17MECC12	COMPUTER INTEGRATED MANUFACTURING	MECH	EC(OE)	3	0	0	3	NIL
32.	17BTSE05	INDUSTRIAL WASTE MANAGEMENT	BTE	EC(OE)	3	0	0	3	NIL
33.	17BMEC04	MEMS AND ITS BIOMEDICAL APPLICATIONS	BME	EC(OE)	3	0	0	3	NIL
34.	17CVEC14	AIR POLLUTION MANAGEMENT	CIVIL	EC(OE)	3	0	0	3	NIL
35.	17BTPI05	INDUSTRIAL BIOSAFETY	BTE	EC(OE)	3	0	0	3	NIL
36.	17BTEC29	GREEN BUILDING AND SUSTAINABLE ENVIRONMENT	BTE	EC(OE)	3	0	0	3	NIL

B.E/ B.TECH.
ARTIFICIAL INTELLIGENC & DATA SCIENCE
SEMESTER I TO VIII

CATEGORY D – PROJECT + INTERNSHIP + INDUSTRY ELECTIVES (P + I + I)- CREDITS (15)

(i) PROJECT - CREDITS (9)

(i) INTERNSHIP + INDUSTRY ELECTIVES - CREDITS (6)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17CSPI01	PROJECT WORK	CSE	PI	0	0	18	9	NIL
2.	17CSPI02	INTERNSHIP	CSE	PI	0	0	0	3	NIL
3.	17CSPI03	BUSINESS INTELLIGENCE AND ITS APPLICATION	CSE	PI	3	0	0	3	NIL
4.	17CSPI04	BUILDING ENTERPRISE APPLICATIONS	CSE	PI	3	0	0	3	NIL
5.	17CSPI05	INTERNET AND WEB TECHNOLOGY	CSE	PI	3	0	0	3	NIL
6.	17CSPI06	LEARNING IT ESSENTIALS BY DOING	CSE	PI	3	0	0	3	NIL
7.	17CSPI07	ESSENTIALS OF INFORMATION TECHNOLOGY	CSE	PI	3	0	0	3	NIL
8.	17CSPI08	INTRODUCTION TO MAIN FRAMES	CSE	PI	3	0	0	3	NIL
9.	17CSPI09	MOBILE APPLICATION DEVELOPMENT	CSE	PI	3	0	0	3	NIL
10.	17CSPI10	INTERNET OF THINGS	CSE	PI	3	0	0	3	NIL

B.E / B.TECH. – ARTIFICIAL INTELLIGENCE & DATA SCIENCE - SEMESTER I TO VIII

CATEGORY E – EMPLOYABILITY ENHANCEMENT COURSES, CO - CURRICULAR COURSES AND EXTRA CURRICULAR COURSES (EEC)** - CREDITS (9)

(- MANDATORY, CREDITS WOULD BE MENTIONED IN MARK SHEETS BUT NOT INCLUDED FOR CGPA CALCULATIONS.)**

(i) EMPLOYABILITY ENHANCEMENT COURSES (EEC) (3)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
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.	17CSEE01	APPLICATION SOFTWARE AND SYSTEM SOFTWARE INSTALLATION	CSE	EE	3	0	0	3	NIL
4.	17CSEE02	WEB DESIGNING	CSE	EE	3	0	0	3	NIL
5.	17CSEE03	DIGITAL MARKETING	CSE	EE	3	0	0	3	NIL
6.	17CSEE04	MOBILE APPLICATION DEVELOPER	CSE	EE	3	0	0	3	NIL

(ii) CO - CURRICULAR COURSES (CCC) (3)

1.	17APEE03	NCC	NCC	EE	2 WEEKS OF TRAINING IN NCC CAMP			1	NIL
2.	17APEE04	NSS	NSS	EE	2 WEEKS OF SOCIAL 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

(iii) EXTRA CURRICULAR COURSES (ECC) - (MOOC / SWAYAM / NPTEL) (3)

1.	17CSEE05	EXTRA CURRICULAR COURSES – I		EE					NIL
2.	17CSEE06	EXTRA CURRICULAR COURSES – II		EE					NIL
3.	17CSEE07	EXTRA CURRICULAR COURSES – III		EE					NIL
4.	17CSEE08	EXTRA CURRICULAR COURSES -IV		EE					NIL
5.	17CSEE09	EXTRA CURRICULAR COURSES –V		EE					NIL
6.	17CSEE10	EXTRA CURRICULAR COURSES – VI		EE					NIL

B.E/ B.TECH. ARTIFICIAL INTELLIGENCE & DATA SCIENCE SEMESTER I TO VIII									
CATEGORY F - MANDATORY COURSES - Non Credit									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	17CHBS01	ENVIROMENTAL SCIENCES	CHEMISTRY	MC	_	_	_	0	NIL
2.	17MBHS11	ESSENCE OF INDIAN KNOWLEDGE TRADITION / INDIAN CONSTITUTION	MBA	MC	_	_	_	0	NIL

B.E/ B.TECH. ARTIFICIAL INTELLIGENCE & DATA SCIENCE SEMESTER I TO VIII	
INDUCTION PROGRAM	
INDUCTION PROGRAM (MANDATORY)	**3 Weeks Duration**
Induction program for students to be offered right at the start of the first year.	• **Physical activity** • **Creative Arts** • **Universal Human Values** • **Literary** • **Proficiency Modules** • **Lectures by Eminent People** • **Visits to local Areas** • **Familiarization to Dept./Branch & Innovations**

17EGHS01	TECHNICAL ENGLISH	Category	L	T	P	Credit
		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, and Writing.)
2.	To make them to become effective communicators
3.	To ensure that learners use Electronic media materials for developing language
4.	To aid the students with employability skills.
5.	To motivate students continuously to use English language
6.	To develop the students communication skills in formal and informal situations

COURSE OUTCOMES

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

CO1. Listen, remember and respond to others in differentscenario	Remember
CO2. Understand and speak fluently and correctly with correct pronunciation in Different situation.	Understand
CO3. To make the students experts in professional writing	Apply
CO4. To make the students in proficient technical communicator	Apply
CO5. To make the students good communicators at the work place and to be Theoretically strong.	Apply
CO6. To make the students recognize the role of technical writing in their careers in business, technical and scientific field	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	-	-	M	M	S	-	L	S	L	S	S	S	M
CO2	-	M	-	L	M	M	S	-	L	S	S	S	S	-	-
CO3	-	L	L	M	-	-	-	L	L	M	S	S	S	S	M
CO4	-	M	-	-	-	M	M	-	L	S	-	S	S	-	-
CO5	M	M	-	M	M	M	S	M	L	S	M	S	S	S	M
CO6	M	-	M	-	-	M	-	-	-	-	S	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

LISTENING

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.

SPEAKING

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.**REPORTING WRITING** 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.

READING

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.

WRITING

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.

TEXT BOOKS:

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 UniversityPress
3. Grammar Builder- I, II, III, and Cambridge UniversityPress.
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	Department	Email ID
1.	Dr.P.Saradha	Associate Professor	English/ VMKVEC	saradhap@vmkvec.edu.in
2.	Mr.S.K.Prem Kishor	Assistant Professor	English /AVIT	prem.english@avit.ac.in

17EGHS02	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
6	To improve the oral skills of the students

COURSE OUTCOMES

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

CO1. Give best performance in group discussion and interview	Understand
CO2. Best performance in the art of conversation and public speaking.	Apply
CO3. Give better job opportunities in corporate companies	Apply
CO4. Better understanding of nuances of English language through audio-visual experience and group activities	Apply
CO5. Speaking skills with clarity and confidence which in turn enhances their employability skills	Apply
CO6. Acquire strategic competence to use both spoken and written language in a wide range of communication strategies	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	-	-	-	S
CO2	M	-	-	-	-	-	-	-	M	S	-	M	S	M	S
CO3	M	-	-	-	-	-	-	-	-	S	-	M	S	S	S
CO4	M	-	-	-	-	-	-	-	-	M	-	-	M	S	S
CO5	M	-	-	S	-	-	-	-	-	M	-	-	M	S	S
CO6	-	M	M	-	-	-	-	-	-	M	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

MODULE 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.

MODULE IV: Telephone Etiquette, Dining Etiquette, Meeting Etiquette.

MODULE V: Case study of Etiquette in different scenario.

TEXT BOOKS:

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 UniversityPress
3. Grammar Builder- I, II, III, and Cambridge UniversityPress.
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	Department	Email ID
1	Dr.P.Saradha	Associate Professor	English / VMKVEC	saradhap@vmkvec.edu.in
2	Mr.S.K.Prem Kishor	Assistant Professor	English / AVIT	Prem.english@avit.ac.in

17EGHS81	BUSINESS ENGLISH	Category	L	T	P	Credit
		HSS	3	0	0	3

PREAMBLE

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.

PREREQUISITE: 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 context
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	Apply
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	-	L	S	S	-	M	S	-	S	M	-	-
CO2	-	M	S	M	-	M	M	-	L	S	-	S	S	-	-
CO3	L	M	-	-	-	M	-	L	-	S	L	M	-	S	M
CO4	-	L	M	M	-	-	L	M	M	S	L	M	S	-	-
CO5	-	-	-	M	-	-	-	M	L	S	-	L	M	-	M
CO6	-	L	-	M	-	L	L	-	-	S	-	S	-	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

SUBJECT AND VERB AGREEMENT: 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.

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

READING SKILLS: 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.

CORPORATE COMMUNICATION: 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

CRITICAL READING: 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.

TEXT BOOKS:

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

REFERENCES:

1. Grammar Builder – I, II, III – Cambridge UniversityPress.
2. Technical English – Writing, Reading and Speaking – Pickett and Lester, Harper andRow.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Email ID
1.	Dr.P.Saradha	Associate Professor	English / VMKVEC	saradhap@vmkvec.edu.in
2.	Mr.S.K.Prem Kishor	Assistant Professor	English/ AVIT	prem.english@avit.ac.in

17MBHS01	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	Category	L	T	P	Credit
		HSS	3	0	0	3

PREAMBLE:

A startup means company initiated by individual innovator or entrepreneurs to search for a repeatable and scalable business model. More specifically, a startup is a newly emerged business venture that aims to develop a viable business model to meet a marketplace needs or wants in an optimum manner.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1. To understand the basics of Startups Management and components.

2. To analyze the startups fund management practices

3. To practice the various kinds of stocks and employment considerations in startups.

4. To apply the importance of intellectual property rights and its procedures.

5. To explore the entrepreneurial mindset and culture.

COURSE OUTCOMES:

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

CO1: Explain the concept of engineering startups, objectives and functions and its components.	Understand
CO2: Analyze the startups funding issues and remuneration practices instartups business.	Analyse
CO3: Analyze the various kinds of stocks and employment opportunities and consideration in startups business.	Analyse
CO4: Compare and contrast the various forms of intellectual property protectionand practice.	Analyse
CO5: Explore the entrepreneurial mindset and culture that has been developing in companies of all sizes and industries.	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	M	-	-	-	-	M	M	S	-	M	-	M	-	L	-
CO2	S	S	M	M	M	L	-	-	-	-	-	M	-	-	M
CO3	S	S	S	M	M	M	-	-	-	-	-	M	-	L	-
CO4	S	S	S	M	M	M	-	-	-	-	-	M	-	M	-
CO5	S	S	-	M	M	M	-	-	-	-	-	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Elements of a successful Start up: Create Management Team and Board of Directors – Evaluate market and Target Customers – Define your product or service –Write your Business Plan

Funding Issues and Remuneration Practices: Funding Issues: Investment Criteria – Looking for seed cash – Seed, Startup, and subsequent Funding Rounds – Milestone Funding - Remuneration Practices for your Start –up : Salaries – Headhunters – Equity Ownership – Form of Equity incentive vehicles – Other compensation – EmploymentContracts

Stock Ownership & startup Employment Considerations: Stock ownership: Risk-Reward Scale – Ownership Interest over time – Common and preferred stock – Authorized and outstanding shares – Acquiring stock – Restricted Stock Grants – Future Tax Liability on Restricted Shares - Compensation and startup Employment Considerations : Entrepreneurs Need Insurance – Do Fringe benefits – outsourcing your benefits work – Life Insurance – Health Insurance – DisabilityInsurance

Protecting Intellectual Property: Protecting your intellectual property: Copyrights - patents–Trade secrets – Trademarks - The Legal Form of your Startup: Corporation – Partnership – Limited Liability Company – Sole Proprietorship - – Making the startup decision: commitment – Leaving a current employer - stay fit.

Entrepreneurship: Entrepreneurship - Introduction to Technology Entrepreneurship and Technology Ventures – Engineers as Entrepreneurs, The Mindset of the Entrepreneurial Leader, Creating and Selling the Entrepreneurial Value Proposition - Essentials of Successful Entrepreneurs – Social environment in entrepreneurial development – Economic environment in entrepreneurial development.

Text Book:

1. James A. Swanson & Michael L. Baird, "Engineering your start-up: A Guie for theHigh-Tech Entrepreneur" 2nd ed, ProfessionalPublications.inc
2. Donald F Kuratko, " Entreprenuership – Theory, Process and Practice", 9th Edition, Cengage Learning 2014.

Reference Books:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill,2013.
2. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd EditionDream tech,2005.
3. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press,2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Email ID
1.	Dr. G. Murugesan	Professor	Management Studies / VMKVEC	murugesan@vmkvec.edu.in
2.	Mr. T. Thangaraja	Assistant Professor	Management Studies / AVIT	thangaraja@avit.ac.in

17EGHS82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	Category	L	T	P	Credit
		HSS	3	0	0	3

PREAMBLE

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 students their vocabulary and use them in appropriate situation	Understand
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 communication and personality skills.	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	S	-	-	M	M	S
CO2	M	-	-	-	-	-	-	-	S	M	-	-	S	M	S
CO3	-	-	-	-	-	-	M	-	S	S	-	-	S	S	-
CO4	S	-	-	-	-	-	-	-	-	-	-	M	-	M	M
CO5	-	-	-	-	-	-	-	-	-	-	-	-	M	M	-
CO6	S	-	-	-	-	-	-	-	M	S	-	M	S	-	M

S- Strong; M-Medium; L-Low

SYLLABUS:

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

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

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.

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

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

TEXT BOOK

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

REFERENCE BOOKS

1. Business Communication, Sinha K. K. S. Chand, New Delhi.
2. Business Communication, Asha Kaul, 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 Mc Graw – Hill.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Email ID
1.	Dr.P.Saradha	Associate Professor	English	saradhap@vmkvec.edu.in
2.	Mr.S.K.Prem Kishor	Assistant Professor	English	Prem.english@avit.ac.in

17MABS01	ENGINEERING MATHEMATICS	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

The driving force in Engineering Mathematics is the rapid growth of technology and is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

PREREQUISITE : NIL

COURSE OBJECTIVES

1.	To identify the characteristics of a linear system with Eigen values and Eigen vectors.
2.	To improve their ability in solving geometrical applications of differential calculus
3.	To find a maximum or minimum value for a function of several variables subject to a given constraint.
4.	To understand the integration techniques for evaluating surface and volume integrals.
5.	Incorporate the knowledge of vector calculus to support their concurrent and subsequent engineering studies

COURSE OUTCOMES

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

CO1. Able to understand the system of linear equations arising in all engineering fields using matrix methods.	Understand
CO2. Determine the evolute and envelope for a given family of curves	Apply
CO3. Apply differentiation to solve maxima and minima problems.	Apply
CO4. Compute the area and volume of plane using integration	Apply
CO5. Evaluate the surface and volume integral using Green's, Stokes and Gauss Divergence theorems	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	M	M	M	--	--	--	--	--	--	M	M	M	--
CO2	S	M	M	M	M	--	--	--	--	--	--	M	M	M	--
CO3	S	M	M	M	M	--	--	--	--	--	--	M	M	M	--
CO4	S	M	M	M	M	--	--	--	--	--	--	M	M	M	--
CO5	S	M	M	M	M	--	--	--	--	--	--	M	M	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 – Tripleintegration.

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. VeerarajanT.,"EngineeringMathematics",TataMcGrawHillEducationPvt,NewDelhi(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 (10thEdition).

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.G.Selvam	Asso.Prof	Maths / VMKVEC	selvam@vmkvec.edu.in
2.	Ms.S.Gayathri	Asst.Prof.Grade I	Maths / AVIT	gayathri@avit.ac.in

17MABS09	MATHEMATICS FOR COMPUTER ENGINEERS	Category	L	T	P	Credit
		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. The Laplace transform method is a powerful method for solving linear ODEs and corresponding initial value problems as well as systems of ODEs arising in Engineering. The knowledge of transformations is to create a new domain in which it is easier to handle the problem that is beinginvestigated

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To familiarize with the applications of differential equations.
2.	To learn Laplace transform and its Inverse method to solve differential Equations and integral transforms
3.	To calculate the Fourier transforms of periodic function.
4.	To gain the knowledge in Z Transform and its applications.

COURSE OUTCOMES

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

CO1. Learn the properties of Laplace transforms techniques	Understand
CO2. Predict the suitable method to solve second and higher order differential equations	Apply
CO3. Apply Applications of Laplace transform to solve an ordinary differential equation.	Apply
CO4. Use the Fourier transform as the tool to connect the time domain and frequency domain 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	PSO1	PSO2	PSO3
CO1	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO5	S	S	M	M	M	--	--	--	--	--	--	M	M	M	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	Department	email ID
1.	Dr.L.Tamilselvi	Professor	Maths / AVIT	ltamilselvi@avit.ac.in
2.	Mrs.V.T.Lakshmi	Asso.Prof	Maths / VMKVEC	lakshmi@vmkvec.edu.in

17MABS14	NUMERICAL METHODS AND NUMBER THEORY	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

This course aims at developing the ability to formulate an engineering problem in a mathematical form appropriate for subsequent computational techniques and to choose an appropriate numerical approach. Number theory encodes properties of number-theoretic objects and has various applications in the field of security, memory management, Authentication, coding theory and the basis behind almost all of modern cryptography.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To familiar with numerical solution for the system of equations
2.	To be get exposed to finite differences and interpolation
3.	To be thorough with the numerical Differentiation and integration
4.	To give an integrated approach to Number Theory and to have the knowledge of division algorithm and fundamental theorem of arithmetic
5.	To familiar with congruences and classical theorems

COURSE OUTCOMES

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

CO1. Solve the system of linear algebraic equations and single non linear equations arising in the field of Computer Science Engineering.	Apply
CO2. Apply various numerical methods to find intermediate numerical value&Polynomial of numerical data.	Apply
CO3. Calculate the differentiation of a polynomial and evaluate the definite integrals byusing numerical methods.	Apply
CO4. Analyze and interpret the concepts of divisibility, greatest common divisor, prime, prime-factorization and congruence.	Analyze
CO5. Analyze the system of linear congruences and derive some classical theorems.	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	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	S	S	M
CO5	S	S	M	M	M	--	--	--	--	--	--	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

SOLUTION OF EQUATIONS: Method of false position, Newton-Raphson method for single variable, Solutions of a linear system by Gaussian, Gauss-Jordan, Jacobian and Gauss- Seidel methods. Inverse of a matrix by Gauss- Jordan method.

INTERPOLATION AND APPROXIMATION: Interpolation with Newton's divided differences, Lagrange's polynomial, Newton forward and backward differences, central difference Formula (Stirling's and Bessel's).

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal and Simpson's (both1/3rd and 3/8th) rules. Romberg's rule, two and three point Gaussian quadrature formula.

DIVISIBILITY THEORY AND CANONICAL DECOMPOSTIONS :

Division algorithm -Base-b Representations - Number Patterns - Prime and Composite Numbers – GCD - Euclidean Algorithm - Fundamental Theorem of Arithmetic - LCM.

CONGRUENCES AND CLASSICAL THEOREMS: Congruence's - Linear Congruence's, Chinese Remainder Theorem, Wilson's Theorem - Fermat's Little Theorem - Euler's Theorem.

TEXT BOOKS:

1. Dr.B.S.Grewal, "Numerical Methods in Engineering & Science", Khanna Publishers,2007
2. Thomas Koshy, "Elementary Number Theory with Applications", Elsevier publications,2002.
3. David.M.Burton."Elementary Number theory", Tata McGraw HillEdition, 2012.

REFERENCES:

1. T. Veerarajan, T. Ramachandran, "Numerical Methods with Programs in C and C++", Tata McGraw-Hill, 2004.
2. Niven.I, Zuckerman.H.S and Montgomery.H.L, "An Introduction to Theory of Numbers", John Wiley and sons, 2004.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	Dr.L.Tamilselvi	Professor	Maths / AVIT	ltamilselvi@avit.ac.in
2.	Dr.P.Sasikala	Professor	Maths / VMKVEC	

17MABS15	PROBABILITY AND QUEUEING THEORY	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

Probability is essential to science and life more generally. Starting from basic probability, the course proceeds to a thorough study of models for stochastic processes which are relevant in processing of random signals. Queueing theory is the mathematical study of waiting lines and it's a primary tool for studying the problem of congestion.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To be thorough with probability concepts and random variables.
2.	To be familiar with different statistical distributions and the typical phenomena that each distribution often describes.
3.	To acquire skills in handling situations involving more than one random variable and functions of random variables.
4.	To be get exposed to the concepts of random processes and discrete time Markov chain.
5.	To study queuing models to analyze the real world systems.

COURSE OUTCOMES

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

CO1. Understand the concepts of random variable and probabilities associated with the distributions of random variables.	Understand
CO2. Classify the random variables to determine the appropriate distributions.	Apply
CO3. Apply the concepts of random variables and distributions to establish the distribution of linear combinations of independent random variables.	Apply
CO4. Classify and apply the concepts of probability, Random Process and their applications in Probabilistic systems.	Analyze
CO5. Derive and analyze the single and multiserver queueing 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	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO5	S	S	M	M	M	--	--	--	--	--	--	M	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

STANDARD DISTRIBUTIONS:

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality.

TWO-DIMENSIONAL RANDOM VARIABLES:

Marginal and conditional distributions, Covariance, Correlation and regression, Transformation of random variables, Central limit theorem.

RANDOM PROCESSES, MARKOV CHAIN:

Classification, Stationary process, Markov process, Binominal process, Poisson process, Birth and death process, Renewal process, Markov chain, Transition probabilities, Limiting distributions.

QUEUEING THEORY:

Markovian queueing models, Little's formula, M/M/1, M/M/C – finite and infinite capacity.

TEXT BOOKS:

1. Dr.A.Singaravelu, "Probability and Queuing Theory", Meenakshi Agency, Chennai,2012.
2. Kapur.J.N. and Saxena.H.C. "Mathematical Statistics", S.Chand & Company Ltd. New Delhi,1997.

REFERENCES:

1. T.Veerarajan, "Probability, Statistics and Random processes" (Third Edition), Tata McGraw-Hill publishing Company Ltd., New Delhi,2008.
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy "Probability, Random Variables and Random Processes" S.Chand &Company Ltd., New Delhi, 2008.
3. Allen.A.O, "Probability Statistics and Queuing theory with Computer science applications", Academic Press, 2nd edition,1990.
4. S.C.Gupta and V.K.Kapoor, Fundamentas of Mathematical Statistics", 11th extensively revised edition, S.Chand & Sons,2007.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	Dr.P.Sasikala	Professor	Maths / VMKVEC	
2.	Dr.A.K.Thamizhsudar	Asso.Prof. grade II	Maths / AVIT	thamizhsudar@avit.ac.in

17MABS22	MATHEMATICS FOR MACHINE LEARNING	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

Machine learning (ML) is one of the most popular topics of nowadays research. This particular topic is having applications in all the areas of engineering and sciences. Various tools of machine learning are having a rich mathematical theory. Therefore, in order to develop new algorithms of machine/deep learning, it is necessary to have knowledge of all such mathematical concepts. In this course, we will introduce these basic mathematical concepts related to the machine/deep learning. In particular, we will focus on topics from matrix algebra, calculus, optimization, and probability theory those are having strong linkage with machine learning. Applications of these topics will be introduced in ML with help of some real-life examples

PREREQUISITE: ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1.	To study about the problem of supervised learning from the point of view of function approximation, optimization, and statistics
2.	To identify the most suitable optimization and modelling approach for a given machine learning problem
3.	To analyse the performance of various optimization algorithms from the point of view of computational complexity (both space and time) and statistical accuracy
4.	To implement a simple neural network architecture and apply it to a pattern recognition task

COURSE OUTCOMES

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

CO1. Understand the problem of supervised learning from the point of view of function approximation, optimization, and statistic	Understand
CO2. Understand the most suitable optimization and modelling approach for a given machine learning problem	Understand
CO3. Analyse the performance of various optimization algorithms from the point of view of computational complexity (both space and time) and statistical accuracy	Analyse
CO4. To analyse a simple neural network architecture on a pattern recognition task	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	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

LINEAR ALGEBRA

LINEAR ALGEBRA BASICS- Vector spaces and subspaces, basis and dimensions, linear transformation, four fundamental subspaces,

MATRICES

MATRIX THEORY- Norms and spaces, eigenvalues and eigenvectors, Special Matrices and their properties, least squared and minimum normed solutions , MATRIX DECOMPOSITION ALGORITHMS- SVD: Properties and applications, low rank approximations, Gram Schmidt process, polar decomposition.

DIMENSIONALITY REDUCTIONS:

DIMENSIONS REDUCTION ALGORITHMS and JCF- Principal component analysis, linear discriminant analysis, minimal polynomial and Jordan canonical form , CALCULUS: – Basic concepts of calculus: partial derivatives, gradient, directional derivatives, jacobian, hessian, , convex sets, convex functions and its properties

PROBABILITY AND OPTIMIZATIONS:

PROBABILITY – Basic concepts of probability: conditional probability, Bayes' theorem, independence, theorem of total probability, expectation and variance, few discrete and continuous distributions, joint distributions and covariance.

OPTIMIZATION – Unconstrained and Constrained optimization, Numerical optimization techniques for constrained and unconstrained optimization: Newton's method, Steepest descent method, Penalty function method.

SUPPORT VECTOR MACHINES

SUPPORT VECTOR MACHINES – Introduction to SVM, Error minimizing LPP, concepts of duality, hard and soft margin classifiers

TEXT BOOKS:

1. W. Cheney, Analysis for Applied Mathematics. New York: Springer Science+Business Medias, 2001.
2. S. Axler, Linear Algebra Done Right (Third Edition). Springer International Publishing, 2015.
3. J. Nocedal and S. J. Wright, Numerical Optimization. New York: Springer Science+Business Media, 2006.
4. J. S. Rosenthal, A First Look at Rigorous Probability Theory (Second Edition). Singapore: World Scientific Publishing, 2006.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Email ID
1.	Dr.L.Tamilselvi	Professor	Maths / AVIT	ltamilselvi@avit.ac.in
2.	Dr.P.Sasikala	Professor	Maths / VMKVEC	

17MABS23	MATHEMATICS FOR DATA SCIENCE	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

Linear Algebra plays a fundamental role in the theory of Data Science. This course aims at introducing the basic notions of vector spaces, Linear Algebra and the use of Linear Algebra in applications to Data Science

PREREQUISITE: ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1.	To understand basic mathematical concepts in data science, relating to linear algebra, probability, and calculus.
2.	To employ methods related to these concepts in a variety of data science applications.
3.	To apply logical thinking to problem-solving in context.
4.	To use appropriate technology to aid problem-solving and data analysis.

COURSE OUTCOMES

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

CO1. To understand the fundamental properties of matrices, their norms, and their applications	Understand
CO2. To understand the concepts of Differentiating/integrating multiple variable functions, and the role of the gradient and the hessian matrix.	Understand
CO3. To learn about Basic properties of optimization problems involving matrices and functions of multiple variables	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	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO VECTOR SPACES

Vector Spaces: Rn and Cn, lists, Fnand digression on Fields, Definition of Vector spaces, Subspaces, sums of Subspaces, Direct Sums, Span and Linear Independence, bases, dimension, LINEAR MAPS: Definition of Linear Maps - Algebraic Operations on - Null spaces and Injectivity - Range and Surjectivity - Fundamental Theorems of Linear Maps - Representing a Linear Map by a Matrix - Invertible Linear Maps - Isomorphic Vector spaces - Linear Map as Matrix Multiplication - Operators - Products of Vector Spaces - Product of Direct Sum - Quotients of Vector spaces.

EIGENVALUES, EIGENVECTORS, AND INNER PRODUCT SPACES

Eigenvalues and Eigenvectors - Eigenvectors and Upper Triangular matrices - Eigenspaces and Diagonal Matrices - Inner Products and Norms - Linear functionals on Inner Product spaces, MATHS FOR DATA SCIENCE: Singular value decomposition - Handwritten digits and simple algorithm - Classification of handwritten digits using SVD bases - Tangent distance - Text Mining

CALCULUS:

Functions of Several Variables - Limits and continuity in HIgher Dimensions - Partial Derivatives - The Chain Rule - Directional Derivative and Gradient vectors - Tangent Planes and Differentials - Extreme Values and Saddle Points - Lagrange Multipliers, CONVEX OPTIMIZATION: Affine and Convex Sets - Hyperplanes and half-spaces - Euclidean balls and ellipsoids - Norm balls and Norm cones - polyhedra - simplexs - The positive definite cone.- separating and supporting hyperplanes.

NORMS AND INNER PRODUCT SPACES:

Introduction - Inequalities on Linear Spaces - Norms on Linear Spaces - Inner products - Orthogonality - Unitary and Orthogonal Matrices - norms for matrices

GRAPHS:

Graphs - subgraphs - factors - Paths - cycles - connectedness - trees - Euler tours - Hamiltonian cycles - Planar Graphs – Digraphs, Algorithms - Representing Graphs - The algorithm of Hierholzer - Writing algorithms - Complexity of Algorithms.

TEXT BOOKS:

1. S. Axler, Linear algebra done right, Springer 2017.
2. Eldén Lars, Matrix methods in data mining and pattern recognition, Society for Industrial and Applied Mathematics, 2007.
3. M.D.Weir, J. Hass, and G.B.Thomas, Thomas' calculus, Pearson, 2016.
4. S. P. Boyd and L. Vandenberghe, Convex optimization. Cambridge Univ. Pr., 2011.
5. D. Jungnickel, Graphs, networks and algorithms. Springer, 2014.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Email ID
1.	Dr.L.Tamilselvi	Professor	Maths / AVIT	ltamilselvi@avit.ac.in
2.	Dr.P.Sasikala	Professor	Maths / VMKVEC	

17MABS24	STATISTICAL FOUNDATIONS	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

Probability is essential to science and life more generally. Starting from basic probability, the course proceeds to a thorough study of models for stochastic processes which are relevant in processing of random signals. Queueing theory is the mathematical study of waiting lines and it's a primary tool for studying the problem of congestion.

PREREQUISITE: ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1.	To be thorough with probability concepts and random variables.
2.	To be familiar with different statistical distributions and the typical phenomena that each distribution often describes.
3.	To acquire skills in handling situations involving more than one random variable and functions of random variables.
4.	To be get exposed to the concepts of random processes and discrete time Markov chain.
5.	To study queuing models to analyze the real world systems.

COURSE OUTCOMES

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

CO1. Understand the concepts of random variable and probabilities associated with the distributions of random variables.	Understand
CO2. Classify the random variables to determine the appropriate distributions.	Apply
CO3. Apply the concepts of random variables and distributions to establish the distribution of linear combinations of independent random variables.	Apply
CO4. Classify and apply the concepts of probability, Random Process and their applications in Probabilistic systems.	Analyze
CO5. Derive and analyze the single and multiserver queueing 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	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	S	M	M
CO5	S	S	M	M	M	--	--	--	--	--	--	M	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

STANDARD DISTRIBUTIONS:

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality.

TWO-DIMENSIONAL RANDOM VARIABLES:

Marginal and conditional distributions, Covariance, Correlation and regression, Transformation of random variables, Central limit theorem.

RANDOM PROCESSES, MARKOV CHAIN:

Classification, Stationary process, Markov process, Binominal process, Poisson process, Birth and death process, Renewal process, Markov chain, Transition probabilities, Limiting distributions.

QUEUEING THEORY:

Markovian queueing models, Little's formula, M/M/1, M/M/C – finite and infinite capacity.

TEXT BOOKS:

1. Dr.A.Singaravelu, "Probability and Queuing Theory", Meenakshi Agency, Chennai, 2012.
2. Kapur.J.N. and Saxena.H.C. "Mathematical Statistics", S.Chand & Company Ltd. New Delhi, 1997.

REFERENCES:

1. T.Veerarajan, "Probability, Statistics and Random processes" (Third Edition), Tata McGraw-Hill publishing Company Ltd., New Delhi,2008.
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy "Probability, Random Variables and Random Processes" S.Chand &Company Ltd., New Delhi, 2008.
3. Allen.A.O, "Probability Statistics and Queuing theory with Computer science applications", Academic Press, 2nd edition,1990.
4. S.C.Gupta and V.K.Kapoor, Fundamentas of Mathematical Statistics", 11th extensively revised edition, S.Chand & Sons,2007.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Email ID
1.	Dr.L.Tamilselvi	Professor	Maths / AVIT	ltamilselvi@avit.ac.in
2.	Dr.P.Sasikala	Professor	Maths / VMKVEC	

17PCBS02	PHYSICAL SCIENCES PART A - ENGINEERING PHYSICS	Category	L	T	P	Credit
		BS	2	0	0	2

PREAMBLE

Engineering Physics is the study of advanced physics concepts and their applications in various technological and engineering domains. Understanding the concepts of laser, types of lasers, thepropagation of light through fibers, applications of optical fibers in communication and different types of non-destructive techniques will help an engineer to analyze, design and to fabricate various conceptual based devices.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To recall the properties of laser and to explain principles of laser
2.	To assess the applications of laser
3.	To detail the principles of fiber optics
4.	To study the applications of fiber optics
5.	To explain various techniques used in Non-destructive testing

COURSE OUTCOMES

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

CO1. Understand the principles laser, fiber optics and non-destructive testing	Understand
CO2. Understand the construction of laser, fiber optic and Non-Destructive testing equipments	Understand
CO3. Demonstrate the working of laser, fiber optic and Non-Destructive testing based components and devices	Apply
CO4. Interpret the potential applications of laser, fiber optics and Non-Destructive testing in various fields.	Apply
CO5. Differentiate the working modes of various types of laser, fiber optic and Non-Destructive testing baseddevices.	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	-	-	-	-	-	-	-	-	M	M	-	-
CO2	S	-	L	-	-	-	-	-	-	-	-	M	-	-	-
CO3	S	-	-	M	-	-	M	-	-	-	-	M	M	-	-
CO4	S	M	-	M	M	S	M	-	-	-	-	M	M	-	-
CO5	S	M	M	-	-	-	-	-	-	-	-	M	-	-	-

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 fibers – numerical aperture and acceptance angle – types of optical fibers (material, refractive index, mode) – Applications: Fiber optic communication system – fiber 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 BOOK

1. Engineering Physics, compiled by Department of Physics, Vinayaka Mission's Research Foundation (Deemed to be University),Salem.

2. P.K. Palanisamy, Engineering Physics, Scientific Publishers,2011.

3. Dr.M. N. Avadhanulu, Engineering Physics, S.Chand & Co,2010.

REFERENCE BOOKS

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. Avadhanulu.M.N., Arun Murthy.T.V.S, Engineering Physics Vol. I, S.Chand,2014.

5. Rajendran. V, Engineering Physics, Tata McGraw Hill Publication and Co., New Delhi,2009.

6. Baldev Raj et al. Practical Non-Destructive Testing, Narosa Publications,2017.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. C. SENTHIL KUMAR	Professor	Physics / VMKVEC	senthilkumarc@vmkvec.edu.in
2.	Dr. R. SETHUPATHI	Associate Professsor	Physics / VMKVEC	sethupathi@vmkvec.edu.in
3.	Dr. G. SURESH	Associate Professsor	Physics / AVIT	suresh.physics@avit.ac.in
4.	Dr. B.DHANALAKSHMI	Associate Professsor	Physics / AVIT	dhanalakshmi.phy@avit.ac.in

17PCBS02	PHYSICAL SCIENCES PART B -ENGINEERING CHEMISTRY Semester I (Common to All Branches)	Category	L	T	P	Credit
		BS	2	0	0	2

PREAMBLE

Objective of this course is to present a better understanding of basic concepts of chemistry and its applications on different engineering domains. It also imparts knowledge on fundamentals of Electrochemistry, Energy storage technologies, properties of water and its treatment methods, classification of fuels, Non conventional sources of Energy and variousadvanced Engineering materials.

PREREQUISITE -NIL

COURSE OBJECTIVES

1.	To impart basic knowledge in Chemistry so that the student will understand the engineering concept
2.	To familiar with electrochemistry and Battery and fuel Cells
3.	To lay foundation for practical applications of water softening methods and its treatment methods in engineering aspects.
4.	To inculcate the knowledge of fuels and advanced material.

COURSE OUTCOMES

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

CO1. Describe the electrochemistry, batteries and working principle of energy storage devices	Understand
CO2. Estimate the hardness of water	Apply
CO3. Identify suitable water treatment methods	Analyze
CO4 Outline the important features of fuels and advanced 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	M	-	M	-	S	S	S	-	-	L	M	M	-	M
CO2	S	S	M	-	-	M	M	M	-	-	-	M	-	-	-
CO3	S	S	M	-	-	M	S	M	-	-	-	M	-	-	-
CO4	S	-	-	-	L	L	M	L	-	-	-	S	M	-	M

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 (H_2-O_2 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 & Reverse Osmosis).

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:

1. Engineering Chemistry by prepared by Vinayaka Mission's Research Foundation,Salem

REFERENCES:

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

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Email ID
1.	Dr. V. Anbazhagan	Professor	Chemistry/ VMKVEC	anbu80@gmail.com
2.	Mr. A. Gilbert Sunderraj	Assistant Professor	Chemistry / VMKVEC	asmgill80@gmail.com
3.	Dr. R. Nagalakshmi	Professor	Chemistry / AVIT	nagalakshmi.chemistry@avit.ac.in
4.	Dr.K.Sanghamitra	Associate Professor	Chemistry / AVIT	sanghamitra.chemistry@avit.ac.in

17PHBS05	SMART MATERIALS	Category	L	T	P	Credit
		BS	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 superconductingmaterials.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To explain the fundamental properties and classification of smart materials, crystalline materials, Nano materials, Magnetic materials and Super conducting materials.
2.	To paraphrase the basic crystalline structure and its properties.
3.	To illustrate the synthesis and fabrication of Nano materials.
4.	To predict the application of smart materials, crystalline materials, Nano materials, Magnetic materials and Super conducting materials.
5.	To analyze the various parameters of crystalline materials.

COURSE OUTCOMES

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

CO1. Restate the properties of various materials.	Understand
CO2. Summarize the various structures of materials.	Understand
CO3. Predict the applications of various materials to designing equipments.	Apply
CO4. Illustrate the properties of materials to designing equipments.	Apply
CO5. Calculate the crystalline parameters of the 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	-	-	S	-	-	-
CO2	S	M	S	M	S	-	-	-	M	-	-	M	-	-	-
CO3	S	S	S	S	S	-	-	-	S	-	-	M	S	M	M
CO4	S	M	S	M	S	-	-	-	M	-	-	M	S	M	M
CO5	M	S	S	M	M	-	-	-	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:

1. Mani P, Engineering Physics II, Dhanam Publications, 2018.

REFERENCES:

1. Pillai S.O., Solid State Physics, New Age International (P) Ltd., publishers,2018.

2. Senthilkumar G. Engineering Physics II. VRB Publishers,2018.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. S. MOHAMMED HARSHULKHAN	Asst.Prof	Physics / VMKVEC	harshulkhan@vmkvec.edu.in
2.	Mr. R. SAKTHI GANAPATHY	Asst.Prof	Physics / VMKVEC	sakthiganapthy@vmkvec.edu.in
3.	Dr .G. LATHA	Professor	Physics / AVIT	latha.physics@avit.ac.in
4.	Dr. R. N. VISWANATH	Professor	Physics / AVIT	viswanath.physics@avit.ac.in

17PCBS81	PHYSICAL SCIENCES LAB: PART A – REAL AND VIRTUAL LAB IN PHYSICS	Category	L	T	P	Credit
		BS	0	0	2	1

PREAMBLE

In this laboratory, experiments are based on the calculation of physical parameters like young's modulus, rigidity modulus, viscosity of water, wavelength of spectral lines, thermal conductivity and band gap. Some of the experiments involve the determination of the dimension of objects like the size of a microparticle and thickness of a thin wire. In addition to the above real lab experiments, students gain hands-on experience in virtual laboratory.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To impart basic skills in taking reading with precision of physics experiments
2.	To inculcate the habit of handling equipments appropriately
3.	To gain the knowledge of practicing experiments through virtual laboratory.
4.	To know the importance of units
5.	To obtain results with accuracy

COURSE OUTCOMES

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

CO1. Recognize the importance of units while performing the experiments, calculating the physical parameters and obtaining results	Understand
CO2. Operate the equipments with precision	Apply
CO3. Practice to handle the equipments in a systematic manner	Apply
CO4. Demonstrate the experiments through virtual laboratory	Apply
CO5. Calculate the result with accuracy	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 1	PSO2	PSO3
CO1	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	S	M	M	S	-	-	-	M	-	-	M	M	-	-
CO3	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	S	S	M	M	S	-	-	-	-	-	-	S	M	-	-
CO5	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Young's modulus of a bar - Non-uniformbending
2. Rigidity modulus of a wire - TorsionalPendulum
3. Viscosity of a liquid - Poiseuille'smethod
4. Velocity of ultrasonic waves in liquids - UltrasonicInterferometer
5. Particle size determination usingLaser
6. Wavelength of spectral lines – grating –Spectrometer
7. Thickness of a wire - Air wedgeMethod
9. Thermal conductivity of a bad conductor - Lee'sdisc
10. Band gap determination of a thermistor - Post OfficeBox
11. Specific resistance of a wire –Potentiometer

LAB MANUAL

Physical Sciences Lab: Part A – Real And Virtual Lab In Physics Manual compiled by Department of Physics, Vinayaka Missions Research Foundation (Deemed to be University), Salem.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. C. Senthil Kumar	Professor	Physics / VMKVEC	senthilkumarc@vmkvec.edu.in
2.	Dr. R. Sethupathi	Associate Professsor	Physics / VMKVEC	sethupathi@vmkvec.edu.in
3.	Dr. G. Suresh	Associate Professsor	Physics / AVIT	suresh.physics@avit.ac.in
4.	Dr. B.Dhanalakshmi	Associate Professsor	Physics / AVIT	dhanalakshmi.phy@avit.ac. in

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

PREAMBLE

The main objective of this course is to develop the intellectual and psychomotor skills of the students by imparting knowledge in water technology and quantitative analysis.

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. Estimate the chemical properties of water	Apply
CO2. Determine the presence of various elements in the water	Analyze
CO3. Calculate the strength of acids, oxidizing and reducing agents	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	M	-	L	M	M	S	-	-	-	M	-	M	M
CO2	S	M	M	-	L	M	M	L	-	-	-	M	M	M	M
CO3	S	S	M	-	L	M	M	M	-	-	-	M	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

1. Determination of Hardness by EDTA method

2. Estimation of Hydrochloric acid by conductometricmethod

3. Acid Base titration by pHmethod

4. Estimation of Ferrous ion by Potentiometricmethod

5. Determination of Dissolved oxygen by Winkler'smethod

6. Estimation of Sodium by Flamephotometer

7. Estimation of Copper from Copper OreSolution

8. Estimation of Iron bySpectrophotometer

TEXTBOOKS

Laboratory Manual on Engineering Chemistry prepared by Vinayaka Mission's Research Foundation, Salem.

REFERENCE BOOKS

1. Laboratory Manual on Engineering Chemistry, K. Bhasin S, Dhanpat Rai Publishing Co Pvt Ltd

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. V. Anbazhagan	Professor	Chemistry / VMKVEC	anbu80@gmail.com
2.	Mr. A. Gilbert Sunderraj	Assistant Professor	Chemistry / VMKVEC	asmgill80@gmail.com
3.	Dr. R. Nagalakshmi	Professor	Chemistry / AVIT	nagalakshmi.chemistry@avit.ac.in
4.	Dr.K.Sanghamitra	Associate Professor	Chemistry / AVIT	sanghamitra.chemistry@avit.ac.in

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 circuits 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

CO1: Explain the evolution of electricity, name of theinventors, electrical quantities and basic laws of electrical engineering.	Remember
CO2: Demonstrate Ohm's and Faraday's Law.	Apply
CO3: Understand the basic concepts of measuring instruments, electrical machineries and its applications.	Understand
CO4: Analyze the various types of electrical loads, power rating of electrical machineries and energy efficient equipment.	Analyze
CO5: Explain the electrical safety and protective devices.	Understand
CO6: 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	L	L	--
CO2	S	M	S	S	--	--	--	--	M	-	--	M	L	M	L
CO3	L	S	L	--	S	--	--	--	--	L	--	L	L	L	--
CO4	S	M	S	L	L	S	S	--	--	S	--	L	L	M	L
CO5	L	M	S	M	--	S	M	M	--	S	--	L	L	L	--
CO6	S	L	S	L	M	S	S	--	--	M	--	L	L	L	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 insulatingmaterials.

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 domesticload. 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.
4. P. Selvam, R. Devarajan, A.Nagappan, T. Muthumanickam and T. Sheela"Basic Electrical and Electronics Engineering", First Edition, VMRFDU, Anuradha Agencies,2017

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/VMKVEC	devarajan@vmkvec.edu.in
2.	Mr. R. Sathish	Assistant Professor	EEE/VMKVEC	sathish@vmkvec.edu.in
3.	Ms. D. Saranya	Assistant Professor (Gr-II)	EEE/AVIT	dsaranya@avit.ac.in
4.	Mr. S. Prakash	Assistant Professor (Gr-II)	EEE/AVIT	sprakash@avit.ac.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. Interpret working principle and application of various active and passive electronic components like resistors, capacitors, inductors, diodes and transistors.	Understand
CO2. Construct the rectifiers and regulators circuits and explore their operations.	Apply
CO3. Execute number system conversions and compute several digital logic operations.	Apply
CO4. Design adders, Multiplexer, De-Multiplexer, Encoder, Decoder circuits.	Apply
CO5. Apply the modern technologies in developing application oriented gadgets like the UHD, OLED, HDR.	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	--	--	--	S	-	-
CO2	S	M	M	M	--	--	M	--	M	--	--	M	-	-	-
CO3	S	M	M	--	--	--	--	--	M	--	--	--	-	M	-
CO4	S	M	M	M	--	--	M	--	M	--	--	M	-	-	-
CO5	S	M	--	--	M	--	M	--	M	M	--	M	M	-	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 diagramsOnly.

TEXT BOOKS:

1. R.K. Rajput, "Basic Electrical and Electronics Engineering", Laxmi Publications, Second Edition,2012.
2. Dr.P.Selvam, Dr.R.Devarajan, Dr.A.Nagappan, Dr.T.Muthumanickam and Dr.T.Sheela,"Basic Electrical and Electronics Engineering", Department of EEE & ECE, Faculty of Engineering & Technology, VMRFDU, Anuradha Agencies,2018.
3. Edward Hughes, "Electrical and Electronics Technology", Pearson Education Limited, Ninth Edition,2005.

REFERENCES:

1. John Kennedy, "Electronics Communication System", Tata McGraw Hill, 2003.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Sheela	Associate Professor	ECE / VMKVEC	sheela@vmkvec.edu.in
2.	Mrs.A.Malarvizhi	Assistant Professor	ECE / VMKVEC	malarvizhi@vmkvec.edu.in
3.	Mr.R.Karthikeyan	Assistant Professor (Gr-II)	ECE / AVIT	rrmdkarthikeyan@avit.ac.in
4.	Ms.R.Mohana Priya	Assistant Professor (Gr-II)	ECE / AVIT	mohanapriya@avit.ac.in

17CMES02	BASIC CIVIL ENGINEERING (Common to CIVIL, MECHANICAL, CSE, ECE, EEE, S&AE & MECT)	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

PRERQUISITE – 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	-	-	-	-	-	-	-	-	-
CO2	S	M	L	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", AnuradhaAgencies.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	S.SUPRIYA	Asst.Prof	Civil/VMKVEC	jansupriyanair@gmail.com
2.	C.VAIDEVI	Asst.Prof	Civil/AVIT	Vaidevi.c@gmail.com

17CMES02	BASICS OF MECHANICAL ENGINEERING	Category	L	T	P	Credit
		FC(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.

PRERQUISITE

NIL

COURSE OBJECTIVES

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

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

REFERENCES:

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.	Name of the Faculty	Designation	Department	Mail ID
1	S. Duraithilagar	Associate Professor	Mech / VMKVEC	sduraithilagar@vmkvec.edu.in
2	T.Raja	Assistant Professor	Mech / VMKVEC	rajat@vmkvec.edu.in

17CSES01	ESSENTIALS OF COMPUTING	Category	L	T	P	Credit
		ES	3	0	0	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. To understand the Basic knowledge on hardware and software terminologies.	Understand
CO2. To Demonstrate the various Application Packages like MS-word, MS- Excel etc.	Apply
CO3.To Understand Program Devolvement Cycle and apply various Problem Solving Techniques.	Apply
CO4. To analyze the efficiency of Algorithms.	Analyze
CO5. To Implement of Algorithms for various concepts.	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	M	-	M	-	-	-	-	-	-	M	S	M	M
CO3	S	S	S	-	M	-	-	-	-	-	-	-	S	-	M
CO4	S	S	S	-	S	-	-	-	-	-	-	-	S	M	M
CO5	S	M	M	-	M	-	-	-	-	-	-	S	S	M	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.	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	Mrs.T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17CSES05	PROGRAMMING IN PYTHON	CATEGORY	L	T	P	CREDIT
		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.	Understand
CO2. Apply the different methods involved in List, String, Tuples and Dictionary.	Apply
CO3. Design solutions for complex programs using decision making and looping statements.	Apply.
CO4. Apply the function programs with all the concepts like lambda, decorators and generators.	Apply.
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	M	M	M	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	M	-	-	-	-	-	-	-	S	M	M
CO3	M	S	S	S	M	-	-	-	-	-	-	-	M	M	M
CO4	S	S	S	S	M	-	-	-	-	-	-	-	S	S	M
CO5	S	M	M	M	M	-	-	-	-	-	-	-	S	M	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 PvtLtd
3. “Dive Into Python”by MarkPilgrim

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.	Mr. K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSES83	PROGRAMMING IN PYTHON LAB	Category	L	T	P	Credit
		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 Syntax and Semantics and create Functions in Python	Apply
CO2. Handle Strings and Files in Python.	Apply
CO3. Design solutions for complex programs using decision making and looping Statements	Apply
CO4. Understand Lists, Dictionaries in Python	Apply
CO5. Compute the exception handling programs	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	M	M
CO2	S	M	L	-	-	-	-	-	-	-	-	-	S	M	-
CO3	S	M	L	-	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M	L	-	-	-	-	-	-	-	-	-	S	M	-
CO5	S	S	M	-	-	-	-	-	-	-	-	-	S	M	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.	Mr. K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17EEES82	ENGINEERING SKILLS PRACTICE LAB A. BASIC ELECTRICAL ENGINEERING	Category	L	T	P	Credit
		ES	0	0	2	1

PREAMBLE

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

PRERQUISITE – 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 earthing and measurement of earth resistance.

COURSE OUTCOMES

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

CO1: Implement the various types of electrical wiring.	Apply
CO2: Measure the fundamental parameters of AC circuits.	Analyze
CO3: 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	L	M	L
CO2	S	M	S	S	--	--	--	--	M	--	--	M	L	L	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 energymeter.
2. Fluorescent lampwiring.
3. Stair casewiring.
4. Measurement of electrical quantities – voltage, current, power &power factor in RLCcircuit.
5. Measurement of energy using single phase energymeter.
6. Measurement of resistance to earth of an electricalequipment.

REFERENCES

1. Laboratory Reference Manual.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Devarajan	Professor	EEE/VMKVEC	devarajan@vmkvec.edu.in
2.	Mr. R. Sathish	Assistant Professor	EEE/VMKVEC	sathish@vmkvec.edu.in
3.	Ms. D. Saranya	Assistant Professor (Gr-II)	EEE/AVIT	dsaranya@avit.ac.in
4.	Mr. S. Prakash	Assistant Professor (Gr-II)	EEE/AVIT	sprakash@avit.ac.in

17EEES82	ENGINEERING SKILLS PRACTICES LAB B. BASIC ELECTRONICS ENGINEERING	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.

PRERQUISITE – NIL

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. Construct experiments for PN and Zener diode characteristics	Understand
CO2. Demonstrate the fundamentals of soldering techniques.	Apply
CO3. Classify the characteristics of Diodes, BJT and FET.	Apply
CO4. Distinguish between amplitude and frequency modulation techniques.	Apply
CO5. Verify the truth tables of logic gates (AND, OR, NOT, NAND, NOR, XOR).	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	--	M	--	--
CO2	M	M	M	--	--	--	--	--	M	--	M	--	M	--	--
CO3	S	M	--	--	--	--	--	--	M	--	M	--	-	--	--
CO4	S	M	--	--	--	--	--	--	M	--	M	--	-	M	M
CO5	S	M	M	--	--	--	--	--	M	--	M	--	M	M	--

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

2. Identifying ElectronicsComponents.

3. Practicing of Soldering andDesoldering.

4. Characteristics of PN junctionDiode.

5. Characteristics of Zenerdiode.

6. Input & Output characteristics ofBJT.

7. Transfer characteristics ofJFET.

8. Verification of LogicGates.

9. Study of AmplitudeModulation.

10. Study of FrequencyModulation.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Sheela	Associate Professor	ECE / VMKVEC	sheela@vmkvec.edu.in
2.	Mrs.A.Malarvizhi	Assistant Professor	ECE / VMKVEC	malarvizhi@vmkvec.edu.in
3.	Mr.R.Karthikeyan	Assistant Professor (Gr-II)	ECE / AVIT	rrmdkarthikeyan@avit.ac.in
4.	Ms.R.Mohana Priya	Assistant Professor (Gr-II)	ECE / AVIT	mohanapriya@avit.ac.in

17CMES81	ENGINEERING SKILLS PRACTICE LAB A. BASIC CIVIL ENGINEERING	Category	L	T	P	Credit
		ES	0	0	2	1

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 itsexecution.

PRERQUISITE – 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 woodenmaterial	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

LIST OF EXPERIMENTS:

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 householdfittings.
3. Study of pipe connections requirements for pumps andturbines.
4. Preparation of plumbing line sketches for water supply and sewageworks.
5. Hands-on-exercise: Mixed pipe material connection – Pipe connections with different joining components.
6. Demonstration of plumbing requirements of high-risebuildings.

Carpentry using Power Tools only:

7. Study of the joints in roofs, doors, windows andfurniture.
8. Hands-on-exercise: Wood work, joints by sawing, planning andcutting.

TEXT BOOKS:

1. " Laboratory Reference Manual

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	S.Supriya	Asst.Profesor	CIVIL / VMKVEC	jansupriyanair@gmail.com
2.	C.VAIDEVI	Asst.Professor	CIVIL / AVIT	vaidevi.c@avit.ac.in

17CMES81	ENGINEERING SKILLS PRACTICE LAB B. BASIC MECHANICAL ENGINEERING	Category	L	T	P	Credit
		ES	0	0	2	1

Preamble

Workshop is a hands-on training practice to Mechanical Engineering students. It dealswith 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 utilize the different type of joints using wooden materials.
3.	To perform and acquire 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.	Identify the different types of fitting using MS plate.	Apply
CO2.	Predict the different types of joints using wooden material	Apply
CO3.	Utilize the different types of joining process in metal by Arc Welding	Apply
CO4.	Make use of 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	M	L	L	L	-	-	-	-	-	-	-	L	-	-
CO2	S	M	L	L	L	-	-	-	-	-	-	-	L	-	-
CO3	S	M	L	L	L	-	-	-	-	-	-	-	L	-	-
CO4	S	M	L	L	L	-	-	-	-	-	-	-	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 inCarpentry 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	Department / Name of the College	Email id
1.	Dr.V.K.Krishnan	Associate Professor	Mech / VMKVEC	vkkrishnan@vmkvec.edu.in
2	B.Selvababu	Assistant Professor	Mech / AVIT	selvababu@avit.ac.in

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

Preamble

Engineering Graphics is referred as language of engineers. An engineer needs to understand the physical geometry of any object through its orthographic or pictorial projections. The knowledge on engineering graphics is 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.	To Interpret the physical geometry of any object through its orthographic or pictorial projections	UNDERSTAND
CO2.	Apply in the form of drawing of the orthographic projections of points, straight lines, plane surfaces and solids.	Apply
CO3.	To establish in the form of drawing of the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO4.	Develop lateral surfaces of the solid section and cut section of solids.	Apply
CO5.	Sketch the pictorial projections (isometric and perspective) of simple solids.	Apply
CO6.	To apply 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	-	-
CO6	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	Department / Name ofthe College	Email id
1.	Prof. N.Rajan	Associate Professor	Mech / VMKVEC	rajan@vmkvec.edu.in
2.	Prof. M.SARAVANAN	Asst. Prof	Mech / AVIT	saravanan@avit.ac.in

17CSES06	PROGRAMMING IN C	Category	L	T	P	Credit
		ES	3	0	0	3

PREAMBLE

This is a course offered in first semester for the students of Bio-Tech Engineering. This course has three credits dedicated to provide the students a strong foundation on programming concepts and its application. It also enables the students to solve problems using Programmable logic.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce Basics of C.
2.	To understand Control Structures & Arrays.
3.	To learn String concept, Structure and Union in C.
4.	To understand the concepts of Functions and Pointers.
5.	To understand Memory and File management concepts in C.

COURSE OUTCOMES

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

CO1: Understand the basics of C Data types, scope of variables, different types of Operators	Understand
CO2: Apply the concept of Input/ Output functions, Decision making and Loop structures in C Programming	Apply
CO3: Demonstrate the C programs for string, arrays, union & structure.	Apply
CO4: Develop C programs for functions and pointers	Apply
CO5: Apply the file management concept to develop the C programs.	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	-	S	-	-	-	M	-	S	M	S	M	-
CO2	S	M	M	-	S	-	-	-	M	-	S	S	S	M	M
CO3	S	M	M	-	S	-	-	-	M	-	S	S	S	M	M
CO4	S	M	M	-	S	-	-	-	M	-	S	S	S	M	M
CO5	S	M	M	-	S	-	-	-	M	-	S	S	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF C

Identifiers, variables, expression, keywords, data types, constants, scope of variables. Operators: arithmetic, logical, relational, conditional and bitwise operators – Special operators: size of ( ) & comma (,) operator – Precedence and associatively of operators – Type conversion in expressions.

CONTROL STRUCTURES

Basic input/output and library functions: Single character input/output i.e. getch( ), getchar( ), getche( ), putchar( ) – Formatted input/output: printf( ) and scanf( ) – Library functions (mathematical and character functions). Decision Making and Branching – Looping statements.

ARRAYS, STRING, STRUCTURE & UNION

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays. Strings: Declaration – Initialization and string handling functions. Structure and Union: structure declaration and definition – Accessing a Structure variable – Structure within a structure – Union.

FUNCTIONS AND POINTERS

Function – Function Declaration – function definition – Pass by value – Pass by reference – Recursive function -Pointers – Definition – Initialization.

MEMORY AND FILE MANAGEMENT

Static and dynamic memory allocation – Storage class specifier – Preprocessor directives. File handling concepts – File read – write – Functions for file manipulation: fopen, fclose, gets, puts, fprintf, fscan, getw, putw, fputs, fgets, fread, fwrite.

TEXT BOOKS

1. Balaguruswami. E, "Programming in C", TMH Publications, 1997

REFERENCES

1. Behrouz A. Forouzan & Richard F. Gilberg, "Computer Science A Structured Programming using C", Cengage Learning, 3rd Edition,2007.
2. Gottfried, "Programming with C", schaums outline series, TMH publications,1997.
3. Mahapatra , "Thinking in C", PHI publications, 2nd Edition,1998.
4. Subbura.R , "Programming in C", Vikas publishing, 1st Edition,2000

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.B.Sundaramurthy	Associate Professor	CSE / VMKVEC	sundaramurthy@ vmkvec.edu.in
2.	Mr.K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSES85	PROGRAMMING IN C LAB	Category	L	T	P	Credit
		ES	0	0	4	2

PREAMBLE

This course is designed to complement the course Problem Solving using Computer. The purpose of this laboratory course is to give hands on training to the students in understanding and practicing the programming concepts and algorithms. This will improve the problem solving capability of the students.

PREREQUISITE NIL

COURSE OUTCOMES

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

CO1 Write, compile, debug, link and execute C program for the given specification/application	Apply
CO2. Design and implement algorithms involving decision structures, loops, arrays and pointers.	Apply
CO3. Use different data structures for solving the given problem using computer	Apply
CO4. Create/update data files.	Apply
CO5. Analyze the implementation complexity of algorithm by modularizing the problem into small modules for the given problem	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	-	-	M	S	M	S
CO2	S	M	M	M	S	-	-	-	S	-	M	M	S	S	M
CO3	S	M	M	M	S	-	-	-	S	-	M	M	S	S	M
CO4	S	M	M	M	S	-	-	-	S	-	M	M	S	M	M
CO5	S	S	M	M	S	-	-	-	S	-	M	M	S	M	M

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Basic programs to understand different types of data, operators and expressions.
2. Programs using control structures
    i) Factorial of a number
    ii) Fibonacci series
    iii) Generating prime numbers
    iv) Generating Armstrong numbers
    v) Greatest common divisor
3. Programs using arrays
    i) Merging of arrays
    ii) Array order reversal
    iii) Selection sort
    iv) Bubble sort
    v) Insertion sort
4. Programs using strings
    i) Palindrome checking
    ii) String sorting
    iii) Linear pattern search
    iv) Text line editing
5. Programs using functions
6. Programs using pointers
7. Programs using structures
8. Programs using file structure

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. B. Sundharamurthy	Associate Professor	CSE / VMKVEC	sundharamurthy@vmkvec..edu.in
2	Mr K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSCC01	DATA STRUCTURES	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course aims at understanding the basic concepts in programming structures, linear structures and non linear structures

PRERQUISITE

NIL

COURSE OBJECTIVES

1.	To remember and understand the basic concepts in linear structures
2.	To learn about tree structures.
3.	To understand about balanced trees
4.	To learn about hashing and sets.
5.	To learn and understand about graphs

COURSE OUTCOMES

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

CO1. Remember the basic concepts in linear structures	Understand
CO2. Learn about tree structures and tree traversals	Apply
CO3. Understand about balanced trees	Apply
CO4. Learn about hashing and sets.	Apply
CO5. Learn and understand about graphs	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	S	S	S
CO2	S	M	M	M	M	-	-	-	-	-	-	M	S	S	S
CO3	S	M	L	M	M	-	-	-	-	-	-	M	S	S	M
CO4	S	M	M	M	M	-	-	-	-	-	-	L	S	S	M
CO5	S	M	L	M	M	-	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

Linear Structures

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists –Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues.

Tree Structures

Tree ADT – tree traversals – left child right sibling data structures for general trees and graphs.

Balanced Trees

AVL Trees – Splay Trees – B-Tree - heaps – binary heaps – applications of binary Heaps **.**

Hashing and Set

Hashing – Separate chaining – open addressing – rehashing – extendible hashing -Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Set.

Graphs

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms –minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – bi-connectivity – Euler circuits – applications of graphs.

TEXT BOOKS:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C (2nd Edition), Pearson Education.

REFERENCES:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First EditionReprint.

2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India,Edition

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Jaichandran	Associate Professor	CSE / AVIT	jaichandran@avit.ac.in
2.	Dr.V.Amirthalingam	Associate Professor	CSE / VMKVEC	amirthalingam@vmkvec.edu.in

17CSCC20	DATA STRUCTURES LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This laboratory enables the students clearly understand the concepts of data structures. Also students can implement the searching and sorting algorithms.

PRERQUISITE

NIL

COURSE OUTCOMES

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

CO1. Develop algorithms for the concepts of data structures.	Apply
CO2. Able to Apply searching and sorting techniques	Apply
CO3. Construct implementations for Abstract Data Types (ADT) using appropriate Data Structures	Apply
CO4. Assess the suitability of a data structure to solve a problem, based on the time and space complexities of different operations on the data structure	Analyze
CO5. Implement algorithms which use sorting, searching and/or selection as sub-procedures.(CO5)	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	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS:

1. Exercises using Objects, Classes, Inheritance
2. Operator Overloading and Polymorphism
3. Array implementation of List Abstract Data Type (ADT)
4. Linked list implementation of List ADT
5. Cursor implementation of List ADT
6. Array implementations of Stack ADT
7. Linked list implementations of Stack ADT
8. Queue ADT
9. Search Tree ADT - Binary Search Tree
10. Heap Sort
11. Quick Sort

REFERENCES:

1. Laboratory Reference Manual.
2. Balaguruswami. E, “Programming in C”, TMH Publications, 1997
3. Gottfried, “Programming with C”, schaums outline series, TMH publications, 1997.
4. Mahapatra , “Thinking in C”, PHI publications, 2nd Edition, 1998.
5. Subbura.R , “Programming in C”, Vikas publishing, 1st Edition, 2000.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Jaichandran	Associate Professor	CSE / AVIT	jaichandran@avit.ac.in
3	Dr. M. Nithya	Prof & Head	CSE / VMKVEC	nithya@vmkvec.edu.in

17CSCC04	COMPUTER ARCHITECTURE	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This course is dedicated to number system, logic design, and memory and processing. This is the only course that is concerned with the hardware of a computer, its logic design and organization. It aims at making the student familiar with digital logic and functional design of arithmetic and logic unit that is capable of performing floating point arithmetic operations.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To learn about the design of the processors.
2.	To learn about the data transfer.
3.	Understand the functional units of a computers, bus structures and addressing modes.
4.	Apply the knowledge of algorithms to solve arithmetic problems.

COURSE OUTCOMES

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

CO1. Explain about computer organization components.	Understand
CO2. Compute simple arithmetic operations for fixed-point and floating-point addition, subtraction, multiplication & division.	Apply
CO3. Design combinational and sequential digital functions.	Analyse
CO4. Construct an instruction set capable of performing a specified set of operations.	Analyze
CO5. Demonstrate a memory system for a given set of specifications	Analyze
CO6.Explain pipelining concepts	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	-	-	-	-	-	-	-	L	M	M	-
CO2	M	M	M	M	-	-	-	-	-	-	-	L	M	M	-
CO3	M	M	S	M	-	-	-	-	-	-	-	-	S		-
CO4	S	M	M		-	-	-	-	-	-	-	-	S	M	-
CO5	S	-	M	L	-	-	-	-	-	-	-	-	S		-
CO6	M	M	M	S	-	-	-	-	-	-	-	L	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Computer Organization- Main memory – CPU operation – Interrupt concept – I/ O techniques – Bus concept – Computer performance factors – System performance measurement- High performance techniques – Comparison of Architecture and Organization – Study of Salient features and architectures of Advanced processors (80286, 80386, 80486, Pentium).

PROCESSOR DESIGN AND CONTROL UNIT

Goals – Design process –Data path organization – Main memory interface – Data path for single instructions- Floating point unit data path – Role of control unit – Reset sequence – Interrupt recognition and servicing – Abnormal situation handling – Hardwired control unit – Micro programmed control unit.

MEMORY DESIGN & MEMORY MANAGEMENT

Memory types – Functional and usage modes – Memory allocation- Multiple memory decoding – Memory hierarchy – Instruction pre fetch – Memory interleaving – Write buffer – Cache memory –Virtual memory – Associative memory.

INTRA SYSTEM COMMUNICATION AND I/O

I/O controller & driver- Case study: Hard disk controller in IBM PC – I /O ports and bus concepts – Case study: Keyboard interface – Bus cycle – Asynchronous and Synchronous Transfer – Interrupt handling in PC – I/O techniques in PC – Case Study : RS 232 interface – Modern serial I/O interface – Bus arbitration techniques – Hard disk interface inPC.

ADVANCED ARCHITECTURE

Classification of parallelism – Multiple functional units – Pipelining – Vector computing – array processors –High performance architecture – RISC systems – Super scalar architecture – VLIW architecture – EPIC architecture – Multiprocessor systems – Cache coherence problem – Fault tolerance.

TEXT BOOKS:

1. WilliamStallings, "Computer OrganizationAndArchitecture–DesigningFor Performance",Sixth Edition, Pearson Education, 2007.

REFERENCES:

1. Govindarajulu, "Computer Architecture and Organization – Design principles and applications" ,Tata McGraw Hill publications, NewDelhi.
2. David A. Patterson And John L. Hennessy, "Computer Organization And Design: The Hardware/Software Interface", Fifth Edition, Morgan Kaufmann, 2013.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill,1998.
4. A.K.Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", McGraw-Hill Education (India), 2013 reprint.

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Mail Id
1.	Mr. S.Senthilkumar	Assistant. Professor	CSE / VMKVEC	senthikumars @vmkvec.edu.in
2.	Mrs. S.Leelavathy	Assistant. Professors (GII)	CSE / AVIT	leelavathy@avit.ac.in

17CSCC02	OBJECT ORIENTED PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Computer science students and enables them to learn Object Oriented Programming and the design of computer solutions in a precise manner. The syllabus emphasizes on OOP concepts, Functions, Polymorphism, Inheritance and I/O. The intention is to provide sufficient depth in these topics to enable candidates to apply Object Oriented Programming approach to programming. The modules in the syllabus reflect solving general problems via programming solution. Thus, modules collectively focus on programming concepts, strategiesand techniques; and the application of these toward the development of programming solutions.

PRERQUISITE

NIL

COURSE OBJECTIVES

1.	To learn about the syntax and semantics of C++ programming language
2.	To learn about the concepts of object oriented programming.
3.	To determine how to reuse the code, Constructors and member functions
4.	To Analyse how to reduce the coding by applying overloading concepts
5.	To Analyse how to reuse the code, how to verify and validate the coding

COURSE OUTCOMES

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

CO1. Construct object-oriented programs for a given scenario using the concepts of abstraction, encapsulation, message-passing and modularity	Apply
CO2. Construct object-oriented programs for a given application by using constructors	Apply
CO3. Develop object-oriented programs for a given application using the concepts of compile-time and run-time polymorphism	Analyze
CO4. Develop object-oriented applications through inheritance concepts	Analyze
CO5. Construct object-oriented applications for a given scenario using files, Sting handling and to handle exceptions	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	M	M	M	-	-	-	-	-	M	L	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	M	L	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	M	L	S	M	M
CO4	S	M	M	M	S	-	-	-	-	-	M	L	S	M	S
CO5	S	M	M	M	M	-	-	-	-	-	M	L	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO FUNDAMENTAL CONCEPTS OF OOP

Object Oriented Paradigm: Elements of Object Oriented Programming – Working with classes, Classes and Objects-Class specification- accessing class members- defining member functions - Passing and returning objects – Array of objects - inline functions - accessing member functions within class - Static members.

OBJECT INITIALIZATION AND FRIEND FUNCTION

Constructors - Parameterized constructors - Constructor overloading. Copy constructor, Destructors, Default arguments - new, delete operators - "this" pointer, friend classes and friend functions.

OVERLOADING AND GENERIC PROGRAMMING

Function overloading – Operator overloading- Non-over loadable operators- unary operator overloading- operator keyword- limitations of increment/decrement operators- binary operator overloading- Generic programming with templates-Function templates- class templates.

INHERITANCE AND VIRTUAL FUNCTION

Inheritance-Base class and derived class relationship-derived class declaration-Forms of inheritance- inheritance and member accessibility, abstract class, virtual functions, pure virtual function**.**

EXCEPTION HANDLING AND STREAMS

Exception handling - Try Catch Throw Paradigm - Uncaught Exception- Files and Streams-Opening and Closing a file- file modes- file pointers and their manipulation, sequential access to a file-random access to a file-Reading and Writing – Exception handling. String Objects.

TEXT BOOKS:

1. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
2. K. R. Venugopal, Rajkumar, T. Ra vishankar, Mastering C++, 4th Edition, Tata McGraw 2. Hill,2008.
3. Budd T., An Introduction to Object-oriented Programming, Addison-Wesley 3rd 4. Edition,2008.
4. Bjarne stroustrup, The C++ programming Language, Addison Wesley, 3rd edition2008.
5. Harvey M. Deitel and Paul J. Deitel, C++ How to Program, 7th edition, Prentice Hall, 2010.
6. Tony Gaddis, Starting Out with Java: From Control Structures through Objects, 4/E, Addison-Wesley,2009.

REFERENCES:

1. H.M. Deitel and P.J. Deitel, C How to program Introducing C++ and Java, Fourth Edition, Pearson Prentice Hall, 2005.
2. 2. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education,2004.

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Mail Id
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr.S. Muthuselvan	Assistant Professor Gr. II	CSE / AVIT	muthuselvan@avit.ac.in

17CSCC21	OBJECT ORIENTED PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

With a dynamic learn-by-doing focus, this laboratory course encourages students to understand the use of object oriented way of problem solving. This course challenges students to exercise their creativity in both programming and analysis.

PRERQUISITE

NIL

COURSE OBJECTIVES

1.	To be capable of explaining procedure as well as object oriented programming concepts & their differences.
2.	To be able to implement inline and friend function very well.
3.	To be familiar with how to make programs using function overloading & operator overloading
4.	To get the capability to implement the different types of inheritance & done problems related to them

COURSE OUTCOMES

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

CO1. Construct object-oriented programs for a given scenario using the concepts of abstraction, encapsulation, message-passing and modularity.	Analysis
CO2. Develop object-oriented programs for a given application using the concepts of compile-time and run-time polymorphism.	Apply
CO3. Construct object-oriented programs for a given application by demonstrating the inter-relationship between classes using inheritance and aggregation.	Apply
CO4. Develop object-oriented applications that can handle exceptions..	Apply
CO5. Construct object-oriented applications for a given scenario to persist data using files and object-serialization.	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	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a program to illustrate function overloading feature
2. Write a program to illustrate the overloading of various operators Ex. Binary operators, Unary operators, New and Delete operators.
3. Write a program to illustrate the use of following functions: a) Friend functions b) Inline functions c) Static Member functions d) Function with default arguments
4. Write a program to illustrate the use of destructor and the various types of constructors (no arguments, constructor, constructor with arguments, copy constructor etc).
5. Write a program to illustrate the various forms of inheritance: Ex. Single, Multiple, multilevel, hierarchical inheritance etc.
6. Write a program having student as on abstract class and create many derived classes such as Engg. Science, Medical, etc. from student's class. Create their objects and process them.
7. Write a program to illustrate the use of virtual functions.
8. Write a program to illustrate the use of virtual base class.
9. Write a program to illustrate file handling operations: Ex. a) Copying a text files b) Displaying the contents of the file etc.
10. Write a program to illustrate how exceptions are handled (ex: division-by-zero, overflow and underflow in stack etc).

REFERENCES:

1. H.M. Deitel and P.J. Deitel, C How to program Introducing C++ and Java, Fourth Edition, Pearson Prentice Hall, 2010.
2. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education, 2004.
3. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
4. K. R. Venugopal, Rajkumar, T. Ra vishankar, Mastering C++, 4th Edition, Tata McGraw 2. Hill, 2008.
5. Budd T., An Introduction to Object-oriented Programming, Addison-Wesley 3rd 4. edition, 2008.
6. Bjarne stroustrup, The C++ programming Language, Addison Wesley, 3rd edition2008.
7. Harvey M. Deitel and Paul J. Deitel, C++ How to Program, 7th edition, Prentice Hall, 2010.
8. Tony Gaddis, Starting Out with Java: From Control Structures through Objects, 4/E, Addison-Wesley, 2009.

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Email Id
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr.K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSCC06	DESIGN AND ANALYSIS OF ALGORITHM	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This subject introduces students the concepts of design and analysis of algorithms. On completion of this course students will be able to:

i) Learn the algorithm analysistechniques.
ii) Become familiar with the different algorithm designtechniques
iii) Construct efficient algorithms for solving engineering problems by using appropriate algorithm design paradigmsand datastructures.

PREREQUISITE: DATA STRUCTURES

COURSE OBJECTIVES

1.	To familiarize the student with good programming design methods, particularly Top- Down design.
2.	To develop algorithms for manipulating stacks, queues, linked lists, trees, graphs
3.	To create the data structures for implementing the above algorithms
4.	To construct the recursive algorithms as they apply to trees and graphs
5.	To familiarize the student with the issues of Time complexity and examine various algorithms from this perspective

COURSE OUTCOMES

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

CO1. Analyse the correctness of algorithms using induction and loop invariants.	Analyze
CO2. Analyse the worst-case, best-case and average-case running time of algorithms using asymptotic.	Analyze
CO3. Analyse the performance of a sequence of operations using amortized analysis techniques like potential method and accounting method.	Analyze
CO4. Construct algorithms using design paradigms like divide and conquer, greedy and dynamic programming for a given problem.	Analyze
CO5. Infer when a design scenario requires the application of the different algorithm design paradigms.	Apply
CO6. Analyse how the performance of an algorithm is affected based on the choice of data structures the algorithm 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	S	M	M	-	-	-	-	-	-	-	-	-	S	M	M
CO2	S	M	M	-	-	-	-	-	-	-	-	-	S	S	M
CO3	M	M	S	-	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M		-	-	-	-	-	-	-	-	-	S	S	M
CO5	M	M	M	-	-	-	-	-	-	-	-	-	S	M	S
CO6	M	M	M	-	-	-	-	-	-	-	-	-	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO ALGORITHMS

The role of algorithms in computing, Growth of functions, Asymptotic notations, Designing and Analyzing algorithms-an Introduction using insertion sort. Review on the Math needed for algorithm design and analysis.

DIVIDE AND CONQUER

Solving recurrences – The Substitution method, Recurrence Tree method and Master's method, Multiplying large integers, Binary Search, Sorting [Merge Sort and Quick Sort], Selection in linear time [Expected and Worst-case], Strassen‟s algorithm for Matrix Multiplication, The maximum sub-array problem.

GREEDY ALGORITHMS

Characteristics of Greedy algorithms, The problem of making change, Greedy algorithms for Scheduling, Minimum Spanning Trees – Kruskal's Algorithm and Prim's Algorithm, Greedy Algorithms for finding the shortest paths in a Graph, The Knapsack problem Amortized Analysis: The accounting method, The potential method.

DYNAMIC PROGRAMMING

Calculating the binomial co-efficient, The problem of making change, The Knapsack problem, Chained matrix multiplication, Finding the shortest paths in a Graph, Reformulating Dynamic programming algorithms using recursion and memory functions.

GRAPH ALGORITHMS

Depth-first search & Breadth-First Search, Flow Networks, Topological sort, Strongly connected components Computational Complexity: Classes P and NP, Polynomial reductions, Classes NP-Complete and NP-Hard. Heuristics: Graph Coloring problem, Travelling Sales Person problem.

TEXT BOOKS:

1. Charles E. Leiserson, "Thomas H. Cormen, Ronald L. Rivest, Clifford Stein – Introduction to Algorithms", Third edition, PHI, 2010

REFERENCES:

1. Gilles Brassard and Paul Bratley, "Fundamentals of Algorithmic", PHI,2000.

2. Sara Baase - Computer algorithms: Introduction to Design and Analysis –, Addison Wesley publication,1998.

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Email Id
1.	Dr. S. Rajaprakash	Assistant Professor Gr. II	CSE / AVIT	srajaprakash@avit.ac.in
2.	Mr. M. Annamalai	Associate Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSCC23	ALGORITHM LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The objective of this laboratory course is to enable students to solve algorithmic problems by appropriately modeling the problem, choosing and/or designing efficient data structures and algorithms to meet the problem constraints and implementing the algorithm in C/C++.

PREREQUISITE

Data Structures Lab (17CSCC20)

COURSE OBJECTIVES

1.	To understand concepts about searching and sorting techniques.
2.	To understand basic concepts about stacks, queues, lists, trees and graphs.
3.	To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

COURSE OUTCOMES

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

CO1. Develop efficient algorithms and implementation schemes for solving a given problem using appropriate data structures and design techniques like divide and conquer, greedy, branch and bound and dynamic programming.	Apply
CO2. Compare the suitability of several candidate data structures, algorithms and implementation schemes to solve a problem, based on the time , space complexities and problem constraints imposed.	Analyze
CO3. Model, implement and evaluate the algorithms designed using a high – level programming language.	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	-	-	-	-	-	-	-	-	M	M	S
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a program to illustrate basic algorithm design and asymptotic notations
2. Write a program to illustrate algorithm design involving sorting and selection
3. Write a program to illustrate algorithm design involving union find structures
4. Write a program to illustrate algorithm design involving hash tables and priority queues
5. Write a program to illustrate Divide and Conquer Algorithm design
6. Write a program to illustrate Greedy Algorithm design
7. Write a program to illustrate algorithm design involving trees like search trees, interval trees, k-d trees and AVL trees
8. Write a program to illustrate Dynamic Programming Algorithm design
9. Write a program to illustrate Branch-and-Bound Algorithms
10. Write a program to illustrate Algorithm design involving graphs
11. Write a program to illustrate Algorithm design involving String matching.
12. Write a program to illustrate Algorithm design based on Network Flows.

REFERENCES:

1. Charles E. Leiserson, Thomas H. Cormen, Ronald L. Rivest, Clifford Stein – Introduction to Algorithms, Third edition, PHI, 2013
2. Gilles Brassard and Paul Bratley - Fundamentals of Algorithmics - PHI, 2000.
3. Sara Baase - Computer algorithms: Introduction to Design and Analysis –, Addison Wesley publication, 1998.

COURSE DESIGNERS

S. No	Name of the faculty	Designation	Department	Email Id
1.	Mr. M. Annamalai	Associate Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in
2.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in

17AICC01	PROBLEM SOLVING USING PYTHON PROGRAMMING (Theory + Practice)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE:

This course is designed to introduce basic problem solving and program design skills that are used to create computer Programs using python programming skills. It gives engineering students an introduction to python programming and developing analytical skills to use in their subsequent course work and professional development. It presents several techniques using computers to solve problems, including the use of program design strategies and tools, common algorithms used in computer program and elementary programming techniques.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To study algorithmic solutions to simple computational problems.
2.	To study programs using simple Python statements and expressions.
3.	To study an explain control flow and functions concept in Python for solving problems
4.	To study and use Python data structures – lists, tuples & dictionaries for representing compound data
5.	To study and explain files, exception, modules and packages in Python for solving problems.

COURSE OUTCOMES

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

CO1. To understand and develop algorithmic solutions to simple computational problem.	Understand
CO2. To familiarize with the programming concepts in Python Programming Language	Understand
CO3. To understand and apply programming solutions related to Objects, Classes and Functions	Apply
CO4. Construct algorithms using design paradigms like divide and conquer, greedy and dynamic programming for a given problem.	Apply
CO5. Construct algorithms using Python for searching and sorting based 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	-	-	L	-	-	-	-	-	L	M	M	M
CO2	S	M	L	-	M	L	-	-	-	-	-	L	S	M	M
CO3	S	M	L	-	M	L	-	-	-	-	-	L	M	M	M
CO4	S	M	L	-	M	L	-	-	-	-	-	L	S	S	M
CO5	M	M	L	-	M	L	-	-	-	-	-	L	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO PROBLEM SOLVING WITH COMPUTING SYSTEMS:

Hardware and Software – Engineering Problem Solving Methodology: problem specification and analysis, algorithm design, flowchart, implementation, program testing and verification. Lab 1: find minimum in a list, Lab 2: insert a card in a list of sorted cards, guess an integer number in a range, Lab 3: Towers of Hanoi.

PROGRAMMING CONCEPTS:

Basics of Python programming -Constant, variable, keywords, data types - Operators, operator precedence, expressions - Control Structures: Selection structure- Repetition Structure, File Handling, Exception Handling. Lab 4. word count, Lab 5. File handling. Lab 6. Exception handling .

OBJECTS, CLASSES AND FUNCTIONS:

Object and Classes : Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Functions: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Standard Modules in Python. Lab 7. Lambda functions, Lab 8. Functions Lab 9. User defined functions

ALGORITHM DESIGN: FUNDAMENTAL ALGORITHMS:

Swapping of two variables – counting – summation of set of numbers – factorial – Fibonacci sequence – base conversion Factoring Techniques: smallest divisor of an integer – greatest common divisor – generating prime number – generating prime factor. Lab 10. Exchange the values of two variables, Lab 11. Circulate the values of n variables, Lab 12. Distance between two points.

MERGING, SORTING AND SEARCHING TECHNIQUES:

Two way merge – sorting by selection sort – sorting by exchange – sorting by insertion – linear search – binary search Array techniques: Array order reversal – Statistical measurement - array counting - array Partitioning Text Processing and Pattern Searching: Key word search – text line editing –linear pattern search. Lab 7: square root, gcd, Lab 13: exponentiation, sum an array of numbers, Lab 14: linear search, binary search, Lab 15: selection sort, insertion sort, mergesort.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Email Id
1.	Mrs. R Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSCC03	DATABASE MANAGEMENT SYSTEM	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:
This course aims at facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data and how to manipulate them through query languages, the effective designing of relational database and how the system manages the concurrent usage of data in multiuser environment.

PREREQUISITE:
NIL

COURSE OBJECTIVES

1.	Describe a relational database and object-oriented database.
2.	Create, maintain and manipulate a relational database using SQL.
3.	Describe ER model and normalization for database design.
4.	Examine issues in data storage and query processing and can formulate appropriate solutions.
5.	Design and build database system for a given real world problem.

COURSE OUTCOMES

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

CO1. Illustrate the database design for applications and use of ER Diagram.	Understand
CO2. Build and manipulate the relational database using Structured Query Language and relational languages.	Apply
CO3. Develop a normalized database for a given application by incorporating various constraints like integrity and value constraints.	Apply
CO4. Apply concurrency control & recovery mechanism for database problems.	Apply
CO5. Construct data structures like indexes and hash tables for the fast retrieval of 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	M	M	M	-	-	-	-	-	M	S	S	M	S
CO2	M	M	M	L	M	-	-	-	-	-	M	M	S	M	S
CO3	M	M	S	M	M	-	-	-	-	-	M	L	S	M	S
CO4	S	M	M	M	L	-	-	-	-	-	M	M	S	S	S
CO5	S	M	M	M	M	-	-	-	-	-	M	M	S	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Database System Applications - Views of data - Data Models - Database Languages -Modification of the Database - Database System Architecture - Database users and Administrator- Introduction to relational databases - Structure of Relational Databases - Entity-Relationship model (E-R model) - E-R Diagrams.

RELATIONAL APPROACH

The relational Model - Additional & Extended Relational - Types of Keys - Relational Algebra - Null Values - Domain Relational Calculus - Tuple Relational Calculus - Fundamental operations - Additional Operations- SQL fundamentals - Structure of SQL Queries - SQL Data Types and Schemas - Nested Sub queries - Complex Queries - Integrity Constraints - Triggers - Security - Advanced SQL Features - Embedded SQL- Dynamic SQL- Views - Introduction to Distributed Databases and Client/Server Databases.

DATABASE DESIGN

Overview of the Design Process - Functional Dependencies - Non-loss Decomposition - Functional Dependencies - Normalization and its Types - Dependency Preservation - Boyce/Codd Normal Form- Decomposition Using Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form - Entity Sets and its Types.

TRANSACTION &CONCURRENCY CONTROL

Transaction Concepts - Transaction State - Transaction Recovery - ACID Properties - System Recovery - Media Recovery - Two Phase Commit - SQL Facilities for recovery -Advanced Recovery Techniques - Buffer Management - Remote Backup Systems - Concurrency Control - Need for Concurrency - Locking Protocols -Two Phase Locking - Internet Locking - Deadlock Handling - Serializability - Recovery Isolation Levels - SQL Facilities forConcurrency.

STORAGE STRUCTURE

Introduction to Storage and File Structure - Overview of Physical Storage Media - Magnetic Disks - RAID - Tertiary storage - File Organization - Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ tree Index Files - B- tree Index Files - Bitmap Indices - Static Hashing - Dynamic Hashing -Query Processing - Catalogue Information for Cost Estimation – Selection Operation - Sorting - Join Operation - Query optimization - Database Data Analysis.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw-Hill Education; 6 edition,2010).

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson India; 7th edition, 2017
2. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Third Edition, McGraw Hill, 2002.
3. Carlos Coronel, Steven Morris , “Database Systems – Design, Implementation and Management, 13th Edition, Cengage Learning; 13th edition, 2018).

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Mail Id
1.	Mr. S. SenthilKumar	Assistant Professor	CSE / VMKVEC	senthikumars @vmkvec.edu.in
2.	Mr. S. Muthuselvan	Assistant Professor Gr. II	CSE / AVIT	muthuselvan@avit.ac.in

17CSCC22	DATABASE MANAGEMENT SYSTEM LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course aims at facilitating the student to apply the effective designing of relational database for Real-world applications, perform many operations related to creating, manipulating and maintaining databases using DBMS tools and manipulate data using other languages through ODBC and JDBC.

PRERQUISITE NIL

COURSE OBJECTIVES

1.	To demonstrate the basic fundamentals of Structured Query Language (SQL).
2.	To employ the conceptual and relational models to design large database systems.
3.	To design and build database system for a given real world problems.

COURSE OUTCOMES

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

CO1. On the successful completion of the course, students will be able to Build and manipulate relational databases using simple and complex queries in Structured Query Language.	Apply
CO2. Develop normalized and demoralized databases for a given application using various constraints like integrity and value constraints.	Apply
CO3. Construct and make use of database objects such as indices, sequences, synonyms using Structured Query Language.	Analysis
CO4. Develop objects using PL/SQL and manipulate databases through these objects.	Analysis
CO5. Construct and make use of composite data types using PL/SQL (CO5) Develop a complete database application in a high level language using Java Database Connectivity.	Analysis

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	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a program to illustrate the creation of a database and writing SQL queries to retrieve information from the database
2. Write a program to perform Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions
3. Write a program to illustrate Simple SQL Queries
4. Write a program to analyze and model a database application
5. Write a program to illustrate the creation and Modification of Tables without normalization
6. Write a program to illustrate the creation and Modification of Tables with normalization
7. Write a program to illustrate Integrity Constraints enforcement
8. Write a program to illustrate Complex SQL Queries
9. Write a program to illustrate the creation and usage of other database objects
10. Write a program to illustrate the creation of Procedures, Functions and Package with Cursor
11. Write a program to illustrate the creation of Triggers.
12. Write a program to illustrate the creation of composite data types in PL/SQL

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fourth Edition, Tata McGraw Hill, 2012.

2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Addision weskey, 2002.

3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2002.

4. Peter Rob and Corlos Coronel, "Database Systems – Design, Implementation and Management, Fifth Edition, Thompson Learning, Course Technology, 2003.

COURSE DESIGNERS

S. No	Name of the faculty	Designation	Department	Email Id
1.	Mr. S. SenthilKumar	Assistant Professor	CSE / VMKVEC	senthikumars @vmkvec.edu.in
2.	Mr.S.Muthuselvan	Assistant Professor (G II)	CSE / AVIT	muthuselvan@avit.ac.in

17CSCC09	JAVA PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course of study builds on the skills gained by students in Java Fundamentals and helps to advance Java programming skills. Students will design object-oriented applications with Java and will create Java programs using hands-on, engaging activities.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2.	Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3.	Be aware of the important topics and principles of software development.
4.	Understand Event Handling and Swing Components.
5.	Understand Generic Programming.

COURSE OUTCOMES

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

CO1. Knowledge of the structure and model of the Java programming language	Understand
CO2. Use the Java programming language for various programming technologies	Understand
CO3. Develop software in the Java programming language	Apply
CO4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements	Analyze
CO5. Choose an engineering approach to solving problems, Starting from the acquired knowledge of programming and knowledge of operating systems.	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	-	-	-	-	-	-	-	S	M	-
CO2	S	M	M	-	M	-	-	-	-	-	-	-	M	M	M
CO3	S	M	L	L	M	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	L	M	-	-	-	-	-	-	-	M	M	-
CO5	S	M	L	L	S	-	-	-	-	-	-	-	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF JAVA

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifiers – static members – constructors – finalizemethod.

ARRAYS, STRINGS &OBJECTS

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes - The Object class – Reflection – interfaces – object cloning – inner classes – proxies.

EVENTS & GRAPHICS PROGRAMMING

I/O Streams - Filter and pipe streams – Byte Code interpretation - Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – Graphics programming – Frame – Components – working with 2D shapes.

SWING & GENERIC PROGRAMMING

Introduction to Swing – Model-View-Controller design pattern – buttons – layout management – Swing Components – exception handling – exception hierarchy – throwing and catching exceptions - Motivation for generic programming – generic classes – generic methods – generic code and virtual machine – inheritance and generics – reflection and generics.

THREADS & SOCKET PROGRAMMING

Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers – Socket Programming – UDP Datagram – Introduction to JavaBeans.

TEXT BOOKS:

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press,2008.
2. Elliotte Rusty Harold, “ Java Network Programming”, O‟Reilly publishers,2000.
3. Ed Roman, “Mastering Enterprise Java Beans”, John Wiley &Sons Inc., 1999.

REFERENCES:

1. K. Arnold and J. Gosling, “The JAVA programming language", Third edition, Pearson Education,2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
3. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd.,2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R. Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in
2.	Dr.K.Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSCC26	JAVA PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The goal of this course is to provide students with the ability to write programs in Java and apply concepts described in the Object-Oriented Programming course. The course is designed to accommodate students with diverse programming backgrounds, consequently Java is taught from first principles in a practical class setting were students can work at their own pace from a course handbook. Each practical class will culminate in an assessed exercise.

PREREQUISITE

Object Oriented Programming Lab (17CSCC02)

COURSE OBJECTIVES

1.	Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2.	Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3.	Understand the principles of inheritance, packages and interfaces.

COURSE OUTCOMES

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

CO1. Create Java programs that solve simple business problems.	Apply
CO2. Validate user input.	Apply
CO3. Construct a Java class based on a UML class diagram.	Apply
CO4. Perform a test plan to validate a Java program.	Apply
CO5. Document a Java program.	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	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS.

1. Write a JAVA program to search the largest element from the given array.
2. Write a JAVA program to sort the strings in an alphabetical order.
3. Write a JAVA program to extract a portion of a character string and to print the extracted portion and the remaining portion of the string. Assume that m characters are extracted, starting with the nth character.
4. Write a JAVA program for illustrating overloading and overriding methods in JAVA.
5. Write a JAVA program which illustrates the implementation of multiple inheritance using interfaces in JAVA.
6. Write a JAVA program to create your package for basic mathematical operations such as add, subtract, multiply. Demonstrate the use of this package in another class.
7. Write a JAVA program that counts the number of digits in a given number. If an alphabet is entered instead of a number, the program should not terminate. Instead it should display appropriate error message. (Exception Handling).
8. Write a JAVA program to move the text "JAVA PROGRAMMING LAB" diagonally using Applet.
9. Write a JAVA program to create an Applet with a label "Do you know car driving?" and two buttons Yes, NO. When the user clicks "Yes" button, the message "Congrats" must be displayed. When the user clicks "NO "button, "Regrets" must be displayed.
10. Write a JAVA program to animate the face image using Applet.
11. Write a JAVA program to create four Text fields for the name, street, city and pin code with suitable Labels. Also add a button called "My Details". When you click the button, your name, street, city, and pin code must appear in the Text fields.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. SASIKALA	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr.S.Muthuselvan	Assistant Professor(G II)	CSE / AVIT	muthuselvan@avit.ac.in

17CSCC07	OPERATING SYSTEM	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The student will be able to understand the concepts of operating system to distributed environment like cloud computing, mobile computing etc. This course also includes set of case studies that provides insight into some existing distributed operatingsystems.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To be aware of the evolution of operating systems.
2.	To learn what processes are, how processes communicate, how process synchronization is done and how to manage processes.
3.	To have an understanding of the main memory and secondary memory management techniques.
4.	To understand the I/O Subsystem.
5.	To have an exposure to the role of operating system in cloud and mobile environment operating systems.

COURSE OUTCOMES

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

CO1. To learn the concepts of operating system to an evolution of operating systems and identify the features specific to operating systems	Apply
CO2. To Understand the process synchronization concepts for the given scenario in operating systems environment.	Apply
CO3. Illustrate the different techniques of management of memory (the main memory and secondary memory management techniques).	Understand
CO4. Apply the I/O Subsystem concepts for a given scenario.	Apply
CO5. Identify the role of operating system in cloud and mobile environment.	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	M	-	-	-	-	-	-	-	-	S	S	-
CO2	S	S	-	M	-	-	-	-	-	-	-	-	S	M	-
CO3	S	S	-	M	-	-	-	-	-	-	-	-	S	M	-
CO4	S	M	L	M	-	-	-	-	-	-	-	-	S	L	M
CO5	S	M	L	L	-	-	-	-	-	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

OPERATING SYSTEM

Introduction & Structure: Basics, OS Architecture, OS Operations, System calls.

PROCESSES&SYNCHRONIZATION

Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter process communication – Communication in client-server Systems. Case study: IPC in Linux. Threads: Multi- threading models – Threading issues. Case Study: Threads library– Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock Modelling – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection and Recovery - Election Algorithms.

STORAGEMANAGEMENT

Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background–Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management inLinux.

I/O SYSTEMS

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – streams – performance. Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O inLinux.

CLOUD OS &MOBILEOS

Introduction to Cloud Computing, Features of Cloud OS, Case Studies. - Introduction to Mobile Computing Features of Mobile OS, Case Studies.

TEXT BOOKS:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", 8th Edition, Wiley India Pvt. Ltd, 2008.

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education,2004.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education,2004.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education,2004.
4. Fundamentals Of Mobile Computing, Patnaik, Prasant, Kumar , Mall, Rajib, PHI,2012.
5. Mobile Computing - Technology, Applications, and Service Creation – 1st edition, Asoke K Talukder,Roopa Yavagal, McGraw-Hill,2006.
6. The Practice of Cloud System Administration: Designing and Operating Large Distributed Systems, Thomas A. Limoncelli Strata R. Chalup , Christina J. Hogan , Addison-Wesley Professional; 1st Edition,2014.
7. Cloud Computing: Concepts, Technology & Architecture, Thomas Erl, Ricardo Puttini , Zaigham Mahmood , Prentice Hall; 1st Edition,2013.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. Shobana	Assistant Professor(G II)	CSE / AVIT	shobana@avit.ac.in
2.	Dr.S.SenthilKumar	Assistant Professor	CSE / VMKVEC	senthikumars@vmkvec.edu.in

17CSCC24	OPERATING SYSTEMS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This laboratory course encourages students to understand the behaviour and implementation of computer operating systems, and these experiments for acquiring skill in writing concurrent programs use of operating system experiments with UNIX commands and C Programs.

PREREQUISITE S NIL

COURSE OBJECTIVES

1.	To learn shell programming and the use of filters in the UNIX environment.
2.	To learn to program in C using system calls.
3.	To learn to use the file system related system calls.
4.	To provide knowledge about processes creation and processes communication.
5.	To learn how process synchronization is done using semaphores.

COURSE OUTCOMES

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

CO1. Familiar with the language and terms of the UNIX/LINUX operating system	Apply
CO2. Delineate the commands and procedures needed to carry out basic operations on the UNIX/LINUX operating system	Apply
CO3. Design, develop and evaluate CPU burst time, arrival time, waiting time and average turnaround time for different types of scheduling	Apply
CO4. Design solutions for Inter Process communication and memory management Schemes	Apply
CO5. Design, develop and implement a software solution to a given problem which employs operating systems tools	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	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS.

1. Execute Basic UNIX commands.\
2. Write C programs to simulate UNIX commands like ls, grep, etc.
3. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2sessions).
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2sessions).
5. Developing Application using Inter Process communication (using shared memory, pipes or message queues).
6. Implement the Producer – Consumer problem using semaphores.
7. Implement some memory management schemes – I.
8. Implement some memory management schemes – II.
9. Implement any file allocation technique (Linked, Indexed or Contiguous)

REFERENCES:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Sixth Edition, Wiley India Pvt Ltd, 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education, 2004.\
3. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
4. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. S. Senthilkumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in
2	Mrs. R Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in

17CSCC08	COMPUTER NETWORKS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The purpose of this course is to understand the concepts of data communication and computer networks. Identify the components required to build different types of networks. Choose the required functionality at each layer for given application. Identify the solution for each functionality for each layer. Trace the flow of information from one node to another node in thenetwork.

PREREQUISITE NIL

COURSE OBJECTIVES

1.	To provide basic knowledge in networking concepts.
2.	To introduce and demonstrate various bridges, switches and Ethernets.
3.	To introduce different methodologies in routing.
4.	To learn about transmission protocols and QOS.
5.	To provide knowledge about different application protocols.

COURSE OUTCOMES

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

CO1. Learn the fundamentals of networks and different types of OSI Layers.	Understand
CO2. Learn the different Ethernet, wireless networks, switching and bridging concepts	Understand
CO3. Design solutions for complex routing methods and different multicast routing techniques.	Evaluate
CO4. Learn the concepts of different protocols for transmission purpose and study the quality of service for TCP protocol.	Understand
CO5. Learn different types of application protocols and its architecture.	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	-	-	-	-		-	-	-	-	S	M	-
CO2	S	M	M	-	-	-	-	-	-	-	-	-	S	M	-
CO3	S	M	S	M	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M	M	-	-	-	-	-	-	-	-	-	S	M	-
CO5	S	M	M	-	-	-	-	-	-	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF OSI LAYERS

Building a network – Requirements - Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control.

MEDIA ACCESS & INTERNETWORKING

Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP).

ROUTING

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6) - Multicast – addresses – multicast routing (DVMRP, PIM).

TRANSPORT LAYER

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Applicationrequirements.

APPLICATION LAYER

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS –SNMP.

TEXT BOOKS:

1. Behrouz A. Foruzan, “Data communication and Networking”, Seventh Edition, Tata McGraw- Hill,2017.
2. Andrew S. Tannenbaum, David J. Wetherall “Computer Networks”, Pearson Education, Eighth Edition,2016.

REFERENCES:

1. William Stallings, “Data and Computer Communication”, Eighth Edition, PearsonEducation.
2. Knuth,D.E., “Computer Communication and Networks”, Sixth Edition , McGrath-Hill,2016.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K. Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	Mrs. T. Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17CSCC25	COMPUTER NETWORKS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The purpose of this course is to understand the concepts of data communication and computer networks. Identify the components required to build different types of networks. Choose the required functionality and solution at each layer for given application. Trace the flow of information from one node to another node in the network.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To provide basic knowledge in networking concepts.
2.	To introduce and demonstrate various bridges, switches and Ethernets.
3.	To introduce different methodologies in routing
4.	To learn about transmission protocols and QOS
5.	To provide knowledge about different application protocols.

COURSE OUTCOMES

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

CO1. Learn the fundamentals of networks and different types of OSI Layers	Understand
CO2. Learn the different Ethernet, wireless networks, switching and bridging concepts	Understand
CO3. Design solutions for complex routing methods and different multicast routing techniques.	Apply
CO4. Learn the concepts of different protocols for transmission purpose and study the quality of service for TCP protocol.	Apply
CO5. Learn different types of application protocols and its architecture.	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	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS.

1. Implementation of Stop and Wait Protocol and Sliding WindowProtocol.
2. Study of Socket Programming and Client – Servermodel
3. Write a code simulating ARP /RARPprotocols.
4. Write a code simulating PING and TRACEROUTEcommands
5. Create a socket for HTTP for web page upload anddownload.
6. Simple Tcp/Ip Client ServerCommunication
7. UDP Echo Client ServerCommunication
8. Half Duplex Chat UsingTCP/IP
9. Full Duplex Chat UsingTCP/IP
10. Implementation Of File TransferProtocol
11. Remote Command Execution UsingUDP
12. ARP Implementation Using UDP

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. S. Senthilkumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in
2.	Mr. K. Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSCC18	RICH INTERNET APPLICATION	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Uses of web sites and portals have become common for knowledge sharing and business. The course focuses on the fundamentals of CGI, SCRIPTING LANGUAGES, and WebApplications.

PREREQUISITE: JAVA PROGRAMMING

COURSE OBJECTIVES

1.	To learn CGI Concepts & CGI Programming
2.	To Study DHTML, XML,AJAX
3.	To Study On-Line web application & Internet Concepts

COURSE OUTCOMES

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

CO1: Understand the basic concept of HTML and Scripting Language	Understand
CO2: Learn the HTML, Common Gateway Interface.	Apply
CO3: Learn the Java Script and AJAX	Apply
CO4: Learn the Server side programming	Apply
CO5: Learn the database connectivity.	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	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark –up languages – Next Generation –
Internet –Protocols and Applications

COMMON GATEWAY INTERFACE PROGRAMMING

HTML forms – CGI Concepts – HTML tags Emulation – Server – Browser Communication – E-mail generation – CGI client Side applets – CGI server applets – authorization and security. Introduction to PERL.

SCRIPTING LANGUAGES

Java Script Programming-Dynamic HTML-Cascading style sheets-Object model and Event model- Filters and Transitions-Active X Controls-Multimedia-Client side script.- Traditional webapplication
vs AJAX application –creating full scale AJAX application - Forms – Scripting Object

SERVER SIDE PROGRAMMING

Dynamic Web content – cascading style sheets – DHTML – XML – Server side includes – communication – Active and Java Server Pages - Ruby enabled applications

ONLINE

Simple applications – on-line databases – monitoring user events – plug-ins –database connectivity – Internet Information Systems – MICROSOFT IIS - EDI application in business – Internet Commerce
– Customization of Internet Commerce.

TEXT BOOK

1. Jason Hunter, William Crawford, "Java Servlet Programming", O' Reilly Publications,1999.
2. Ravi Kalakota and Andrew B Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 1996
3.Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and Java", Prentice Hall of India –QUE,1999
4.Paul JDeitel and Harvey M Deitel, "AJAX, Rich Internet appliactions and web development", Prentice Hall,2008.

REFERENCES

1. Jeffy Dwight, Michael Erwin and Robert Niles, "Using CGI", Prentice Hall of India QUE,2010.
2. Scot Johnson, Keith Ballinger, Davis Chapman, "Using Active server Pages", Prentice Hall of India,1999.
3. Ted coombs, Jason coombs , Brewer, " Active X source book", John wiley,1999
4. Evangelos Petroutsos , " Mastering Visual Basic 6", BPB Publications,1998

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Assistant Professor	CSE / AVIT	rjaichandran@avit.ac.in
2.	Mr. B. Sundaramurthy	Assistant Professor	CSE / VMKVEC	sundharamurthy@vmkvec.edu.in

17CSCC31	RICH INTERNET APPLICATION DEVELOPMENT LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course provides to study Internet programming and Web application development. Students will learn basic principles and techniques for building Internet applications. It provides students with the basic Web page development technologies and an introduction to dynamic Web page development using client-side scripting. Topics include introduction to HTTP protocol and client side programming, XHTML, Cascading Style Sheets, JavaScript DOM, XML, Namespace, DTD, Schema and AJAX.

PREREQUISITE – JAVA PROGRAMMING LAB(17CSCC26)

COURSE OBJECTIVES

1.	To learn CGI Concepts & CGI Programming
2.	To Study DHTML, XML,AJAX
3.	To Study On-Line web application & Internet Concepts

COURSE OUTCOMES

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

CO1 Understand Ajax Web application model and compare with traditional Web Application model (JS,XML,PHP,CSS)	Understand
CO2. Develop Rich Internet Applications using JavaScript, XML, PHP, DOM to communicate with Web Server	Apply
CO3. Develop dynamic Web pages using CSS, validating input data, wrapping applications into a single PHP script	Apply
CO4. Implement Server-Side script to serve client-side requests	Apply
CO5. Develop dynamic web pages using Ajax	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	L	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	S
CO4	S	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS

1. Use HTML5 markup tags for structuring web page
2. Use HTML5 with appropriate CSS properties and elements for styling, formatting, and enhancing web pages
3. Construct and validate web pages using HTML5 and CSS3
4. Implement client-side application logic using JavaScript
5. Define XML related concepts and languages
6. Compare and contrast between HTML and XML
7. Validate XML documents for correctness.
8. Create JSON in JavaScript and insert JSON data into HTML
9. Implement Server-Side script to serve client-side requests
10. Develop dynamic web pages using Ajax technology

TEXT BOOK

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, , "Internet and World Wide Web", Prentice Hall; 5 edition (2011-11)

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.K.Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr. S.Muthuselvan	Assistant Professor (G II)	CSE / AVIT	muthuselvan@avit.ac.in

17CSCC16	CLOUD COMPUTING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To study and understand the concepts in cloud computing and apply them practically.

PREREQUISITE : COMPUTER NETWORKS

COURSE OBJECTIVES

1.	To understand cloud computing concepts.
2.	To study various cloud services.
3.	To apply cloud computing in collaboration with other services.
4.	To Apply cloud computing services.
5.	To apply cloud computing online.

COURSE OUTCOMES

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

CO1: Understand basics in Cloud Computing	Understand
CO2: Apply cloud computing concepts in real time	Apply
CO3: Develop cloud computing projects	Apply
CO4: Apply cloud services	Apply
CO5: Able to collaborate cloud services with other 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	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage –Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

DEVELOPING CLOUD SERVICES

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

USING CLOUD SERVICES

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.

COLLABORATING ONLINE

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services –Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

TEXT BOOKS

1. Rajkumar Buyya, James Broberg, Andzej M.Goscinski, "Cloud Computing –Principles and aradigms",John Wiley & Sons,2010.

2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.

REFERENCES

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring. Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Professor	CSE / AVIT	rjaichandran@avit.ac.in
2.	T.Geetha	Assistant professor	CSE / VMKVEC	geetha_kcs@yahoo.com

17AICC02	INFORMATION SECURITY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To provide an introduction to the need for Information Security in real time and to study techniques involved in it.

PREREQUISITE: Computer Networks

COURSE OBJECTIVES

1.	To study foundational theory behind informationsecurity
2.	To study basic principles and techniques whendesigning a secure system
3.	To study the attacks and defenses work in practice
4.	To learn about the threats for their significance
5.	To learn about the protections and limitations providedby today's technology

COURSE OUTCOMES

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

CO1. Understand the foundational theory behind informationsecurity	Understand
CO2. Understand the basic principles and techniques whendesigning a secure system	Understand
CO3. Learn how today's attacks and defenses work in practice	Understand
CO4. Learn how to assess threats for their significance	Understand
CO5. Infer the protections and limitations providedby today's technology	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	M	M
CO2.	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3.	M	M	S	M	M	-	-	-	-	-	-	-	M	M	M
CO4.	S	M	M	M		-	-	-	-	-	-	-	M	M	S
CO5.	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

An Overview of Computer Security, Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

INFORMATION SECURITY MANAGEMENT

Cryptography- Key management – Session and Interchange keys, Key exchange and generation, Cryptographic Key Infrastructure, Storing and Revoking Keys, Digital Signatures, Cipher Techniques.

SECURITY DESIGN AND ACCESS CONTROL MECHANISMS

Systems: Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem.

SECURITY ATTACKS FOR CLIENT/ SERVER SYSTEMS

Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection

INFORMATION SECURITY RISK MANAGEMENT

Network Security, System Security, User Security and Program Security

TEXT BOOK

1.Matt Bishop ,"Computer Security art and science ", Second Edition, Pearson Education

REFERENCE BOOKS

1. Mark Merkow, James Breithaupt " Information Security : Principles and Practices" First Edition, Pearson Education,

2. Whitman, "Principles of Information Security", Second Edition, Pearson Education

3. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education.

4. "Security in Computing", Charles P.Pfleeger and Shari Lawrence Pfleeger, Third Edition.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in
2.	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSCC15	C# AND .NET APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To provide an introduction to the .NET framework and enable the student to program in C#.

PREREQUISITE: Java Programming

COURSE OBJECTIVES

1.	To study basic and advanced features of the C# language
2.	To create form based and web based applications
3.	To study the internals of the .NET framework
4.	To learn about ADO.Net
5.	To learn about different web services

COURSE OUTCOMES

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

CO1. Learn the basics of .net Frame work and C# language	Understand
CO2. Learn C# elements and OOPS concepts	Apply
CO3. Learn interface and inheritance concepts in C# language	Analyze
CO4. Learn fundamentals of window application programming and create a window Application	Apply
CO5. Develop web applications and learn advanced	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	M	-	-	-	-	-	-	-	M	-	-
CO2.	S	M	M	L	L	-	-	-	-	-	-	-	M	M	M
CO3.	S	M	S	-	M	-	-	-	-	-	-	-	M	M	M
CO4.	S	M	L	-	M	-	-	-	-	-	-	-	M	M	-
CO5.	S	M	L	L	M	-	-	-	-	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION:

Overview Of .Net-Advantages Of .Net Over Other Languages-Assemblies-.Net Architecture-The Role of C# In The .Net Enterprise Architecture-The Common Language Runtime-C# Basics-Objects And Types-Inheritance –Arrays.

OBJECT ORIENTED ASPECTS OF C#:

Operators and Casts: Operators - Type Safety - Operator Overloading - User-Defined Casts. Delegates and Events: Delegates – Events. Strings and Regular Expressions: System.String -Regular Expressions. Collections: Collection Interfaces and Types – Lists - Queues – Stacks -Linked Lists - Sorted Lists – Dictionaries – Hash Set - Bit Arrays – Performance-Indexers.

I/O AND NETWORKPROGRAMMING:

Tracing and events - threading and synchronization - .Net security – localization –Manipulating XML - Managing the file system – basic networkprogramming.

ADO.NET: #:

Data Access: ADO.NET Overview - Using Database Connections – Commands - Fast Data Access: The Data Reader - Managing Data and Relationships: The DataSet Class – XML Schemas: Generating Code with XSD – Working with ADO.NET. Windows Forms: Creating a Windows Form Application - Control Class - Standard Controls and Components – Forms. Data Binding: The Data Grid View Control - Data Grid View Class Hierarchy - Data Binding - Visual Studio .NET and Data Access.

ASP.NET AND WEB SERVICES:

ASP.NET Pages: ASP.NET Introduction - ASP.NET Web Forms - ADO.NET and Data Binding.ASP.NET Development: User and Custom Controls - Master Pages - Site Navigation – Security –Themes- Web Parts. ASP.NET AJAX: What Is Ajax - What Is ASP.NET AJAX - Using ASP.NET AJAX.

TEXT BOOK

1. Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Professional C# 2008, Wiley Publishing, Inc., 2008. ISBN:978-8-126-51627-8.

REFERENCE BOOKS

1. Andrew Troelsen, “C# and the .NET Platform”, A! Press,2005.
2. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill,2004.
3. Kevin Hoffman, “Visual C# 2005”, Pearson Education,2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. T. Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in
2.	Mrs. R. Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in

17CSCC30	C# AND .NET APPLICATION DEVELOPMENT LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To gain programming knowledge in C#&.Net Framework.

PREREQUISITE : JAVA PROGRAMMING LAB(17CSCC26)

COURSE OBJECTIVES

1.	Distinguish between by value, by ref, and out parameter types.
2.	Call class methods using by value, by ref, and out parameters.
3.	To be able to define and use global named constants
4.	To be able to debug a program of syntax and logic errors
5.	Introduce to .Net IDE Component Framework.
6.	Programming concepts in .Net Framework.
7.	Creating website using ASP.Net Controls.

COURSE OUTCOMES

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

CO1. Create Simple application using web controls	Understand
CO2. Work with States of ASP.NET Pages & Adrotator Control	Apply
CO3. Use of calendar control, Tree view control & Validation controls	Analyze
CO4. Query textbox and Displaying records & Display records by using database	Apply
CO5. Data list link control & Data binding using drop downlist control	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	S	-	--	-	-	-	-	-	M	M	S
CO2.	M	M	M	M	M	-	--	-	-	-	-	-	M	M	M
CO3.	M	M	S	M	M	-	--	-	-	-	-	-	M	M	M
CO4.	S	M	M	M	M	-	--	-	-	-	-	-	M	M	M
CO5.	S	M	M	M	M	-	--	-	-	-	-	-	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS:

1. Classes and Objects using out, ref and params
2. Student Information System using Properties
3. Banking Application using Inheritance
4. Library Management using Predefined Interfaces
5. Students Admission using User defined Interfaces
6. Solving Postfix Expressions using Stack
7. Solving Complex Numbers using Operator Overloading
8. Matrix Addition, Subtraction, Multiplication and Division using Delegates
9. User Subscription for News Events using Events
10. Calculator using Windows Application
11. Advanced Windows Controls

TEXT BOOK:

1. Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Professional C# 2008, Wiley Publishing, Inc., 2008. ISBN: 978-8-126-51627-8.

REFERENCE BOOKS:

1. Andrew Troelsen, "C# and the .NET Platform", A! Press, 2005.
2. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
3. Kevin Hoffman, "Visual C# 2005", Pearson Education, 2006.
4. Laboratory Reference Manual.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. S. Leelavathi	Assistant Professor G-II	CSE / AVIT	leelavathi@avit.ac.in
2.	Mrs. T. Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17AICC03	UNIX INTERNALS (Theory + Practice)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE

This talk is a brief guide to UNIX programming languages, tools and concepts. It is aimed at programming novices or programmers migrating from a Windows system. The aim is to introduce you to the concepts, the possibilities and the tools used in Unixprogramming.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand the design of the UNIX operating system
2.	To become familiar with the various data structures used

COURSE OUTCOMES

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

CO1: Learn the basic Unix operating systems and its basic commands.	Understand
CO2: Analyze the buffers and kernel representation.	Analyze
CO3: Analyze the UNIX system structure, system calls.	Analyze
CO4: Understand UNIX segmentation, scheduling, paging.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M
CO2	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M
CO3	S	M	L	-	L	-	-	-	-	-	-	M	S	M	M
CO4	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

General Review of the System-History-System structure-User Perspective-Operating System Services- Assumptions About Hardware. Introduction to the Kernel-Architecture System Concepts-Data Structures- System Administration Lab1 - Installation of Unix operating system, Lab2 - User management in Unix, Lab3 - Study of Unix general purpose utility command

DISK BLOCKS

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages. Internal Representation of Files-Inodes- Structure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks -Other File Types, Lab4 - Study of Unix networking commands, Lab5 - Study of Unix file system , Lab6 - Study of bash commands.

FILE SYSTEM

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat- Fstat-Pipes-Dup-Mount-Unmount-Link-Unlink-File System Abstraction-Maintenance. Lab7- Study File and directory permissions, Lab8-Study of Editor , Lab9-Study of File System Management

PROCESS MANAGEMENT

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context-Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting-Invokingother Programs-The Shell-System Boot and the INIT Process. Lab10- Study of Shell script, Lab11- Implementation of Shell script, Lab12 - Study of process management

MEMORY MANAGEMENT

Memory Management Policies-Swapping-Demand Paging-a Hybrid System-I/O Subsystem-Driver Interfaces-Disk Drivers-Terminal Drivers. Lab13- study of grep, awk, perl scripts , Lab14- study of Memory management, Lab15- study of User management.

TEXT BOOKS

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education 2002.

REFERENCES

1. UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
2. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications,2004.
3. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.
4. M. Beck et al, “Linux KernelProgramming

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr. S. Muthuselvan	Assitant Professor (G-II)	CSE / AVIT	muthuselvan@avit.ac.in
2.	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSCC14	ARTIFICIAL INTELLIGENCE	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. This is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE :NIL

COURSE OBJECTIVES

1.	To identify the kind of problems that can be solved using AI technique: to know the relation between AI and other areas of computer science.
2.	To have knowledge of generic problem-solving methods in AI..
3.	To design software agents to solve a problem.
4.	To apply the knowledge of algorithms to solve arithmetic problems.
5.	To assemble an efficient code for engineering problems.

COURSE OUTCOMES

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

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: Know about the problem solving technique in Artificial Intelligence.	Apply
CO3: Construct the normal form and represent the knowledge.	Apply
CO4: Know about extension of condition probability and how to apply in the real time environment.	Apply
CO5: Learn about Information Retrieval and Speech Recognition	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	-	-	-	-	-	-	M	S	M	-
CO2	M	M	L	M	L	-	-	-	-	-	M	M	S	M	M
CO3	M	-	S	M	M	-	-	-	-	-	-	M	S	-	M
CO4	S	M	M	M	M	-	-	-	-	-	-	M	S	M	M
CO5	S	M	M	M	M	-	-	-	-	-	-	M	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

PROBLEM SOLVING

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed Search Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

KNOWLEDGE REPRESENTATION

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining- Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

MACHINE LEARNING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATION

AI Applications-Language Models-Information Retrieval-Information Extraction-Natural Language Processing-Machine Translation-Speech Recognition

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2015.
2. Bratko, I., Prolog Programming For Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th Edition, 2011..

REFERENCES

1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: A Logical Approach", Oxford University Press, 2004.

2. G. Luger, "Artificial Intelligence: Structures and Strategies For Complex Problem Solving", Fourth Edition, Pearson Education, 2002.

3. J. Nilsson, "Artificial Intelligence: A New Synthesis", Elsevier Publishers, 1998.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate professor	CSE / AVIT	rajaprakash@avit.ac.in.
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkv.ac.in

17AICC04	ARTIFICIAL INTELLIGENCE LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. This is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE :NIL

COURSE OBJECTIVES

1.	To identify the kind of problems that can be solved using AI technique: to know the relation between AI and other areas of computer science.
2.	To have knowledge of generic problem-solving methods in AI..
3.	To design software agents to solve a problem.
4.	Apply the knowledge of algorithms to solve arithmetic problems.
5.	Assemble an efficient code for engineering problems.

COURSE OUTCOMES

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

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: Know about the problem solving technique in Artificial Intelligence.	Apply
CO3: Construct the normal form and represent the knowledge.	Apply
CO4: Know about extension of condition probability and how to apply in the real time environment.	Apply
CO5: Learn about Information Retrieval and Speech Recognition	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	-	-	-	-	-	-	M	S	M	-
CO2	M	M	L	M	L	-	-	-	-	-	M	M	S	M	M
CO3	M	M	S	M	M	-	-	-	-	-	-	M	S	-	M
CO4	S	M	M	M	M	-	-	-	-	-	-	M	S	M	M
CO5	S	M	M	M	M	-	-	-	-	-	-	M	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS

1. Write a program to implement BFS
2. Write a program to implement DFS
3. Write a program to implement Minimum Spanning Tree – Kruskal's algorithm
4. Write a program to implement Minimum Spanning Tree – Prim's algorithm
5. Write a program to implement 8 puzzle problem
6. Write a program to implement A* algorithm
7. Write a program to implement Travelling Salesman Problem

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2015.
2. Bratko, I., Prolog Programming For Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th Edition, 2011..

REFERENCES

1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: A Logical Approach", Oxford University Press, 2004.

2. G. Luger, "Artificial Intelligence: Structures and Strategies For Complex Problem Solving", Fourth Edition, Pearson Education, 2002.

3. J. Nilsson, "Artificial Intelligence: A New Synthesis", Elsevier Publishers, 1998.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in
2.	Dr.Nithya	Professor	CSE / VMVKEC	nithya@vmkv.ac.in

17CSEC27	SOFT COMPUTING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students to learn about Artificial Intelligence, intelligent agent, Knowledge Representation, Machine learning, and its application. It is useful to know how to represent knowledge in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE: ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real-world problems
2.	Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms. Use of ANN, Fuzzy sets to solve hard real-world problems
3.	To give an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
4.	To study aboutAlgorithm

COURSE OUTCOMES

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

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: know about the problem solving technique in Artificial Intelligence	Apply
CO3: Construct the normal form and represent the knowledge	Apply
CO4: Identify the extension of condition probability and how to apply in the real time environment.	Analyze
CO5: Apply the Information Retrieval and Speech Recognition in the real-world problems	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	S	S	M
CO2	S	M	L	-	-	-	-	-	-	-	-	L	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	-	S	-	M
CO4	S	S	S	-	-	-	-	-	-	-	-	M	M	M	M
CO5	S	M	M	-	-	-	-	-	-	-	-	-	M	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUZZY SET THEORY

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

OPTIMIZATION

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed Search Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

NEURAL NETWORKS

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining- Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

NEURO FUZZY MODELING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS

1.J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2011

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill,1997.
2. DavisE.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y.,1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI,2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston,2005.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	V.Amirthalingam	Assistant Professor	CSE / VMKVEC	amirhalingam@vmkvec.edu.in

17AICC05	MACHINE LEARNING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To provide an in-depth knowledge about machine learning concepts and identify applications suitable for different types of machine learning with suitable justification.

PREREQUISITE: ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To study the outline the key concepts of machine learning
2.	To understand the supervised learning and classification techniques
3.	To apply the concept of unsupervised learning and Clustering for applications
4.	To infer theoretical and practical aspects of reinforcement learning

COURSE OUTCOMES

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

CO1: Outline the key concepts of machine learning	Understand
CO2: Summarize supervised learning and classification techniques	Understand
CO3: Apply the concept of unsupervised learning and Clustering for applications	Apply
CO4: Infer theoretical and practical aspects of reinforcement learning	Understand
CO5: Infer theoretical and practical aspects of reinforcement learning	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	-	-
CO2	S	S	S	L	-	L	-	L	L	-	L	L	S	M	L
CO3	S	S	M	L	-	L	-	L	L	-	L	L	S	M	L
CO4	S	L	M	L	-	L	-	-	-	-	-	L	-	-	-
CO5	S	L	S	-	-	L	-	L	-	-	-	L	-	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Machine Learning - Examples of machine learning applications- Types of machine learning –Model selection and generalization – Guidelines for Machine Learning Experiments

SUPERVISED LEARNING

Classification - Decision Trees – Univariate Tree –Multivariate Tree - Pruning –Perceptron – Multilayer Perceptron - Back Propagation – Cross Validation and Resampling Methods

UNSUPERVISED LEARNING

Clustering- Mixture densities -K-means - EM Algorithm – Supervised Learning After Clustering- Hierarchical Clustering

DIMENSIONALITY REDUCTION

The Curse of Dimensionality –Subset Collection - Principal Component Analysis - Factor Analysis – Linear Discriminant Analysis

REINFORCEMENT LEARNING

Single State Case – Elements of Reinforcement Learning - Model Based Learning – TemporalDifference Learning – Generalization in Reinforcement Learning - Policy Search

TEXT BOOKS

1. EthemAlpaydin, Introduction to Machine Learning MIT Press, 2014.

REFERENCES

1. Tom M Mitchell, Machine Learning, First Edition, McGraw Hill Education, 2013
2. Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr. S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AICC06	MACHINE LEARNING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To provide an in-depth knowledge about machine learning concepts and identify applications suitable for different types of machine learning with suitable justification.

PREREQUISITE: ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To study the outline the key concepts of machine learning
2.	To understand the supervised learning and classification techniques
3.	To apply the concept of unsupervised learning and Clustering for applications
4.	To infer theoretical and practical aspects of reinforcement learning

COURSE OUTCOMES

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

CO1: Outline the key concepts of machine learning	Understand
CO2: Summarize supervised learning and classification techniques	Understand
CO3: Understand the concept of unsupervised learning and Clustering for applications	Understand
CO4: Infer theoretical and practical aspects of reinforcement learning	Understand
CO5: Infer theoretical and practical aspects of reinforcement learning	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	-	-
CO2	S	S	S	L	-	L	-	L	L	-	L	L	S	M	L
CO3	S	S	M	L	-	L	-	L	L	-	L	L	S	M	L
CO4	S	L	M	L	-	L	-	-	-	-	-	L	-	-	-
CO5	S	L	S	-	-	L	-	L	-	-	-	L	-	L	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

Design of experiments in Machine Learning
Introduction to popular Machine Learning Datasets and Toolkits
Face Recognition using PCA; Practical applications of clustering
Experiments on Supervised classification using MLP, RBF, ANN, SVM and Decision Trees
Applications of Classifiers Ensembles
Sequence classification using HMM
Applications of CNN and RNN
Path planning with Reinforcement learning

TEXT BOOKS

1. Ethem Alpaydin, Introduction to Machine Learning MIT Press, 2014.

REFERENCES

1. Tom M Mitchell, Machine Learning, First Edition, McGraw Hill Education, 2013
2. Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mai l ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr.K.Sasikala	Assistant Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AICC07	DEEP LEARNING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course provides an introduction to the basics of machine learning, neural networks, and Deep learning techniques. This course also provides the learning practice and acquires knowledge on deep learning tools.

PREREQUISITE: ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To study the basics of machine learning, neural networks and deep learning
2.	To study the present the mathematical, statistical and computational challenges of building neural networks
3.	To study the dimensionality reduction techniques
4.	To know deep learning techniques to support real-time applications
5.	To examine the case studies of deep learning techniques

COURSE OUTCOMES

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

CO1: Understand basics of deep learning	Understand
CO2: Implement various deep learning models	Apply
CO3: Realign high dimensional data using reduction techniques	Apply
CO4: Understand and apply scaling up machine learning techniques and associated computing techniques and technologies	Apply
CO5: Analyse optimization and generalization in deep learning	Apply
CO6: Explore the deep learning application	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	-	M	M	M	-	-
CO2	S	S	S	S	M	-	-	M	M	-	M	M	-	-	M
CO3	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO4	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO5	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO6	S	M	M	S	M	-	-	M	M	-	M	M	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximate

DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation andregularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow NetworksConvolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

DIMENSIONALITY REDUCTION

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization- Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience

CASE STUDY AND APPLICATIONS

Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec
- Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

REFERENCE BOOKS

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr. S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AICC08	DEEP LEARNING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To provide an in-depth knowledge about deep learning concepts and identify applications suitable for different types of deep learning with suitable justification.

PREREQUISITE: ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To study the basics of machine learning, neural networks and deep learning
2.	To study the present the mathematical, statistical and computational challenges of building neural networks
3.	To study the dimensionality reduction techniques
4.	To know deep learning techniques to support real-time applications
5.	To examine the case studies of deep learning techniques

COURSE OUTCOMES

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

CO1: Understand basics of deep learning	Understand
CO2: Implement various deep learning models	Apply
CO3: Realign high dimensional data using reduction techniques	Apply
CO4:Understand and apply scaling up machine learning techniques and associated computing techniques and technologies	Apply
CO5: Analyse optimization and generalization in deep learning	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	-	-
CO2	S	S	S	L	-	L	-	L	L	-	L	L	S	M	L
CO3	S	S	M	L	-	L	-	L	L	-	L	L	S	M	L
CO4	S	L	M	L	-	L	-	-	-	-	-	L	-	-	-
CO5	S	L	S	-	-	L	-	L	-	-	-	L	-	L	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a Python program to work on Theanos i) functionswith scalars ii) functions with vectors iii) Functions with scalars and vectors iv) activation functions
2. Write a Python program for Single Layer Neural Network
3. Write a Python program for Two Layer Neural Network
4. Write a Python program for Multiclass Classification
5. Write a Python program for Regression with Keras
6. Write a Python program for Optimizers
7. Write a Python program for Activation Functions
8. Write a Python program for CNN using MNIST dataset
9. Write a Python program for LSTM model using IMDB dataset
10. Write a Python program for getting information on GPUs
11. Write a Python program for Vector Addition
12. Write a Python program for Matrix multiplication

REFERENCE BOOKS:

1. "Deep Learning with Python A Hands-on Introduction", Nikhil Kethkar, Apress, 2017.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R Shobana	Assistant Professor (GII)	CSE / AVIT	shobana@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSCC13	DATA WAREHOUSING AND DATA INING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines.

PREREQUISITE: DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES

1.	Distinguish a data warehouse from an operational database system, and appreciate the needs for developing a data warehouse for large corporation.
2.	Describe the problems and processes involved in the development of a data warehouse
3.	To explain the process of data mining and its importance.

COURSE OUTCOMES

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

CO1: Understand the basics of data warehousing and mining	Understand
CO2: Learn the data preprocessing, language, architectures, concept description.	Apply
CO3: Learn the association rules and its algorithms.	Apply
CO4: Learn the classification and clustering rules and the respective algorithms	Apply
CO5: Know the latest trends about the data warehousing and mining	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	-	M	-	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	L		L	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	L	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION AND DATA WAREHOUSING

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining.

DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

ASSOCIATION RULES

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

CLASSIFICATION AND CLUSTERING

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

RECENT TRENDS

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.

TEXT BOOK

1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, 2001.

REFERENCES

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2004.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
5. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", MeGraw-Hill Edition, 2001.
6. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Assistant Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AICC09	FOUNDATION OF DATA SCIENCE	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Data Science is about drawing useful conclusions from large and diverse data sets through exploration, prediction, and inference. Exploration involves identifying patterns in information. Prediction involves using information we know to make informed guesses about values we wish we knew. Inference involves quantifying our degree of certainty. The primary tools for exploration are visualizations and descriptive statistics, for prediction are machine learning and optimization, and for inferenceare statistical tests and models.Throug hunder standing aparticular domain, the students learn to ask appropriate questions about their data and correctly interpret the answers provided by inferential and computational tools

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To obtain a Comprehensive knowledge of various tools and techniques for Data transformation and visualization
2.	To learn the probability and probabilistic models of datascience
3.	To learn the basic statistics and testing hypothesis for specific problems
4.	To learn about the prediction models

COURSE OUTCOMES

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

CO1: Understand how to apply pre-processing techniques to convert raw data so as to enabl further analysis	Understand
CO2: Understand and apply exploratory data analysis and create insightful visualizations to identify patterns	Understand
CO3: Understand how to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions	Understand
CO4: Understand the statistical foundations of data science and analyze the degree of certainty of predictions using statistical test and models	Understand
CO5: Familiarize with machine learning algorithms for prediction and to derive insights	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	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	-	-	-	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	-	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION:

Data Science, Big Data and Data Science – Datafication - Current landscape of perspectives - Skill sets needed; Matrices - Matrices to represent relations between data, and necessary linear algebraic operations on matrices -Approximately representing matrices by decompositions (SVD and PCA); Statistics: Descriptive Statistics: distributions and probability - Statistical Inference: Populations and samples - Statistical modeling - probability distributions - fitting a model - Hypothesis Testing - Intro to R/ Python.

DATA PREPROCESSING:

Data cleaning - data integration - Data Reduction Data Transformation and Data Discretization.Evaluation of classification methods – Confusion matrix, Students T-tests and ROC curves-Exploratory Data Analysis - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA - The Data Science Process.

BASIC MACHINE LEARNING ALGORITHMS:

Association Rule mining - Linear Regression- Logistic Regression - Classifiers - k-Nearest Neighbors (k-NN), k-means - Decision tree - Naive Bayes- Ensemble Methods - Random Forest. Feature Generation and Feature Selection - Feature Selection algorithms - Filters; Wrappers; Decision Trees; Random Forests.

CLUSTERING:

Choosing distance metrics - Different clustering approaches - hierarchical agglomerative clustering, k-means (Lloyd's algorithm), - DBSCAN - Relative merits of each method - clustering tendency and quality.

DATA VISUALIZATION:

Basic principles, ideas and tools for data visualization.

REFERENCE BOOKS

1. Cathy O'Neil and Rachel Schutt, " Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.
2. Jiawei Han, Micheline Kamber and Jian Pei, " Data Mining: Concepts and Techniques", Third Edition. ISBN 0123814790, 2011.
3. Mohammed J. Zaki and Wagner Miera Jr, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge University Press, 2014.
4. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.
5. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.
6. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2012

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Mrs. T. Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17AICC10	BIG DATA ANALYTICS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course covers foundational techniques and tools required for big data analytics. This course spotlights the concepts, principles, and techniques are applicable in big data analytics environment in industry and real-world experience.

PREREQUISITE

DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES

1.	To understand how big data analytics can leverage into a key component
2.	To understand the big data tools with their applications
3.	To understand the big data reports for the existing tools
4.	To understand the big data applications like MongoDB, Cassandra and Hive.

COURSE OUTCOMES

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

CO1: Understand the basics of digital data and introduction to big data	Understand
CO2: Analyze the basic big data challenges, important and technologies.	Analyze
CO3: Solve big data analytics challenges with the help of Hadoop and MongoDB architecture and technologies.	Apply
CO4: Analyze big data storage like MongoDB, Cassandra and Hive.	Analyze
CO5: Analyze Pig and Hive in terms of processing and to design JasperReports.	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	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

DIGITAL DATA AND INTRODUCTION TO BIG DATA

Types of Digital Data - Structured Data - Semi-Structured Data - Unstructured Data - Introduction to Big Data - What is Big Data - Why Big Data - Traditional Business Intelligence (BI) versus Big Data - Typical Hadoop Environment - Changes in the Realms of Big Data - Coexistence of Big Data and Data Warehouse.

BIG DATA ANALYTICS

What's in Store? - Big Data Analytics - Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Big Data Analytics Important - Technologies for Meet the Challenges Posed by Big Data - Data Science - Data Scientist - Big Data Environment - Analytics Tools.

HADOOP

Introduction to Hadoop - Hadoop Components - Hadoop Conceptual Layer - High Level Architecture of Hadoop - Business Value of Hadoop -Hadoop Distributed File System - Processing Data with Hadoop - MapReduce Daemons - MapReduce working - MapReduce Example - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem.

MONGODB, CASSANDRA AND HIVE

MongoDB - RDBMS and MongoDB - Data Types in MongoDB-CRUD- Introduction to Apache Cassandra - Features of Cassandra - CQL Data Types -CQLSH- Keyspaces-CRUD-Collections- Using a Counter - Time To Live (TTL)-Alter - Import and Export - Export to CSV - Import from CSV - Import from STDIN - Export to STDOUT - System Tables - Practice Examples - Introduction to Hive - Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language - RCFILE Implementation - SERDE - UDF.

PIG AND JASPER REPORTS

Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig: ETL Processing - Pig Latin Overview - Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Type - Piggy Bank - UDF (User Defined Function) - Parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig at Yahoo - Pig versus Hive - Hive Vs Pig - Introduction to Jasper Reports, Jaspersoft Studio - Connecting to MongoDB NoSQL database - Connecting to Cassandra NoSQL Databases

TEXT BOOKS:

1. Big Data and Analytics - Seema Acharya and Subhashini C - Wiley India
2. Big data for dummies - Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman
3. Hadoop: The Definitive Guide by Tom White
4. Hadoop in action - Chuck Lam
5. Hadoop for dummies - Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown

REFERENCES:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Assistant professor G-II	CSE / AVIT	rjaichandran@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkvec.edu.in

17AICC11	BIG DATA ANALYTICS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The subject is intended to give the knowledge of Big Data evolving in every real-time applications and how they are manipulated using the emerging technologies. This course breaks down the walls of complexity in processing Big Data by providing a practical approach to developing Java applications on top of the Hadoop platform. It describes the Hadoop architecture and how to work with the Hadoop Distributed File System (HDFS) and HBase in Ubuntu platform

PREREQUISITE

DATA WAREHOUSING AND DATA MINING

COURSE OBJECTIVES

1.	To understand how big data analytics can leverage into a key component
2.	To understand the big data tools with their applications
3.	To understand the big data reports for the existing tools
4.	To understand the big data applications like MongoDB, Cassandra and Hive.

COURSE OUTCOMES

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

CO1: Understand the Big Data concepts in real time scenario	Understand
CO2: Understand the big data systems and identify the main sources of Big Data in the real world.	Understand
CO3: Demonstrate an ability to use Hadoop framework for processing Big Data for Analytics	Apply
CO4: Evaluate the Map reduce approach for different domain problems	Evaluate
CO5: Analyze Pig and Hive in terms of processing and to design JasperReports.	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	-	-	-	-	-	-	M	M	M	-
CO2	S	M	L	M	M	-	-	-	-	-	-	M	M	M	-
CO3	S	M	L	M	M	-	-	-	-	-	-	M	M	M	-
CO4	S	M	L	M	M	-	-	-	-	-	-	M	M	M	-
CO5	S	M	L	M	M	-	-	-	-	-	-	M	M	M	-

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Install VMWare
2. a. Perform setting up and Installing Hadoop in its three operating modes. i. Standalone. ii. Pseudo distributed. iii. Fully distributed. b. Use web based tools to monitor your Hadoop setup.
3. a. Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations. b. Implement the following file management tasks in Hadoop: i. Adding files and directories ii. Retrieving files iii. Deleting files
4. Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
5. Write a Map Reduce program that mines weather data. Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented
6. Implement matrix multiplication with Hadoop Map Reduce
7. a. Installation of PIG. b. Write Pig Latin scripts sort, group, join, project, and filter your data.
8. a. Run the Pig Latin Scripts to find Word Count. b. Run the Pig Latin Scripts to find a max temp for each and every year.
9. a. Installation of HIVE. b. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

TEXT BOOKS:

1. Big Data and Analytics - Seema Acharya and Subhashini C - Wiley India
2. Big data for dummies - Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman
3. Hadoop: The Definitive Guide by Tom White
4. Hadoop in action - Chuck Lam
5. Hadoop for dummies - Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown

REFERENCES:

1. Frank J Ohlhorst, “Big Data Analytics: Turning Big Data into Big Money”, Wiley and SAS Business Series, 2012.
2. Colleen Mccue, “Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis”, Elsevier, 2007
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Wiley and SAS Business Series, 2012

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Assistant professor G-II	CSE / AVIT	rjaichandran@avit.ac.in

17AICC12	DATA ANALYTICS USING PYTHON	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course will take you from the basics of Python to exploring many different types of data. You will learn how to prepare data for analysis, perform simple statistical analyses, create meaningful data visualizations, predict future trends from data, and more.

PREREQUISITE: PROGRAMMING IN PYTHON

COURSE OBJECTIVES

1.	Understand the basics in Python programming in terms of constructs, control statements, string functions
2.	To learn to use Pandas DataFrames, Numpy multi-dimentional arrays, and SciPy libraries to work with a various datasets
3.	To learn about pandas, an open-source library, and we will use it to load, manipulate, analyze, and visualize cool datasets.
4.	To introduce another open-source library, scikit-learn, and we will use some of its machine learning algorithms to build smart models and make cool predictions

COURSE OUTCOMES

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

CO1: Understand the basics in Python programming in terms of constructs, control statements, string functions	Understand
CO2: To use Pandas DataFrames, Numpy multi-dimentional arrays, and SciPy libraries to work with a various datasets	Understand
CO3: To use pandas, an open-source library, and we will use it to load, manipulate, analyze, and visualize cool datasets.	Understand
CO4: To use scikit-learn, and we will use some of its machine learning algorithms to build smart models and make cool predictions	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	-	M	-	-	-	-	-	-	M	S	S	M
CO2	S	M	S	-	M	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	M	-	-	-	-	-	-	M	S	-	M
CO4	S	M	S	-	M	-	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

PYTHON BASICS:

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping-Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions

SEQUENCE DATATYPES AND OBJECT_ORIENTED PROGRAMMING

Sequences, Mapping and Sets- Dictionaries- -Classes: Classes and Instances-Inheritance-Exceptional Handling-Introduction to Regular Expressions using "re" module.

USING NUMPY

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays-Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Array.

DATA MANIPULATION WITH PANDAS

Introduction to Pandas Objects-Data indexing and Selection-Operating on Data in Pandas-Handling Missing Data-Hierarchical Indexing - Combining Data Sets - Aggregation and Grouping-Pivot Tables-Vectorized String Operations -Working with Time Series-High Performance Pandas- and query()

VISUALIZATION WITH MATPLOTLIB:

Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots-Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars-Three-Dimensional Plotting in Matplotlib.

REFERENCES

1. Jake VanderPlas ,Python Data Science Handbook - Essential Tools for Working with Data, O'Reily Media,Inc, 2016
2. Zhang.Y ,An Introduction to Python and Computer Programming, Springer Publications,2016
3. Joel Grus ,Data Science from Scratch First Principles with Python, O'Reilly Media,2016
4. T.R.Padmanabhan, Programming with Python,Springer Publications,2016

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSCC05	SOFTWARE ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This course aims at introducing to the students about the product that is to be engineered and the process that provides a framework for the engineering technology. The course facilitates the students to analyze risk in software design and quality and to plan, design, develop and validate the software project.

PREREQUISITE:

NIL

COURSE OBJECTIVES

1.	To be aware of generic models to structure the software development process.
2.	To understand fundamental concepts of requirements engineering and requirements specification.
3.	To understand different notion of complexity at both the module and system level.
4.	To be aware of some widely known design methods.
5.	To understand the role and contents of testing activities in different life cycle phases.

COURSE OUTCOMES

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

CO1. Explain a process model for a software project Development.	Understand
CO2. Prepare the SRS, Life Cycle Models.	Apply
CO3. Apply Design document, Project plan of a given software system, Project Management and Requirement analysis, Principles to S/W project development.	Apply
CO4. Analyze the cost estimate and problem complexity using various estimation techniques.	Analyse
CO5. Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing.	Apply
CO6. Explain the advantages of Design Process, configuration management and risk management activities	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	L	-	-	-	-	-	-	S	S	S	M	M
CO2	S	M	M	M	-	-	-	-	-	-	S	S	S	M	M
CO3	S	M	S	L	-	-	-	-	-	-	S	S	S	M	M
CO4	S	M	L	L	-	-	-	-	-	-	S	L	S	M	S
CO5	S	M	M	M	-	-	-	-	-	-	S	M	S	M	S
CO6	S	M	M	L	-	-	-	-	-	-	S	M	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

SOFTWARE

Introduction – S/W Engineering paradigm -SDLC– Software Process.

LIFE CYCLE MODELS

Linear Sequential Model- Prototyping Model-RAD Model-Evolutionary Software Process Models-Component Based Development - Project Planning Objectives – Software Scope – Resources – Software Project Estimation – Empirical Estimation Models – Make/Buy Decision-Functional and Non Functional requirements –software requirement specification (SRS) – Requirement Engineering process-Feasibility studies.

PLANNING AND ESTIMATION

System Engineering-Analysis Concepts - Design Process & concepts – Design Principles –Effective Modular Design – Design Heuristics– Design Model – The status of software Architecture-Architecture Styles-case Study: Keyword in context- Software Design Description (SDD).

REQUIREMENT ENGINEERING TASKS

Requirements Management, Structured coding Techniques-Coding Styles-Standards and Guidelines- Software testing Fundamentals-Types of testing - Quality Concepts – Quality Movement - Software Quality Assurance – Software Reviews — Formal Approaches to SQA - Software Reliability – ISO 9000 Quality Standards – SQA Plan.

SOFTWARE CONFIGURATION MANAGEMENT

Introduction about software configuration management – the SCM process –identification of objects in the software configuration – version control – change control – configuration audit – status reporting – SCM standards –software Documentation-seven rules for sound documentation..

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, McGraw-Hill Education; 8th edition, 2014.
2. Ian sommerville, ”Software Engineering“, Tenth Edition, Pearson Education Asia, 2018.
3. Mary Shaw, David Garlan,”Software Architecture- a perspectives on an Emerging Discipline

REFERENCES:

1. Watts S.Humphrey,”A Discipline for Software Engineering”, Pearson Education, 2007.
2. James F.Peters and Witold Pedrycz, ”Software Engineering, An Engineering Approach”, Riley-India, 2007

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1.	Mr. B. Sundaramurthy	Assistant Professor	CSE / VMKVEC	sundaramurthy@vmkvec.edu.in
2.	Mr. K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSCC10	OBJECT ORIENTED ANALYSIS AND DESIGN	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This syllabus is intended for the Engineering students and enable them to lean about basic concepts of designing object oriented systems and its application in Programming. This syllabus helps the students to develop software by identifying and implementing a set of objects and their interactions to meet the desired objectives..

PREREQUISITE:

Object Oriented Programming.

COURSE OBJECTIVES

1.	To impart basic knowledge in analyzing the software systems so that the student will understand the object oriented concepts and they can design the object oriented systems effectively.
2.	To inculcate the knowledge of various UML (Unified Modeling language)diagrams
3.	To lay foundation for practical applications of object oriented concepts in programming aspects

COURSE OUTCOMES

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

CO1: To learn about various UML diagrams and design patterns	Understand
CO2: To do case study on various real time systems and applying design patterns	Apply
CO3: To Practice the for the basic concepts	Apply
CO4: To implement the design to code and perform testing	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	M	M	-	-	-	M	-	-	M	S	M	M
CO3	S	M	S	S	M	-	-	-	-	-	-	L	S	M	M
CO4	S	M	M	-	M	-	-	-	L	-	M	L	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO OOAD

Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

DESIGN PATTERNS

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer

CASE STUDY

Case study – the Next Gen POS system, Inception –Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition

APPLYING DESIGN PATTERNS

System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns

CODING AND TESTING

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

TEXT BOOKS:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development‖, Third Edition, Pearson Education
2. Object Oriented Analysis And Design By Brahama Dathan & Sranath Ramnath.

REFERENCES:

1. Simon Bennett, Steve Mc Robb and Ray Farmer, ―Object Oriented Systems Analysis and Design Using UML‖, Fourth Edition, Mc-Graw Hill Education
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software‖, Addison-Wesley
3. Martin Fowler, ―UML Distilled: A Brief Guide to the Standard Object Modeling Language‖, Third edition, Addison Wesley

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in
2.	Mrs.S. Leelavathy	Assistant Professor	CSE / AVIT	leelavathy@avit.ac.in

17CSCC27	CASE TOOLS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

Scope of this lab is to understand the application of case tools, which focuses on the Software engineering activities.

PRERQUISITE : Object Oriented Analysis and Design

COURSE OBJECTIVES

1.	Software requirements analysis and specification
2.	Software design
3.	Software implementation
4.	Software testing and maintenance
5.	Communication skills and teamwork.
6.	Modelling techniques and CASE tools
7.	Software project planning and management

COURSE OUTCOMES

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

CO1. Design and implement projects using OO concepts	Apply
CO2. Use the UML analysis and design diagrams	Apply
CO3. Apply appropriate design patterns.	Apply
CO4. Create code from design.	Apply
CO5. Compare and contrast various testing 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	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	M	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

List of Experiment

1. Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.
2. Program Analysis and Project Planning. Thorough study of the problem – Identify project scope, Objectives, Infrastructure.
3. Software requirement Analysis Describe the individual Phases / Modules of the project, Identify deliverables.
4. Data Modelling Use work products – Data dictionary, Use diagrams and activity diagrams, build and test lass diagrams, Sequence diagrams and add interface to class diagrams.
5. Software Development and Debugging
6. Software Testing
7. Prepare test plan, perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy, Site check and Site monitor.
8. Create an Application for any 2 of the following :
    - Quiz System
    - Student Marks Analyzing System
    - Online Ticket Reservation System
    - Payroll System
    - Course Registration System
    - Expert Systems
    - ATM Systems
    - Stock Maintenance
    - Real-Time Scheduler
    - Remote Procedure Call Implementation

Reference Books

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999
2. Martin Fowler, "UML Distilled", Second Edition, PHI/Pearson Education, 2002. (UNIT II).
3. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.
4. James Rumbaugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.
5. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in
2.	Mrs.S. Leelavathy	Assistant Professor	CSE /AVIT	leelavathy@avit.ac.in

17CSCC17	CYBER SECURITY	Category	L	T	P	Credit
		CC	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.	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	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	M	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M		-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

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. Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, "Cyber security: The Essential Body of Knowledge", Cengage Learning, 2012

REFERENCES

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	Asst professor G-II	CSE / AVIT	rjaichandran@avit.ac.in
2.	V.Amirthalingam	Assistant Professor	CSE / VMKVEC	amirthalingam@vmkvec.edu.in

17CSCC32	DESIGN PATTERNS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:
This course is indented to cover various software design patterns. The course covers the rationale and benefits of object-oriented software design patterns. Numerous problems will be studied to investigate the implementation of good design patterns.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To understand the Design patterns that are common in software applications
2.	To understand how these patterns are related to Object Oriented design.

COURSE OUTCOMES

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

CO1.specific object oriented design problem the pattern solves.	Understand
CO2. Perform the analysis of the software-to-be-developed using an object oriented approach	Apply
CO3 Prepare the refined list of entities, their attributes and relationships, design the object types and their interfaces, concrete classes and types for the software-to-be developed.	Apply
CO4. Implement the pattern in Java to a real world problem.	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	M	M	M	L	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION
Object and object orientation –Need for analysis and design – Difference and boundary between analysis and design- The Micro development process – The Macro Development process. Three models **–** Subject matter model – Object type model – Technical model.

SUBJECT & OBJECT TYPE MODEL
Subject matter model **–** Modelling – Entities – Properties and connections - Objects – Type Design – CRC. Technical Model – Inheritance – Encapsulation - Relationships - Implementation inheritance and abstract class

DESIGN PATTERNS: CREATIONAL PATTERNS
Abstract Factory- Builder – Factory Method – Object Pool – Prototype – Singleton.

STRUCTURAL PATTERNS

Adapter- Bridge- Composite- Decorator – Facade – Flyweight – Private Class Data – Proxy.

BEHAVIORAL PATTERNS

Chain of responsibility – Command – Interpreter - Iterator – Mediator – Memento – Null Object – Observer - State – Strategy – Template Method – Visitor Design patterns in cloud, Business process management and Automation testing.

TEXT BOOKS:

1. Eric Freeman & Elisabeth Robson: Head First Design Patterns, O"REILLY, 2014.

REFERENCES:

1. Grady Booch, Robert A.Maksimchuk, Michael W.Engel, Bobbi J.Young, Jim Conallen, Kelli A. Houston, Object Oriented Analysis and Design with Applications, Third Edition, Addison- Wesley, 2011
2. John Deacon, Object Oriented Analysis and Design, First Edition, Addison Wesley, 2005.

COURSE DESIGNERS

S. No	Name of the faculty	Designation	Department	Email Id
1.	Mr. R. Bharanidharan	Associate Professor	CSE / VMKVEC	bharanidharan@vmkvec.edu.in
2.	Mr. S.Muthuselvan	Assistant Professor (G II)	CSE / AVIT	muthuselvan@avit.ac.in

17AICC13	DATA SCIENCE USING R PROGRAMMING (Theory + Practice)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE

In this course you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment, discuss generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. Topics in statistical data analysis and optimization will provide working example.

PREREQUISITE

DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES

1.	Understand the basics in R programming in terms of constructs, control statements, string functions
2.	Understand the use of R for Big Data analytics
3.	Learn to apply R programming for Text processing
4.	Able to appreciate and apply the R programming from a statistical perspective

COURSE OUTCOMES

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

CO1: Understand the basics in R programming in terms of constructs, control statements, string functions	Understand
CO2: Understand the use of R for Big Data analytics	Understand
CO3: Learn to apply R programming for Text processing	Understand
CO4: Appreciate and apply the R programming from a statistical perspective	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	-	-	-	-	-	-	-	-	M	S	S	M
CO2	S	M	S	-	-	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	M	S	-	M
CO4	S	M	S	-	-	-	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

R INSTALLATION, SETUP AND LINEAR REGRESSION

Download and install R – R IDE environments – Why R – Getting started with R – Vectors and Data Frames – Loading Data Frames – Data analysis with summary statistics and scatter plots – Summary tables - Working with Script Files, Linear Regression – Introduction – Regression model for one variable regression – Selecting best model – Error measures SSE, SST, RMSE, R2 – Interpreting R2 – Multiple linear regression – Lasso and ridge regression – Correlation – Recitation – Lab Program 1. Using with and without R objects on console Lab Program 2. Using mathematical functions on console Lab Program 3. Write an R script, to create R objects for calculator application and save in a specified location in disk

LOGISTIC REGRESSION

Logistic Regression – The Logit – Confusion matrix – sensitivity, specificity – ROC curve – Threshold selection with ROC curve – Making predictions – Area under the ROC curve (AUC) - Recitation – Lab Programs 4. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars& cars datasets. Lab Programs 5. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset. Lab Programs 6. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location., Reading Excel data sheet in R, Reading XML dataset in R.

DECISION TREES: Approaches to missing data – Data imputation – Multiple imputation – Classification and Regression Tress (CART) – CART with Cross Validation – Predictions from CART – ROC curve for CART – Random Forests – Building many trees – Parameter selection – K-fold Cross Validation – Recitation – Lab Programs 7. Find the data distributions using box and scatter plot, Lab Programs 8. Find the outliers using plot, Plot the histogram, bar chart and pie chart on sample data. Lab Program 9. Find the correlation matrix, Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data, analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

TEXT ANALYTICS USING NLP:

Using text as data – Text analytics – Natural language processing – Bag of words – Stemming – word clouds – Recitation – Time series analysis – Clustering – k-mean clustering – Random forest with clustering – Understanding cluster patterns – Impact of clustering – Heatmaps – Recitation – Lab Programs 10. Apply multiple regressions, if data have a continuous independent variable. Lab Programs 11. Apply regression Model techniques to predict the data, Lab Programs 12. Apply NLP techniques to find the contents based on the positive or negative reviews for any dataset.

ENSEMBLE MODELLING:

Support Vector Machines – Gradient Boosting – Naive Bayes - Bayesian GLM – GLMNET - Ensemble modeling – Experimenting with all of the above approaches with and without data imputation and assessing predictive accuracy – Recitation – Lab programs 13 Apply SVM techniques on any prediction problem, Lab Program 14. Naïve Bayes techniques on any prediction problem. Lab 15. Lab 9. Apply Clustering algorithms for unsupervised classification and plot the cluster data using R visualizations.

TEXT BOOKS

1. .Hands-on programming with R, Garrett Grolemund, O'Reilley, 1st Edition, 2014

2. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley, 2014

REFERENCES

1. Beginning R – The Statistical Programming Language, Mark Gardener, Wiley,2015

2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R, Robert Knell, Amazon Digital South Asia Services Inc, 2013.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AIEC01	NEURAL NETWORKS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. This is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real-world problems
2.	Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms. Use of ANN, Fuzzy sets to solve hard real-world problems
3.	To give an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
4.	To study aboutAlgorithm

COURSE OUTCOMES

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

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: Know about the problem solving technique in Artificial Intelligence	Apply
CO3: Construct the normal form and represent the knowledge	Apply
CO4: Identify the extension of condition probability and how to apply in the real time environment.	Analyze
CO5: Apply the Information Retrieval and Speech Recognition in the real-world problems	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	S	S	M
CO2	S	M	L	-	-	-	-	-	-	-	-	L	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	-	S	-	M
CO4	S	S	S	-	-	-	-	-	-	-	-	M	M	M	M
CO5	S	M	M	-	-	-	-	-	-	-	-	-	M	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUZZY SET THEORY

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

OPTIMIZATION

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed earch Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

NEURAL NETWORKS

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining- Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

NEURO FUZZY MODELING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS

1.J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2011

REFERENCES

Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
DavisE.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 2005.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr.S.Senthil kumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in

17CSEC13	HUMAN COMPUTER INTERACTION	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

Human-Computer Interaction (HCI) is a multidisciplinary field of study concentrating on the plan of PC innovation and, specifically, the association between people (the users) and PCs. While at first worried about PCs, HCI has since extended to cover all types of data innovation plan.

PREREQUISITE

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	Learn the foundations of Human Computer Interaction
2.	Be familiar with the design technologies for individuals and persons with disabilities
3.	Be aware of mobile HCI
4.	To learn the mobile human computer interaction
5.	Learn the guidelines for user interface

COURSE OUTCOMES

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

CO1: Understand the foundations of human computer interaction	Understand
CO2: Understand fundamental design and evaluation Methodologies of human computer interaction.	Apply
CO3: Understand the models and theories of HCI	Apply
CO4: Demonstrate knowledge of human computer interaction design concepts and related methodologies	Apply
CO5: Apply theories and concepts associated with effective work design to real world application and web interface design	Apply

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

S- Strong; M-Medium; L-Low

SYLLABUS

FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

DESIGN & SOFTWARE PROCESS

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

MODELS AND THEORIES

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

MOBILE HCI

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

WEB INTERFACE DESIGN

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

TEXT BOOKS

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II &III)

2. Brian Fling, "Mobile Design and Development", First Edition , O"Reilly Media Inc., 2009 (UNIT–IV)

REFERENCES

1. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O"Reilly, 2009.(UNIT-V).

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17AIEC02	NATURAL LANGUAGE PROCESSING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course will cover the techniques, models, and algorithms that enable computers to deal withthe ambiguity and implicit structure of natural language. The computational and linguisticaspectsof natural language will be dealt with. How Knowledge will be extracted from unstructured text by identifying references to named entities as well as stated relationships between such entities,will be taught.

PREREQUISITE

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To introduce the fundamentals of Language processing from the algorithmic viewpoint.
2.	To discuss various issues those make natural language processing a hard task.
3.	To discuss some applications of Natural Language Processing (NLP).

COURSE OUTCOMES

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

CO1: To understand thefundamental concepts of Natural Language Processing.	Understand
CO2: To understand the algorithm design forNLP tasks	Understand
CO3: To apply usefulsystems for language processing and relatedtasks involving text processing	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	S	M
CO2	S	M	L	-	-	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	-	S	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to Natural Language Understanding- Levels oflanguage analysis- Syntax, Semantics, ragmatics.Linguistic Background- An Outline of English Syntax

LEXICONS

Lexicons, POS Tagging, Word Senses.Grammars and Parsing- Features, Agreement and Augmented Grammars.

SEMANTICS AND LOGICAL FORM

Linking Syntax and SemanticsAmbiguity Resolution- other Strategies for SemanticInterpretation- Scoping and the Interpretation of NounPhrases.

KNOWLEDGE REASONING AND REPRESENTATION

Local DiscourseContext and Reference- Using World Knowledge- DiscourseStructure- Defining a Conversational Agent.

APPLICATIONS

Machine Translation, Information Retrievaland Extraction, Text Categorization and Summarization

TEXT BOOKS

1. James Allen, Natural Language Understanding, The Benjamin/Cummings Publishing Company Inc., Redwood City, CA.

2. D. Jurafsky and J. H. Martin, Speech and Language Processing, Prentice Hall India.

REFERENCES

1. Charniak, Eugene, Introduction to Artificial intelligence, Addison-Wesley.

2. Ricardo Baeza-Yates and BerthierRibeiro-Neto, Modern Information Retrieval, AddisonWesley,1999.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	V.Amirthalingam	Assistant Professor	CSE / VMKVEC	amirthalingam@vmkvec.edu.in

17AIEC03	REINFORCEMENT LEARNING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

Sequential decision-making is one of the major topics in machine learning. From experience, the task is to decide the sequence of actions to perform in an uncertain environment in order to achieve some goals that may not necessarily seem beneficial in near future but are optimal for getting better long term reward. Reinforcement learning (RL) is a paradigm that proposes a formal framework to this problem. The aim of the course will be to familiarize the students with the basic concepts as well as with the state-of-the-art research literature in deep reinforcement learning. After completion the students will be able to (a) structure a reinforcement learning problem, (b) understand and apply basic RL algorithms for simple sequential decision making problems in uncertain conditions. (c) evaluate the performance of the solution (d) interpret state-of-the-art RL research and communicate their results.

PREREQUISITE

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To introduce the fundamentals of Reinforcement Learning system that knows how to make automated decisions
2.	To understand how RL relates to and fits under the broader umbrella of machine learning, deep learning, supervised and unsupervised learning
3.	To understand how to formalize your task as a RL problem, and how to begin implementing a solution.

COURSE OUTCOMES

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

CO1: To introduce the fundamentals of Reinforcement Learning system that knows how to make automated decisions	Understand
CO2: To understand how RL relates to and fits under the broader umbrella of machine learning, deep learning, supervised and unsupervised learning	Understand
CO3: To understand how to formalize your task as a RL problem, and how to begin implementing a solution.	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	S	S	M
CO2	S	M	M	-	-	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	M	S	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Course logistics and overview. Origin and history of Reinforcement Learning research. Its connections with other related fields and with different branches of machine learning. Probability Primer : Brush up of Probability concepts - Axioms of probability, concepts of random variables, PMF, PDFs, CDFs, Expectation. Concepts of joint and multiple random variables, joint, conditional and marginal distributions. Correlation and independence.

MARKOV DECISION PROCESS

Introduction to RL terminology, Markov property, Markov chains, Markov reward process (MRP). Introduction to and proof of Bellman equations for MRPs along with proof of existence of solution to Bellman equations in MRP. Introduction to Markov decision process (MDP), state and action value functions, Bellman expectation equations, optimality of value functions and policies, Bellman optimality equations.

PREDICTION AND CONTROL BY DYNAMIC PROGRAMMING

Overiew of dynamic programing for MDP, definition and formulation of planning in MDPs, principle of optimality, iterative policy evaluation, policy iteration, value iteration, Banach fixed point theorem, proof of contraction mapping property of Bellman expectation and optimality operators, proof of convergence of policy evalutation and value iteration algorithms, DP extensions.

MONTE CARLO METHODS FOR MODEL FREE PREDICTION AND CONTROL

Overiew of Monte Carlo methods for model free RL, First visit and every visit Monte Carlo, Monte Carlo control, On policy and off policy learning, Importance sampling. TD Methods: Incremental Monte Carlo Methods for Model Free Prediction, Overview TD(0), TD(1) and TD(λ), k-step estimators, unified view of DP, MC and TD evaluation methods, TD Control methods - SARSA, Q-Learning and their variants.

FUNCTION APPROXIMATION METHODS

Getting started with the function approximation methods, Revisiting risk minimization, gradient descent from Machine Learning, Gradient MC and Semi-gradient TD(0) algorithms, Eligibility trace for function approximation, Afterstates, Control with function approximation, Least squares, Experience replay in deep Q-Networks. Policy Gradients: Getting started with policy gradient methods, Log-derivative trick, Naive REINFORCE algorithm, bias and variance in Reinforcement Learning, Reducing variance in policy gradient estimates, baselines, advantage function, actor-critic methods

TEXT BOOKS

Reinforcement Learning: An Introduction", Richard S. Sutton and Andrew G. Barto, 2nd Edition
Probability, Statistics, and Random Processes for Electrical Engineering", 3rd Edition, Alberto Leon-Garcia.
Machine Learning: A Probabilistic Perspective", Kevin P. Murphy

REFERENCES

Richard S. Sutton, Andrew G. Barto, Reinforcement Learning: An Introduction, Second edition, MIT Press,2018

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkv.edu.in

17AIEC04	BIG DATA SECURITY	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

In this course you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment, discuss generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. Topics in statistical data analysis and optimization will provide working example.

PREREQUISITE

BIG DATA ANALYTICS

COURSE OBJECTIVES

1.	To understand the mathematical foundations of security principles
2.	To appreciate the different aspects of encryption techniques
3.	To understand the role played by authentication in security
4.	To understand the security concerns of big-data.

COURSE OUTCOMES

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

CO1: To understand the mathematical foundations of security principles	Understand
CO2: To appreciate the different aspects of encryption techniques	Understand
CO3: To understand the role played by authentication in security	Understand
CO4: To understand the security concerns of big-data	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	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

SYMMETRIC TECHNIQUES
Probability and Information Theory - Algebraic foundations – Number theory - Substitution Ciphers – Transposition Ciphers – Classical Ciphers – DES – AES – Confidentiality Modes of Operation

ASYMMETRIC TECHNIQUES
Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Elliptic curve architecture and cryptography – Data Integrity techniques.

AUTHENTICATION
Authentication requirements – Authentication functions – Message authentication codes – Hash functions – Security of hash functions and MACS – MD5 Message Digest algorithm – Secure hash algorithm.

SECURITY ANALYTICS I
Introduction to Security Analytics – Techniques in Analytics – Analysis in everyday life – Challenges in Intrusion and Incident Identification – Analysis of Log file – Simulation and Security Process.

SECURITY ANALYTICS II
Access Analytics – Security Analysis with Text Mining – Security Intelligence – Security Breaches

REFERENCESBOOKS:
William Stallings, "Crpyptography and Network security: Principles and Practices", Pearson/PHI, 5th Edition, 2010.
2. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education, 2nd Edition, 2010.
3. Douglas R. Stinson ,"Cryptography Theory and Practice ", Chapman & Hall/CRC, 3rd Edition, 2006.
4. Mark Talabis, Robert McPherson, I Miyamoto and Jason Martin, "Information Security Analytics: Finding Security Insights, Patterns, and Anomalies in Big Data",Syngress Media, U.S., 2014.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R. Latha	Assistant Professor	CSE / AVIT	rlatha@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17AIEC05	DATA VISUALIZATION TECHNIQUES	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

Visualization is increasingly important in this era where the use of data is growing in many different fields. Data visualization techniques allow people to use their perception to better understand this data. The goal of this course is to introduce students to data visualization including both the principles and techniques. Students will learn the value of visualization, specific techniques in information visualization and scientific visualization, and how understand how to best leverage visualization methods.

PREREQUISITE

DATA WAREHOUSING AND DATA MINING

COURSE OBJECTIVES

1.	To understand how accurately represent voluminous complex data set in web and fromother data sources
2.	To understand the methodologies used to visualize large data sets
3.	To understand the process involved in data visualization and security aspects involved in data visualization

COURSE OUTCOMES

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

CO1: Understand how accurately represent voluminous complex data set in web and fromother data sources	Understand
CO2: Understand the methodologies used to visualize large data sets	Understand
CO3: Uunderstand the process involved in data visualization and security aspects involved in data visualization	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	**S**	M	M
CO2	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Context of data visualization – Definition, Methodology, Visualization design objectives. KeyFactors – Purpose, visualization function and tone, visualization design options – Datarepresentation, Data Presentation, Seven stages of data visualization, widgets, data visualizationtools.

VISUALIZING DATA METHODS

Mapping - Time series - Connections and correlations - Scatterplot maps - Trees, Hierarchies andRecursion - Networks and Graphs, Info graphics

VISUALIZING DATA PROCESS

Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files forUse with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder,Asynchronous Image Downloads, Advanced Web Techniques, Using a Database, Dealing with a Large Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best,Text Markup Languages, Regular Expressions (regexps), Grammars and BNF Notation,Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work.

INTERACTIVE DATA VISUALIZATION

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts –Geomapping – Exporting, Framework – T3, .js, tablo.

SECURITY DATA VISUALIZATION

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization -Intrusion detection log visualization -Attacking and defending visualization systems - Creatingsecurity visualization system.

REFERENCES

1. Scott Murray, “Interactive data visualization for the web”, O‟Reilly Media, Inc., 2013.
2. Ben Fry, “Visualizing Data”, O‟Reilly Media, Inc., 2007.
3. Greg Conti, “Security Data Visualization: Graphical Techniques for Network Analysis”, No Starch Press Inc, 2007

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Jaichandran	Associate Professor	CSE / AVIT	rjaichandran@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSEC05	CLOUD COMPUTING SECURITY	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course cloud computing security introduces the basic concepts of security in cloud services and crypto systems in cloud services, which are widely used in the design of cloud computing security. The security issues in virtualization system, virtualization technology, virtualization attacks and legal issues are also considered with in this course.

PREREQUISITE

CLOUD COMPUTING, CYBER SECURITY

COURSE OBJECTIVES

1.	To understand cloud computing security concepts
2.	To study various cloud services
3.	To apply cloud computing in collaboration with other services
4.	To understand the cloud computing services
5.	To apply cloud computing online

COURSE OUTCOMES

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

CO1: Understand basic service concepts of cloud computing	Understand
CO2: Understand and apply security issues in cloud computing	Analyze
CO3: Apply virtualization techniques	Apply
CO4: Understand and apply the attacks concepts in virtualization	Apply
CO5: Understand and apply legal issues in cloud services	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	-	-	-	M	S	M	M
CO2	S	M	L	-	M	-	-	M	-	-	-	M	S	M	M
CO3	S	M	L	-	M	-	-	M	-	-	-	M	S	M	M
CO4	S	M	L	-	M	-	-	M	-	-	-	M	S	M	M
CO5	S	M	L	-	M	-	-	M	-	-	-	M	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Security in Cloud Services (PaaS, IaaS and SaaS). Authentication in cloud services, open SSL, key management and crypto systems in cloud services: stream ciphers, block ciphers, modes of operation, hashing, digital signatures.

SECURITY ISSSUES

Security Issues in Virtualization System: ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery. Vulnerabilities in virtual machine, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

VIRTUALIZATION TECHNOLOGY

IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management, Data Loss Prevention. Location of the Perimeter.

VIRTUALIZATION ATTACKS

Guest hopping, attacks on VM (attack on control of VM, code injection into virtualized file structure), VM migration attack, hyperjacking.

LEGAL ISSUES

Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer

TEXT BOOKS

1. TimMather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance” O'Reilly Media; 1 edition [ISBN: 0596802765], 2009.
2. Ronald L. Krutz, Russell Dean Vines, “Cloud Security” [ISBN: 0470589876], 2010.

REFERENCES

1. John Rittinghouse, James Ransome, “Cloud Computing” CRC Press; 1 edition [ISBN: 1439806802], 2009.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Jaichandran	Associate Professor	CSE / AVIT	rjaichandran@avit.ac.in
2.	Dr. S. Senthilkumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in

17CSEC07	DATA CENTRE VIRTUALIZATION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course focuses on the challenges in setting up a data center. Resource monitoring using hypervisors and access control to virtual machines will be covered in depth in this course. Setting up of a virtual data center and how to manage them with software interfaces will be discussed in detail

PREREQUISITE

DATABASE MANAGEMENT SYSTEM

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
4.	To learn about Resource monitoring and virtual machine data Protection

COURSE OUTCOMES

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

CO1: Explain the concept of data center and Evolution of Data Centre	Understand
CO2: Apply enterprise-level virtualization machines through software management interfaces, Environments connectivity.	Apply
CO3: Illustrate the virtualization deployment, modification, management; monitoring and migration methodologies	Apply
CO4: Analyze the utility in Windows Vista and later, displays information about the use of hardware and software resources in real time.	Analyze
CO5: Develop the resource monitoring and virtual machine data Protection skills.	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	**S**	M	-
CO2	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	-	M
CO4	S	M	L	-	L	-	-	-	-	-	-	M	**S**	M	M
CO5	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	-

SYLLABUS

DATA CENTER CHALLENGES

How server, desktop, network Virtualization and cloud computing reduce data centre footprint, environmental impact and power requirements by driving server consolidation; Evolution of Data Centres: The evolution of computing infrastructures and architectures from standalone servers to rack optimized blade servers and unified computing systems (UCS).

ENTERPRISE-LEVEL VIRTUALIZATION

Provision, monitoring and management of a virtual datacenter and multiple enterprise-level virtual servers and virtual machines through software management interfaces; Networking and Storage in Enterprise Virtualized Environments - Connectivity to storage area and IP networks from within virtualized environments using industry standard protocols

VIRTUAL MACHINES & ACCESS CONTROL

Virtual machine deployment, modification, management; monitoring and migration methodologies.

RESOURCE MONITORING

Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor

VIRTUAL MACHINE DATA PROTECTION

Backup and recovery of virtual machines using data recovery techniques; Scalability - Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability : Virtualization high availability and redundancy techniques.

TEXT BOOKS

1. Mickey Iqbal, "IT Virtualization Best Practices: A Lean, Green Virtualized Data Center Approach", MC Press [ISBN: 978-1583473542]2012.

2. Mike Laverick, "VMware vSphere 4 Implementation" Tata McGraw-Hill Osborne Media; 1 edition [ISBN: 978-0071664523],2012.

3. Jason W. McCarty, Scott Lowe, Matthew K. Johnson, "VMware vSphere 4 AdministrationInstant

REFERENCES

1. BrianPerry,ChrisHuss,Jeantet Fields,"VCPVMwareCertifiedProfessionalonvSphere4 StudyGuide"Sybex; edition [ISBN: 978-0470569610],2013.

2. Jason Kappel, Anthony Velte, Toby Velte, "Microsoft Virtualization with Hyper-V: Manage Your Datacenter with Hyper-V, Virtual PC, Virtual Server, and Application Virtualization" McGraw-Hill Osborne [ISBN: 978-007161

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	T.Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17CSEC02	AGILE METHODOLOGIES	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

Software Development is an umbrella term for an arrangement of strategies and practices in light of the qualities and standards communicated in the Agile Manifesto. Arrangements advance through coordinated effort between self-sorting out, cross-utilitarian groups using the suitable practices for their specific circumstance.

PREREQUISITE

SOFTWARE ENGINEERING

COURSE OBJECTIVES

1.	To understand the background and driving forces for taking an Agile approach to software development
2.	To obtain practical knowledge of agile development frameworks and be able to distinguish between agile and traditional project management methodologies.
3.	To Examine various metrics for adopting agile software engineering
4.	Describe how an unit tests is executed from beginning to end.
5.	Identify the approaches, tools and scenarios to introduce Agile to your organization effectively
6.	To design automated build tools, version control and continuous integration

COURSE OUTCOMES

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

CO1: Identify the fundamentals of agile and scrum framework	Understand
CO2: Apply design principles and refactoring to achieve Agility.	Apply
CO3: Reduce the risks in Test driven approach in agile projects	Analyze
CO4: Implement a real software project that implements agile execution techniques	Apply
CO5: Deploy a firm basis for adopting agile methodology, regardless of the industry/professional sector.	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	S	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	S	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	S	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	S	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF AGILE

The Genesis of Agile- Introduction and background- Agile Manifesto and Principles- Overview of Scrum- Extreme Programming- Feature Driven development- Lean Software Development- Agile project management- Design and development practices in Agile projects- Test Driven Development- Continuous Integration- Refactoring- Pair Programming- Simple Design- User Stories- Agile Testing- Agile Tools.

AGILE SCRUM FRAMEWORK

Introduction to Scrum- Project phases- Agile Estimation- Planning game- Product backlog- Sprint backlog- Iteration planning- User story definition- Characteristics and content of user stories- Acceptance tests and Verifying stories- Project velocity- Burn down chart- Sprint planning and retrospective- Daily scrum- Scrum roles – Product Owner- Scrum Master- Scrum Team- Scrum case study- Tools for Agile project management.

AGILE TESTING

The Agile lifecycle and its impact on testing- Test-Driven Development (TDD)- xUnit framework and tools for TDD- Testing user stories - acceptance tests and scenarios- Planning and managing testing cycle- Exploratory testing- Risk based testing- Regression tests- Test Automation- Tools to support the Agile tester.

AGILE SOFTWARE DESIGN AND DEVELOPMENT

Agile design practices- Role of design Principles including Single Responsibility Principle- Open Closed Principle- Liskov Substitution Principle- Interface Segregation Principles- Dependency Inversion Principle in Agile Design- Need and significance of Refactoring- Refactoring Techniques- Continuous Integration- Automated build tools- Version control.

INDUSTRY TRENDS

Market scenario and adoption of Agile- Agile ALM- Roles in an Agile project- Agile applicability- Agile in Distributed teams- Business benefits- Challenges in Agile- Risks and Mitigation- Agile projects on Cloud- Balancing Agility with Discipline- Agile rapid development technologies

TEXT BOOKS

1. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 21 Mar2008.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 25 Oct2002.
3. Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", AddisonWesley, 30 Dec 2008
4. www.it-ebooks.info/tag/agile
5. http://martinfowler.com/agile.html

REFERENCES

1. Alistair Cockburn, "Agile Software Development: The Cooperative Game", Addison Wesley, 19 Oct2006.
2. Mike Cohn Publisher, "User Stories Applied: For Agile Software", Addison Wesley, 1 Mar2004

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSEC04	BIO METRICS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

To explore how biological information could be stored in digital form to create biometric resources and how the same may be processed.

PREREQUISITE

INFORMATION SECURITY

COURSE OBJECTIVES

1.	To understand the concepts of Biometrics, to enable design of biometric system
2.	To understand the basics of Biometrics and its functionalities
3.	To get the exposure the context of Biometric Applications
4.	To learn to develop applications with biometric security

COURSE OUTCOMES

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

CO1: To learn about the concepts of biometric matching for identification	Understand
CO2: To identify algorithms for finger biometric technology	Understand
CO3: Apply facial biometrics for identification	Apply
CO4: Analyze iris biometric, voice biometric, physiological biometrics etc. for identification.	Analyze
CO5: To analyze the use of ethical 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	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

The design cycle of biometric systems – Applications of Biometric systems – Security and priPerson Recognition – Biometric systems –Biometric functionalities: verification, identification – Biometric systems issues.

FINGERPRINT, FACIAL and IRIS RECOGNITION

FINGERPRINT: Friction ridge pattern- finger print acquisition: sensing techniques, image quality –Feature Extraction –matching –indexing. FACE RECOGNITION: Image acquisition: 2D sensors, 3D sensors- Face detection- Feature extraction -matching. Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching- IRIS quality –performance evaluation.

BEHAVIORAL BIOMETRICS AND MULTIBIOMETRICS

Ear detection and - gait feature extraction and matching - hand geometry- soft biometrics - sources of multi-biometrics- Acquisition and processing - Fusion levels.

BIOMETRIC CRYPTOGRAPHY

Protection of biometric data –biometric data shuffling scheme- experimental results –security analysis - cryptographic key Reservation - cryptographic key with biometrics-Revocability in key generation system-Adaptations of Generalized key Regeneration scheme –IRIS Biometrics –Face Biometrics –Extension of Key Regeneration scheme.

ETHICAL USAGE

Public sector Implementation – Border Control – Responsibilities –Customer service – Government sector – Agriculture – Academic Research – Online Communications – Environmental situations – External pressure – Distractions – Implementations issues – Future Works

TEXT BOOKS

1. Anil K Jain and Arun A Roass Karthik Nandedkar, "Introduction to Biometrics", Springer,2011.
2. David Check Ling Ngo,Andrew Beng Jin Teoh,Jiankun Hu "Biometric Security" Cambridge,2015.

REFERENCES

1. LI , S . Z. , AND JAIN, A. K. , Eds. Handbook of Face Recognition. Springer, Heidelberg, Germany,2011.
2. MALTONI , D. , MAIO, D. , JAIN, A. K. , AND PRABHAKAR , S . Handbook of Fingerprint Recognition. Springer,2009.
3. JAIN, L.C. , HALICI, U. , HAYASHI, I. ; LEE, S.B., TSUTSUI, S. Intelligent Biometric Techniques in Fingerprint and Face Recognition. CRC Press,1999.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	R.Bharanidharan	Assistant Professor	CSE / VMKVEC	bharanidharan@vmkvec.edu.in

17CSEC24	OPEN SOURCE SYSTEMS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

The purpose of an open standard is to increase the market for a technology by enabling potential consumers or suppliers of that technology to invest in it without having to either pay monopoly rent or fear litigation on trade secret, copyright, patent, or trademark causes of action. No standard can properly be described as "open" except to the extent it achieves these goals.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	Students will study common open source software licenses, open source project structure
2.	To understand distributed team software development, and current events in the open source world
3.	To learn free and open source components & tools
4.	Students will also work on an open source project and will be expected to make a significant contribution

COURSE OUTCOMES

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

CO1: Explain common open source licenses and the impact of choosing a license	Understand
CO2: Analyze the open source project structure and how to successfully setup a project	Analyze
CO3 Apply the linux based user profile, file security, and file link and management.	Apply
CO4: Knowledge of free and open source tools like libre office, open office.	Apply
CO5: Apply the libre office- presentation like create, open, adding slide, text, background.	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	-	-	-	-	-	-	S	S	S	S
CO2	S	M	M	-	M	-	-	-	-	-	-	M	S	M	-
CO3	S	M	M	M	-	-	-	-	-	-	-	M	S	S	S
CO4	S	S	L	M	M	-	-	-	-	-	-	M	S	M	-
CO5	S	M	L	M	-	-	-	-	-	-	-	M	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

OPEN SOURCE LICENSING

Open Source Licensing, Contract, and Copyright Law-The MIT, BSD, Apache, and Academic Free Licenses-The GPL, LGPL, and Mozilla Licenses-Qt, Artistic, and Creative Commons Licenses-Non-Open Source Licenses.

OPEN SOURCE OPERATING SYSTEM

Linux history-distributions-licensing-installing Linux-working with directories-working with files-working with file contents-the Linux file tree. shell expansion: commands and arguments-control operators-shell variables-file globing. Pipes and commands: I/O redirection-filters -regular expressions. Introduction to vi – scripting: scripting introduction- scripting loops-scripting parameters

LINUX USER MANAGEMENT

local user management- introduction to users-user management-user passwords-user profiles -groups. file security: standard file permissions-advanced file permissions-access control lists-file links.

LIBRE OFFICE –WORD, SPREAD SHEET

Introduction of libre office- WRITER — THE WORD PROCESSOR: Opening a Document -Laying Out the Page-Setting paper size, margins, and orientation -Creating headers and footers -Numbering pages -Entering and Editing Text-Modifying text-Moving and copying text. CALC — THE SPREADSHEET: Creating a Spreadsheet -Inputting Your Data -Entering your data -Editing your data - Filling cells automatically -Managing Columns and Rows-Copying, pasting, cutting, dragging, and dropping your cells -Adding the Art -Formula Basics.

LIBRE OFFICE- PRESENTATION

IMPRESS — THE PRESENTATION Creating a Presentation -Opening an existing presentation -Adding Slides - Adding text to a slide -Saving Your Presentation for Posterity - Making Presentations Picture Perfect -Adding Images - Clipping art -Drawing objects -Coloring Backgrounds - Creating a plain-colored background -Creating a gradient background.

TEXT BOOKS

1. Understanding Open Source and Free Software Licensing By Andrew M. St. Lauren , August 2004 , Pages: 207. (UnitI)

2. Linux study link:https://itsfoss.com/learn-linux-for-free/ (Unit II &Unit III).

3.https://www.libreoffice.org/assets/Uploads/Documentation/en/GS51-GettingStartedLO.pdf (Unit IV &V)

REFERENCES

1. Andy channelle (2009), "Beginning OpenOffice 3",Aprèss.

2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", Sixth Edition, OReilly Media, 2009.

3. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers;2005.

4. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers,2002.

4. Carla Schroder, Linux Cookbook, First Edition, O'Reilly Cookbooks Series,2004.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K. Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	Mr.M.Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSEC17	KNOWLEDGE BASED DECISION SUPPORT SYSTEMS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

The purpose of this course is to impart knowledge on decision support systems and implementation.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To familiarize decision support systems and their characteristics
2.	To study about Intelligent DSS and applications of DSS
3.	To learn Collaborative Computing Technologies
4.	To learn the technologies related to decision support systems
5.	To learn Electronic Commerce and Management-Support Systems.

COURSE OUTCOMES

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

CO1: Understand decision making and computerized support	Understand
CO2: Understand Business Intelligence ,Data Warehousing and Data Mining	Understand
CO3: Understand and apply Collaboration, Communication, Enterprise Decision	Apply
CO4: Understand and apply Artificial Intelligence and Expert Systems over the Internet.	Apply
CO5: Understand and apply Electronic Commerce and Management-Support Systems.	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	M	L	-	-	-	-	-	-	M	**S**	M	M
CO2	M	S	S	S	M	-	-	-	-	-	-	M	M	M	M
CO3	S	M	S	M	M	-	-	-	-	-	-	M	M	-	M
CO4	S	M	S	S	M	-	-	-	-	-	-	M	**S**	S	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	-

S- Strong; M-Medium; L-Low,

SYLLABUS

DECISION MAKING AND COMPUTERIZED SUPPORT
Management Support Systems: An Overview - Decision Making, Systems, Modeling, and Support.

DECISION SUPPORT SYSTEMS
Decision Support Systems: Overview - Modeling and Analysis – Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analysis, and Visualization - Decision Support System Development.

COLLABORATION, COMMUNICATION, ENTERPRISE DECISION
Collaborative Computing Technologies: Group Support Systems -Enterprise Information Systems - knowledge Management.

EVIDENCE COLLECTION AND FORENSICS TOOLS
Artificial Intelligence and Expert Systems: Knowledge-Based System – Knowledge Acquisition, Representation, and Reasoning - Advanced Intelligent Systems - Intelligent Systems over the Internet.

IMPLEMENTING IN THE E-BUSINESS ERA
Electronic Commerce - Integration, Impacts, and the Future of the Management-Support Systems.

TEXT BOOKS

1. Efraim Turban, Jay Aronson E., Ting-Peng Liang, "Decision Support Systems and Intelligent Systems", 7th Edition, Pearson Education, 2013.

REFERENCES

1.Michel R. Klein and Leif B. Methlie, “Knowledge-Based Decision Support Systems With Applications in Business”, , Wiley; 2nd edition

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17CSEC14	INFORMATION RETRIEVAL TECHNIQUES	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Information Retrieval with pertinence to modeling, query operations and indexing.

PREREQUISITE

DATA MINING & DATA WAREHOUSING

COURSE OBJECTIVES

1.	To learn about the basic concepts, practical issues and impact of the web on Information Retrieval
2.	To understand about the various IR models
3.	To get an understanding of machine learning techniques for text classification and clustering
4.	To understand the various applications of Information Retrieval giving emphasis to Multimedia IR
5.	To lay foundation for learning the concepts of digital libraries

COURSE OUTCOMES

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

CO1: Describe the objectives of information retrieval systems	Understand
CO2: Understand about the various IR models	Apply
CO3: Understand the static and dynamic indices and query operations	Apply
CO4: Implement clustering algorithms like hierarchical clustering and classification	Apply
CO5: Understand searching ,ranking and digital libraries	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	M	-	-	-	-	-	M	S	S	S
CO2	S	S	S	M	M	L	-	M	-	-	-	M	S	M	M
CO3	S	L	L	-	L	-	-	-	-	-	-	S	M	S	S
CO4	S	S	S	M	M	M	-	M	-	-	-	M	S	-	S
CO5	S	S	M	M	M	L	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTIO N

Motivation – Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval –Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR — IR Versus Web Search–Components of a Searchengine.

MODELING

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing.

INDEXING

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency.

CLASSIFICATION AND CLUSTERING

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning.

SEARCHING AND RANKING

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking - Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries.

TEXT BOOKS

1. Ricardo Baeza – Yates, BerthierRibeiro – Neto, Modern Information Retrieval: The concepts and Technology behind Search (ACM Press Books), SecondEdition

2.Textbook Retrieval Systems In Information Management by GGChowdhury

REFERENCES

1. ChristopherD.Manning,PrabhakarRaghavan,HinrichSchutze,IntroductiontoInformationRetrieval,Cambridge University Press, First South AsianEdition

2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval Implementing and Evaluating Search Engines, The MIT Press,Cambridge.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R. Latha	Assistant Professor	CSE / AVIT	rlatha@avit.ac.in
2.	Mrs.T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17CSEC16	IT INFRASTRUCTURE AND MANAGEMENT	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

The proposed course exposes the students to understand the features of different technologies involved in IT infrastructure and management.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand the basics of IT infrastructure
2.	To understand the current computing techniques in IT fields
3.	To explore the business models
4.	To understand the different security management and storage management in IT infrastructure
5.	To understand the service delivery concept in IT field

COURSE OUTCOMES

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

CO1: Understand the basics of IT infrastructure	Understand
CO2: Understand the current computing techniques in IT fields	Understand
CO3: Explore the business models	Apply
CO4: Apply the different security management and storage management in IT infrastructure	Apply
CO5: Understand the service delivery concept in IT field	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	-	-	M	S	-	-	-	-	-	M	M	S	S
CO2	S	-	S	-	M	S	-	-	-	-	-	M	M	M	-
CO3	S	M	S	-	M	S	-	-	-	-	-	M	M	S	S
CO4	S	L	S	M	M	M	-	-	-	-	-	L	S	M	-
CO5	S	S	S	M	M	M	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

IT system Management

Common tasks in IT system management, approaches for organization Management, Models in IT system design, IT management systems context diagram, patterns for IT system Management.

IT Infrastructure Management

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

Establishing business value of information system

Information system costs and benefits, Capital budgeting for information system, Real Options pricing models, Limitation of financial models.

Service Delivery and Service Support Management

Service-level management, financial management and advantages of financial management -Service support process, Configuration Management-Incident management.

Storage Management and Security Management

Types of Storage management, Benefits of storage management, backups, Archive, Recovery, Disaster recovery-Introduction Security, Identity management, Single sign-on, Access Management.

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

REFERENCES

1. P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi,2009.

2. J. D. Finnerty, Project financing - Asset-based financial engineering, John Wiley & Sons, New York,1996.

3. A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York,2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	E.Srividhya	Assistant Professor	CSE / AVIT	srividhya@avit.ac.in
2.	Mr.B.Sundaramurthy	Associate Professor	CSE / VMKVEC	sundaramurthy@vmvkec.edu.in

17CSEC33	VIRTUALIZATION TECHNIQUES	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

ThissyllabusisintendedfortheEngineeringstudentsandenablethemtounderstandthebasicsvirtualizationandvirtual machines.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand the concepts of virtualization and virtual machines
2.	To understand the implementation of process and system virtual machines
3.	To explore the aspects of high level language virtual machines
4.	To gain expertise in server, network and storage virtualization
5.	To understand and deploy practical virtualization solutions and enterprise solutions

COURSE OUTCOMES

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

CO1: Install and configure virtualization technology such as VMware	Apply
CO2: Configure and manage virtual network and storage such as vCenter server or ESxi	Apply
CO3: Deploy, manage and migrate virtual machines.	Apply
CO4: Describe the architecture of a Data Center environment with RAID and Intelligent Storage Systems.	Apply
CO5: Configure and manage a Storage Area Network (SAN).	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	-	-	-	-	-	-	-	-	M	S	-	M
CO2	S	M	L	-	M	-	-	-	-	-	-	L	-	M	-
CO3	S	S	M	-	-	-	-	-	-	-	-	M	S	-	M
CO4	S	S	L	-	-	-	-	-	-	-	-		-	M	-
CO5	S	M	L	-	L	-	-	-	-	-	-	L	M	-	S

S- Strong; M-Medium; L-Low

SYLLABUS

OVERVIEW OF VIRTUALIZATION

System architectures - Virtual Machine basics - Process vs System Virtual Machines - Taxonomy. Emulation: Basic Interpretation - Threaded Interpretation - Precoded and Direct Threaded Interpretation - Binary Translation. System Virtual Machines - Key concepts - Resource utilization basics.

PROCESS VIRTUAL MACHINES

Implementation – Compatibility – Levels – Framework – State Mapping – Register – Memory Address Space – Memory Architecture Emulation – Memory Protection – Instruction Emulation – Performance Tradeoff - Staged Emulation – Exception Emulation – Exception Detection – Interrupt Handling – Operating Systems Emulation – Same OS Emulation – Different OS Emulation – System Environment

HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION

HLL virtual machines: Pascal P-Code – Object Oriented HLLVMs - Java VM architecture - Java Native Interface - Common Language Infrastructure. Server virtualization: Partitioning techniques - virtual hardware - uses of virtual servers - server virtualization platforms.

NETWORK AND STORAGE VIRTUALIZATION

Design of Scalable Enterprise Networks – Layer2 Virtualization – VLAN - VFI - Layer 3 Virtualization – VRF - Virtual Firewall Contexts - Network Device Virtualization - Data- Path Virtualization - Routing Protocols. Hardware Devices – SAN backup and recovery techniques – RAID – Classical Storage Model – SNIA Shared Storage Model – Virtual Storage: File System Level and Block Level.

APPLYING VIRTUALIZATION

Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers – Socket Programming – UDP Datagram – Introduction to Java Beans.

TEXT BOOKS

1.Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann,2005.

2. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications,2006.

3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July,2006.

4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress2005.

5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
2.	R.Bharanidharan	Professor	CSE / VMKVEC	bharanidharan@vmkvec.edu.in

17AIEC06	INTRODUCTION TO DRONES	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course provides hands on experience on design, fabrication and flying of UAV category aircraft. Students will get in-depth skill set on design and fabrication techniques of UAV such as drones.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To be able to describe common components of drone
2.	To be able to define acronyms related to drone

COURSE OUTCOMES

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

CO1: Describe the parts and functions of UAV & Indian Aviation regulations of UAV	Understand
CO2: Explain the concepts of Aerodynamics, Propulsion & Structures of Model Aircrafts	Understand
CO3: Describe the working principle and components of UAV	Understand
CO4: Demonstrate the design process of UAV	Apply
CO5: Demonstrate design, fabrication and Flying of UAV	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	S	S	M	-	-	S	S	-	-	-	S	-	-
CO2	S	-	S	S	-	-	-	S	S	-	-	-	-	M	-
CO3	S	-	S	S	-	-	-	S	S	-	-	-	-	M	-
CO4	S	S	S	S	-	-	-	S	S	-	-	-	-	-	-
CO5	S	S	S	S	-	-	-	S	S	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF FLIGHT

Different types of flight vehicles - Components and functions of an airplane - Forces acting on Airplane - Physical properties and structure of the atmosphere - Aerodynamics –Airfoil nomenclature -aerofoil characteristics - Angle of attack, Mach number- Lift and Drag - Propulsion and airplane structures.

UNMANNED AERIAL VEHICLE

Difference between aircraft and UAV - Parts and functions of Fixed, Rotorcraft and flapping wing UAV – various History of UAV's, Types of Drones, Applications and Uses. Characteristics of Multi rotor vehicle, Fixed Wing vehicle, Flapping wing Vehicles and their applications – Defense, Civil, Environmental monitoring (physical, chemical and biological).

PAYLOADS FOR UAV

Payloads – Classification of Payloads – camera – sensors – radars – various measuring devices – classification of payload based on applications – Hyper spectral sensors – laser detection and range – synthetic aperture radar – thermal cameras – ultra sonic detectors - case study on payloads.

LAUNCH AND RECOVERY

Launching systems - UAV Launch Methods for Fixed-Wing Vehicles - Vertical Takeoff and Landing UAV Launch - Recovery systems.

UAV NAVIGATION AND GUIDANCE SYSTEMS

Navigation - Dead Reckoning – Inertial – Radio Navigation – Satellite – Way point Navigation. Dijkstra's Algorithm – A- star Algorithm - UAV Guidance – Types of guidance - UAV communication systems - Ground control station – Telemetry - UAS future

TEXT BOOKS

1. Andey Lennon " Basics of R/C model Aircraft design" Model airplane news publication

REFERENCES

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2	R.Bharanidharan	Professor	CSE / VMKVEC	bharanidharan@vmkvec.edu.in

17AIEC07	BIOSYSTEMS WITH AI	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

The goal of this course is to introduce and apply Artificial Intelligence (AI) tools to problems in Biomedical Engineering. AI algorithms can learn patterns from biomedical data sets to provide actionable insights on disease diagnosis or treatment. This course will focus on practical applications of AI in BME with hands-on tutorials. This course will provide an overview of a wide range of AI and machine-learning tools (e.g. clustering, regression, decision trees, random forests and neural networks), biomedical data sets and diseases.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce general biological concepts in engineering fields
2.	To understand importance of biological concepts in engineering fields
3.	To understand application of engineering concepts in medical instrumentation

COURSE OUTCOMES

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

CO1: Understand the use of basic biology in engineering	Understand
CO2: Understand the relation between AI & healthcare	Understand
CO3: Apply the AI concepts to analyses & predict the medical imaging data	Apply
CO4: Design healthcare devices using AI and its applications in robotic surgery & 3D printing	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	-	-	-	-	S	M	-	-	-	S	S	-	-
CO2	-	M	-	-	M	-	S	M	-	-	-	S	S	M	-
CO3	M	-	-	M	S	-	M	M	M	-	-	M	-	S	-
CO4	S	M	S	-	S	-	S	M	M	-	-	M	-	-	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODCTION TO AI:

A Multifaceted Discipline – Examining Artificial Intelligence – Machine Learning and Data Science – Learning from Real-time, Big Data, Applications of AI in Healthcare – Realizing the Potential of AI in healthcare Data: Data – Types of Data – Big Data Small Data – Meta Data – Healthcare Data Little and Big Use Cases – Evolution of Data and its Analytics – Turning Data into Information Using Big Data – Reasoning – Challenged of Big Data Resistance – Policies and Governance – Fragmentation – Lack of Data Strategy – Visualization – Timeliness of Analysis – Ethics – Data and Information Governance – Deploying a Big Data Project – Big Data Tools

MACHINE LEARNING ALGORITHMS:

Basics – Machine Learning different from Traditional Software Engineering – Machine Learning Basics – How to Perform Machine Learning – Machine Learning Algorithms: Defining the ML project – Common Libraries for Machine Learning – Supervised Learning Algorithms – Decision Tress – Ensembles – Linear Regression – Logistic Regression – SVM – Naïve Bayes – kNN k-Nearest neighbor – Neural Networks – Deep Learning – Unsupervised Learning – Dimensionality Reduction Algorithms – Dimensionality Reduction techniques – Natural Language Processing (NLP): Preprocessing: Lexical Analysis – Syntactic Analysis – Semantic Analysis – Techniques Used within NLP – Genetic Algorithm – Best Practices and Considerations – Use Case: Type 2 Diabetes

OVERVIEW OF HEALTH CARE DATA:

Type of Healthcare data – Structure of Health care Data – Common Data sources for High Utlilizers - Machine Learning Modelling from Health Care Data: Supervised Models – Interpreting supervised Models – Unsupervised Models - Descriptive Analysis of High Utilizers: Threshold-Based Methods for Frequent Emergency Department Users – Temporal Consistency of High Utilizers - Residual Analysis for Identifying High Utilizers: Bata and Methods – Results - Results – Machine Learning Results for High Utilizers – Predicting Hospital Readmissions – Predicting Healthcare expenditure – Clustering Asynchronous Healthcare Encounters Time Series

OVERVIEW OF HEALTHCARE DATA:

Type of Healthcare data – Structure of Health care Data – Common Data sources for High Utlilizers - Machine Learning Modelling from Health Care Data: Supervised Models – Interpreting supervised Models – Unsupervised Models - Descriptive Analysis of High Utilizers: Threshold-Based Methods for Frequent Emergency Department Users – Temporal Consistency of High Utilizers - Residual Analysis for Identifying High Utilizers: Bata and Methods – Results - Results – Machine Learning Results for High Utilizers – Predicting Hospital Readmissions – Predicting Healthcare expenditure – Clustering Asynchronous Healthcare Encounters Time Series

FUTURE OF HEALTHCARE & CASE STUDIES:

Shifting from Volume to Value – Evidence-Based Medicine – Personalized Medicine – Vision of the Future – Connected Medicine – Medication Adherence – Accessible Diagnostic Tests – Smart Implantables – Digital Health and Therapeutics – Incentivized Wellness – AI – Virtual and Augmented Reality – Blockchain – Robots – Smart Places Case Studies: AI for Imaging of Diabetic Foot Concerns and Prioritization of Referral for Improvements in Morbidity and Mortality – Outcomes of a Digitally Delivered, Low Carbohydrate, Type 2 Diabetes Self-Management Program: 1-Year Results of a Single-Arm – Delivering a Scalable and Engaging Digital Therapy for Epilepsy – Improving Learning Outcomes For Junior Doctors Through the Novel use of Augmented and Virtual Reality – Big Data, Big Ehics: Diagnosing Disease Risk from Patient Data

TEXT BOOKS

1. Machine Learning and AI for Healthcare Big Data for Improved health Outcomes, Arjun Panesar, Apress, 2019
2. Data Driven Approaches for Health Care Machine Learning for Identifying High Utilizers, Chengliang Yang, Chris Detcher, Elizabeth Shenkman, Sanjay Ranka, CRC Press, 2020.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R. Latha	Assistant Professor	CSE / AVIT	rlatha@avit.ac.in
2.	R.Bharanidharan	Professor	CSE / VMKVEC	bharanidharan@vmkvec.edu.in

17AIEC08	INTRODUCTION TO DIGITAL SYSTEM	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

The primary aim of this course is to understand the fundamentals behind the digital logic design. From that students can the experience, to design any digital circuits and systems. The course includes fundamentals of Boolean algebra, combinational, sequential circuits and applications of digital electronics. Students can learn the basic programming concepts to implement digital circuits using hardware description language

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To familiarize with various Digital IC
2.	To understand basic fundamentals of Digital circuits
3.	To prepare for various engineering applications

COURSE OUTCOMES

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

CO1: Understand the Number system	Understand
CO2: Understand Digital IC and measure their performance parameters	Understand
CO3: Understand the application of combinational logic	Understand
CO4: Perform experiments and demonstrate combinational and sequential Digital electronics systems with HDL program	Apply
CO5: Solve asynchronous sequential circuits for simple application	Apply
CO6: Explain the applications of digital electronics	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	L	M	-	-	-	-	-	-	-	L	M	-	-
CO2	S	M	L	L	-	-	-	-	-	-	-	-	-	-	-
CO3	S	M	L	L	-	-	-	-	-	-	-	M	M	-	-
CO4	S	-	-	M	-	-	-	-	-	-	-	-	M	-	-
CO5	S	-	-	M	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

NUMBER SYSTEMS & BOOLEAN ALGEBRA

Decimal, binary, octal, hexadecimal number system and conversion, binary weighted & nonweighted codes & code conversion, signed numbers, 1s and 2s complement codes, Binary arithmetic, Binary logic functions , Boolean laws, truth tables, associative and distributive properties, De-Morgan's theorems, realization of switching functions using logic gates.

COMBINATIONAL LOGIC:

Switching equations(Mathematical operations), canonical logic forms, sum of product & product of sums, Karnaugh maps, two, three and four variable Karnaugh maps, simplification of expressions, mixed logic combinational circuits, multiple output functions, Quine Mcluskey Methods for 5 variables. Introduction to combinational circuits, code conversions, decoder, encoder, priority encoder, multiplexers & De-multiplexer, binary adder, subtractor, BCD adder, carry look ahead adder, Binary comparator, Arithmetic Logic Units

SEQUENTIAL LOGIC & CIRCUITS:

Latch, flip-flops, clocked and edge triggered flip-flops, timing specifications, asynchronous and synchronous counters, counter design, Registers, types of registers. Analysis of simple synchronous sequential circuits, Introduction to Mealy and Moore Circuits.

INTRODUCTION TO HARDWARE DESCRIPTION LANGUAGE

Introduction to Verilog / VHDL- Structural, Dataflow and Behavioral modeling. Structural, Dataflow and Behavioral modeling of combinational logic circuits (Multiplexer, Demultiplexer, decoder and encoder). Structural, Dataflow and Behavioral modeling of sequential logic circuits (counters and shift registers)

ASYNCHRONOUS SEQUENTIAL CIRCUITS & ITS APPLICATIONS

Analysis Procedure, Circuits with latches; Design Procedure, Reduction of state and flow table; Race free state assignment; Hazards; ASM chart; Design examples Multiplexing displays - Frequency counters - Time measurements - using the ADC0804 - Slope alone operation, span adjust, zero shift, testing - microprocessor compatible A/D converters.

TEXT BOOKS

1. Digital Electronics, R P Jain, McGraw Hill, 2017, Second Edition
2. Digital Logic and Computer Design, Morris Mano, PHI, 2017 review, Second Edition
3. Digital Electronic Principles, Malvino, PHI, 2011-13, Seventh Edition

REFERENCES

1. Digital Design, John F.Wakerly ,4th Edition, Pearson/PHI, 2006.
2. Digital Fundamentals, Thomas L. Floyd, 8th Edition, Pearson Education Inc, New Delhi, 2003
3. Digital Principles and Design, Donald D.Givone, TMH.
4. Digital Electronics, William H. Gothmann, 2nd Edition, PHI, 1982.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs. R. Latha	Assistant Professor	CSE / AVIT	rlatha@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AIEC09	EMBEDDED PROGRAMMING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course aims at imparting the state of art in Embedded technologies. Participants learn the essential concepts of embedded systems development through a practical hands-on approach utilizing industry design automation (EDA) tools and design kits.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To give the awareness of major embedded devices
2.	To give the knowledge about interfacing devices.
3.	To gain knowledge on the programming concepts for embedded systems
4.	To gain knowledge on embedded design with PIC controllers and Arduino microcontrollers

COURSE OUTCOMES

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

CO1: Explain embedded system concept	Understand
CO2: Describe the embedded operating system	Understand
CO3: Illustrate the hardware fundamentals of embedded system	Apply
CO4: Demonstrate RTOS	Apply
CO5: List the development tools and explain with case studies	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	-	-	-	-	-	-	-	-	M	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	M	M	M		L	-	-	-	-	-	-	-	-	-
CO4	-	M	M	M	L	S	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

PROGRAMMING EMBEDDED SYSTEMS

Embedded Program – Role of Infinite loop – Compiling, Linking and locating – downloading and debugging – Emulators and simulators processor – External peripherals – Memory testing – Flash Memory.

OPERATING SYSTEM

Embedded operating system – Real time characteristics – Selection process – Flashing the LED – serial ports – Zilog 85230 serial controlled code efficiency – Code size – Reducing memory usage – Impact of C++.

HARDWARE FUNDAMENTALS

Buses – DMA – interrupts – Built-ins on the microprocessor – Conventions used on schematics – Microprocessor Architectures – Software Architectures – RTOS Architectures – Selecting and Architecture.

RTOS

Tasks and Task states – Semaphores – Shared data – Message queues, Mail boxes and pipes – Memory management– Interrupt routines – Encapsulating semaphore and queues – Hard Real-time scheduling – Power saving.

EMBEDDED SOFTWARE DEVELOPMENT TOOLS

Host and target machines – Linkers / Locators for Embedded Software – Debugging techniques – Instruction set simulators Laboratory tools – Practical example – Source code.

TEXT BOOKS

1. An Embedded Software Primer, David E.Simon, Pearson Education, 2003.
2. Programming Embedded Systems in C and C++, Michael Bass, O'Reilly, 2003.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. S. Senthilkumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in

17AIEC10	PROBLEM IDENTIFICATION AND DESIGN THINKING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course applies to everyday problems in order to create human-centered innovations. Envisioned as a collaborative lab, it fosters the integration of research, problem-forming and problem-solving, aesthetics, technology, prototyping, and publishing, with a strong focus on user's needs. It will address design needs through research on end users, creating a human-centric point of view as a guide. It will drive students to experiment with ideas, to analyze case studies and to build rapid prototypes, in order to test and communicate the proposed product.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	Introduce students to a discipline, design thinking that enhances innovation activities in terms of value creation, speed, and sustainability. Be exposed to architectural styles and views
2.	Strengthen students individual and collaborative capabilities to identify problems/issues/needs, develop sound hypotheses, collect and analyze appropriate data, and develop ways to collect meaningful feedback in a real-world environment
3.	Teach students to translate broadly defined opportunities into actionable innovation possibilities and recommendations for key stakeholders and their organizations

COURSE OUTCOMES

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

CO1: Explain how design thinking can be applied in a wide range of contexts, from the personal to the global	Understand
CO2: Understand how to please and win as a designers	Understand
CO3: Initiate an attitude of playfulness to aid design thinking	Apply
CO4: Use computing tools and online environments	Apply
CO5: Apply your skills in thinking and visualizing images, words, colour, shapes etc.	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	-	-	-
CO2	S	-	-	-	-	-	-	-	M	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	L	L
CO4	-	S	S		S	-	-	-	M	-	-	M	-	L	L
CO5	-	S	S	-	-	-	-	-	-	-	-	M	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

STAGES OF THINKING:
Why Design Thinking, The Design Process, Stages of Design Thinking, Research- Identifying drivers, Information gathering, Target groups, Samples and feedback

IDEA GENERATION:
Idea generation- Basic design, Themes of thinking, Inspiration and References, Brainstorming ,Value, Inclusion, Sketching, Presenting ideas , Refinement - Thinking in images, Thinking in signs, Appropriation , Humour, Personification, Visual metaphors, Modification, Thinking in words, Words and language , Type 'faces', Thinking in shapes, Thinking in proportions, Thinking in color

REFINEMENT:
Thinking in images – Thinking in signs – Appropriation – Humour – Personification – Visual metaphors – Modification – Thinking in words – Words and language – Type 'faces' – Thinking in shapes – Thinking in proportions – Thinking in colour

PROTOTYPING:
Developing designs, 'Types' of prototype, Vocabulary, Implementation-Format, Materials, Finishing, Media, Scale, Series/Continuity

DESIGNING TO WIN/ PLEASE:
Formula One Designing – Radical innovation – City / Car Design – Learning from Failures – Design Process and Working Methods – Product Innovations – Learning from Failures – Design Process and Working Methods

TEXT BOOKS

1. Designing for Growth: A Design Thinking Tool Kit for Managers, Jeanne Liedtka and Tim Ogilvie , Columbia University Press, 2011
2. Design Thinking: Understanding How Designers Think and Work, Niger Cross , BERG 2011

REFERENCES

1.The Art of Innovation: Lessons in Creativity From IDEO, Tom Kelly , America's Leading Design Firm (Profile Books, 2002)

2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown,Harper Business, 2009

3. The Design of Business: Why Design Thinking Is The Next Competitive Advantage, Roger Martin, (Harvard Business Review Press, 2009)

4. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers , Alexander Osterwalder and Yves Pigneur , John Wiley and Sons, 2010

5. Design Thinking: Understanding How Designers Think and Work, Nigel Cross , Bloomsbury Academic, 2011

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17AIEC11	INTRODUCTION TO ROBOTICS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course will help us to study the basic concepts of robotics and their design and enable the students to understand about the working concepts of robot and its role in automation

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand the basics of robot
2.	To understand the End effectors and robot controls
3.	To understand the Robot Transformations and Sensors
4.	To understand the Robot cell design and applications
5.	To understand the Micro/Nano robotic systems

COURSE OUTCOMES

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

CO1: Enlighten the students about the fundamentals of robotic systems	Understand
CO2: Apply the basic concepts of robot	Apply
CO3: Analyze End effectors and robot control	Analyse
CO4: Formulate Robot Transformations and Sensors	Create
CO5: Develop Robot cell design and applications	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	-	-	-	-	-	-	-	-	-
CO2	-	M	-	-	-	L	-	-	-	-	-	-	-	-	-
CO3	-	M	-	S	-	-	-	S	-	-	-	-	-	-	-
CO4	-	M	-	-	-	L	-	-	-	-	-	-	-	-	-
CO5	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of RobotSpeed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systemsRobot Drive systems-Hydraulic, Pneumatic and Electric system.

END EFFECTORS AND ROBOT CONTROLS

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.

ROBOT TRANSFORMATIONS AND SENSORS

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.

ROBOT CELL DESIGN AND APPLICATIONS

Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications- Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.

MICRO/NANO ROBOTICS SYSTEM

Micro/Nanorobotics system overviewScaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics syst+emNanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system

REFERENCES

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
4. Francis N. Nagy, Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.
5. P.A. Janaki Raman, Robotics and Image Processing anIntroduction, Tata McGraw Hill Publishing company Ltd., 1995.
6. Carl D. Crane and Joseph Duffy, Kinematic Analysis of Robot manipulators, Cambridge University press, 2008.
7. Fu. K. S., Gonzalez. R. C. & Lee C.S.G., "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 1987
8. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999. 9.Ray Asfahl. C., "Robots and Manufacturing Automation", John Wiley & Sons Inc.,1985. 10.Bharat Bhushan., "Springer Handbook of Nanotechnology", Springer, 2004.
9. Julian W. Gardner., "Micro sensor MEMS and Smart Devices", John Wiley & Sons

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K.Karthik	Associate Professor	CSE / AVIT	karthik@avit.ac.in
2.	Dr.K.Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmvkec.edu.in

17AIEC12	DIGITAL IMAGE PROCESSING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course provides an introduction to the fundamental concepts and general principles of image processing. It covers the key stages of digital image processing techniques. Students will also get an opportunity to implement the algorithms that are specific to real time image processing systems/applications

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To learn digital image fundamentals
2.	To be exposed to image processing techniques
3.	To be familiar with segmentation techniques and image compression
4.	To understand applying image processing algorithms to real problems

COURSE OUTCOMES

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

CO1: Understand the need for image transforms and their properties	Understand
CO2: Apply image enhancement and restoration techniques	Apply
CO3: Use the techniques, skills, and modern engineering tools necessary for engineering application to real problems	Apply
CO4: Develop algorithm for image segmentation, image compression & coding	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	M	-	-	L	M	-	-	L	S	-	-
CO2	M	L	L	L	M	L	L	L	M	L	-	M	S	-	-
CO3	M	L	L	L	M	L	L	L	M	L	-	M	-	M	-
CO4	M	L	L	L	M	L	L	L	M	L	-	H	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

DIGITAL IMAGE FUNDAMENTALS

Light and Electromagnetic spectrum, Components of Image processing system, Image formation and digitization concepts, Neighbours of pixel adjacency connectivity, Distance measures, Color fundamentals, Color models.

IMAGE PROCESSING TECHNIQUE

Image Enhancements: In spatial domain: Basic gray level transformations, Histogram processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters. In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.

IMAGE RESTORATION

Image Restoration: Various noise models, image restoration using spatial domain filtering, image restoration using frequency domain filtering, Estimating the degradation function, Inverse filtering.

IMAGE SEGMENTATION

Detection of Discontinuities, Edge linking and boundary Description: Local processing, Global processing, Hough transform, Thresholding & Region based segmentation, Segmentation by Morphological watersheds, Object representation, description and recognition

IMAGE COMPRESSION

Image compression model, Fundamental coding theorem, Lossless compression, Lossy compression

TEXT BOOKS

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 3rd Edition, Prentice Hall India, 2002
2. Fundamentals of Digital Image Processing, A K Jain, Prentice Hall India, 2008.

REFERENCES

1. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Virakumar , McGraw Hill, 3rd Edition, 2010.
2. Digital Image Processing, Chanda Mazumdar, 3rd Edition, Prentice Hall, India, 2000.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Associate Professor(G-II)	CSE / AVIT	rjaichandran@avit.ac.in
2.	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17AIEC13	THEORY OF COMPUTATION	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course helps the learners to know the models of computation, along with their variants in the context of formal languages and their recognizers. This can be applied in designing compilers and pattern recognition system

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages
2.	To introduce the fundamental concepts of formal languages, grammars and automata theory
3.	Classify machines by their power to recognize languages
4.	Employ finite state machines to solve problems in computing
5.	To understand deterministic and non-deterministic machines.
6.	To understand the differences between decidability and un-decidability

COURSE OUTCOMES

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

CO1: Understand the concept of abstract machines and their power to recognize the languages	Understand
CO2: Distinguish between decidability and un-decidability	Understand
CO3: Gain proficiency with mathematical tools and formal methods	Understand
CO4: Employ finite state machines for modeling and solving computing problems	Apply
CO5: Design context free grammars for formal languages	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	S	M	-
CO2	-	S	M	-	M	-	-	-	-	-	-	M	**S**	M	-
CO3	-	-	M	-	S	-	-	-	-	-	-	M	-	M	-
CO4	S	M	M	-	M	-	-	-	-	M	M	M	-	M	S
CO5	-	S	M	-	M	-	-	-	-	-	-	M	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA"s with and without €-moves – Equivalence of finite Automaton.

REGULAR EXPRESSIONS

Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Properties of Regular Languages Pumping Lemma for Regular Languages, Applications of the Pumping Lemma, Closure Properties of Regular Languages, Decision Properties of Regular Languages.

CONTEXT-FREE GRAMMARS:

Chomsky hierarchy of languages.Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Push Down Automata,: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

TURING MACHINES

Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – The Halting problem – Partial Solvability – Problems about Turing machine

UN-DECIDABILITY:

A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Post's Correspondence Problem, Other Undecidable Problems, Intractable Problems: The Classes P and NP, An NP Complete Problem

TEXT BOOKS

1. Introduction to Automata Theory, Languages, and Computation, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education, 3rd Edition.
2. Introduction to the Theory of Computation, Michael Sipser, Cengage Learning, 3rd Edition.

REFERENCES

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson Education.
5. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17AIEC14	GENETIC ALGORITHMS & FUZZY LOGIC SYSTEMS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course will cover fundamental concepts of Artificial Neural Networks (ANNs), Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA), PSO, DE etc

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
2.	To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
3.	To provide the mathematical background for carrying out the optimization associated with neural network learning

COURSE OUTCOMES

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

CO1: Identify and select a suitable Soft Computing technology to solve the problem	Understand
CO2: Design a neural network to solve any problem	Create
CO3: Design fuzzy controller systems	Create
CO4: Construct a solution and implement a Soft Computing solution	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	-	-
CO2	L	-	-	-	-	-	-	S	L	M	-	-	M	-	-
CO3	L	M	-	-	-	-	M	S	L	M	-	-	M	-	-
CO4	L	M	-	-	S	-	-	-	-	-	-	-	H	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BNN

Neural Networks: Introduction to Biological Neural Networks: Neuron physiology, Neuronal diversity, specification of the brain, the eye's Neural Network. Artificial Neural Network Concepts: Neural attributes, modeling learning in ANN, characteristics of ANN, ANN topologies, learning algorithm

NETWORK PARADIGM

Neural Network Paradigm: MeCulloch-Pitts, Model, the perception, Backpropagation networks. Associative Memory, Adaptive Resonance (ART) paradigm, Hopfield Model, Competitive learning Model, Kohonen SelfOrganizing Network

FUZZY SETS

Fuzzy Logic: Introduction to Fuzzy sets: Fuzzy set theory Vs Probability Theory, classical set theory, properties of Fuzzy sets, Operation on Fuzzy sets. Fuzzy relations, Operations of Fuzzy relation, the extension principle. Fuzzy Arithmetic

APPROXIMATE REASONING

Approximate reasoning: Introduction, linguistic variables, Fuzzy proposition, Fuzzy if-then rules. Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models –Tsukamoto Fuzzy Models –Input Space Partitioning and Fuzzy Modeling

GENETIC ALGORITHMS & HYBRID SYSTEMS

Genetic Algorithm – Genetic Modelling - Hybrid systems: Integration of Neural Networks, Fuzzy logic and Genetic Algorithms – GA based backpropagation networks – Fuzzy backpropagation networks – Simplifies Fuzzy ARTMAP - Fuzzy Associative Memories – Fuzzy Logic controlled Genetic systems

TEXT BOOKS

1. Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publishing House, 1994.
2. Neural Network, Fuzzy Logic and Genetic Algorithm, S. Rajshekahran, G.A. Vijaylaxmi Pai, PHI Learning Pvt. Ltd, 2003.

REFERENCES

1. Fuzzy sets & fuzzy logic, George J Klir, B. Yuan, PHI, 1995..
2. Swarm Intelligence: From Natural to Artificial Systems, E. Bonabeau, M. Dorigo, and G. Theraulaz, Oxford University Press, 1999.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17AIEC15	OPTIMIZATION IN MACHINE LEARNING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course introduces a range of machine learning models and optimization tools that are used to apply these models in practice. For the students with some ML background this course will introduce what lies behind the optimization tools often used as a black box as well as an understanding of the trade-offs of numerical accuracy and theoretical and empirical complexity. Through this course the students with some optimization background will introduce a variety of applications arising in machine learning and statistics as well as novel optimization methods targeting these applications

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	Introduces a general mathematical concept of optimization
2.	Skills the students to understand important mathematical models used in computer science branch
3.	Helps to understand the in-depth functioning of the algorithms
4.	Helps to choose the methods in order to improve their performances

COURSE OUTCOMES

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

CO1: Understand the basic concepts in Optimization of Machine Learning algorithms	Understand
CO2: Understand the usage of various methods of Convex Optimization	Understand
CO3: Familiarize with the various Lagrangian methods in Machine Learning	Understand
CO4: Familiarize with the various Newton-type and Robust Optimization methods	Understand
CO5: Familiarize with the methods to improve the performance of the algorithm	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	-	-	M	M	-	-
CO2	S	M	-	-	M	-	-	-	M	-	-	M	M	-	-
CO3	S	M	-	-	M	-	-	-	M	-	-	M	M	-	-
CO4	S	M	-	-	M	-	-	-	M	-	-	M	M	-	-
CO5	S	M	-	-	M	-	-	-	M	-	-	M	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: OPTIMIZATION AND MACHINE LEARNING

Support Vector Machines – Regularized Optimization Convex Optimization with Sparsity-Inducing Norms: Generic Methods – Proximal Methods – Coordinate Descent Algorithms – Reweighted-t2 Algorithms – Working-set Methods – Quantitative Evaluation – Extensions – Interior-Point Methods for Large-Scale Cone Programming: Primal-Dual Interior-Point Methods – Linear and Quadratic programming – Second-Order Cone Programming – Semidefinite Programming

METHODS FOR CONVEX OPTIMIZATION:

Incremental Subgradient-Proximal Methods – Convergence for Methods with Cyclic Order – Convergence for Methods with Randomized Order – Applications – First-Order Methods for Nonsmooth Convex Large-Scale Optimization: Mirror Decent Algorithm: Minimizing over a Simple Set – Problems with Functional Constraints – Minimizing Strongly Convex Functions – Mirror Decent Stochastic Approximation - Mirror Descent for Convex-Concave Saddle-Point Problems – Setting up a Mirror Descent Method – First-Order Methods for Nonsmooth Convex Large-Scale Optimizatio II: Saddle-Point Reformulations of Convex Minimization Problems – Mirror-Pros Algorithm – Accelerating First Order Methods by Randomization – Notes and Remarks

LAGRANGIAN METHODS IN MACHINE LEARNING:

Introduction – Regularized Risk Minimization – Multiple Kernel Learning – Map Inference in graphical Models – Dual Decomposition for Inference: Motivation Applications – Ducal Decomposition and Langrangian Relaxation – Subgradient Algorithms – Block Coordinate Descent Algorithms – Relations to Linear Programming Relaxation – Decoding: Finding the MAP Assignment – Augmented Lagrangian Methods for Learning, Selecting and Combining Features – Proximal Minimization Algorithm – Ducal Augmented Lagrangian (DAL) Algorithm – Convex Optimixation Approach to Regret Minimization: The RFTL Algorithm and Its Analysis – The "Proximal-Dual" Approach – Convexity of Loss Functions – Applications

NEWTON -TYPE METHODS AND ROBUST OPTIMIZATION

Projected Newton-type Methods – Two-Metric Projection Methods – Inexact Projection Methods – Toward Nonsmooth Objectives – Interior-Point Methods in Machine Learning: Background – Polynomial Complexity Result – Interior-Point Methods for Machine Learning – Accelerating Interior-Point Methods – The Tradeoffs of Large-Scale Learning: Approximate Optimization – Asymptotic Analysis – Robust Optimization in Machine Learning – Background on Robust Optimization – Robust Optimization and Regularization – Robustness and Consistency – Robustness and Generalization

METHODS TO IMPROVE PERFORMANCE:

Optimization Versus Learning – Building a Model of the Gradients – The Relative Roles of the Covariance and the Hessian – A Second Order of the Gradients - An Efficient Implementation of Online Consensus Gradient TONGA – Bandit View on Noisy Optimization – Concentration Inequalities – Discrete Optimization – Online Optimization – Optimization Methods for Sparse Inverse Covariance Selection – Block Coordinate Descent Methods – Alternating Linearization Methods – Remarks on Numerical Performance - A Pathwise Algorithm for Covariance Selection: Covariance Selection – Algorithm – Numerical results – Outline Covariance Selection

TEXT BOOKS

1. Suvrit Sra, Sebastaian Nowozin, Stephen J. Wright, Optimization for Machine Learning, The MIT Press, 2012.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
2.	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17AIEC16	PATTERN RECOGNITION AND MACHINE LEARNING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course will help the students to learn the fundamentals of pattern recognition and its relevance to classical and modern problems. It helps to make the students identify where, when and how pattern recognition can be applied. It will make the students to learn the sufficient background necessary to read more advance texts as well as journal articles on the field.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To study statistic, pattern recognition, parametric approaches to study parametric discriminate functions.
2.	To study nonparametric classification, feature extraction, pattern recognition algorithms..
3.	To provide knowledge about statistical, classification, unsupervised and supervised classification, clustering.

COURSE OUTCOMES

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

CO1: Understand and apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as Bayesian parameter estimation	Apply
CO2: Understand and use Cluster and classify the system using non parametric techniques like KNN and clustering	Apply
CO3: Apply and analyze classification problems probabilistically and estimate classifier performance	Analyse
CO4: Design systems and algorithms for pattern recognition, with focus on sequences of patterns that are analyzed	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	S	S	-	S	-	-	M	M	-	M	M	-	S	-
CO2	S	S	S	-	S	-	-	M	M	-	M	M	-	S	-
CO3	S	S	S	-	S	-	-	M	M	-	M	M	-	S	-
CO4	S	S	S	-	S	-	-	M	M	-	M	M	-	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Machine Perception, an Example, Pattern Recognition Systems, The Design Cycle, Learning and Adaption. Recognition with strings, grammatical methods, Rule based Methods.

BAYESIAN DECISION THEORY

Introduction, Bayesian Decision Theory-Continuous Features, Minimum-Error-Rate Classification, Classifiers, Discriminant Functions, and Decision Surfaces, The Normal Density, Discriminant Functions for the Normal Density, Error Probabilities and Integrals, Error Bounds for Normal Densities, Bayes Decision Theory-Discrete Features, Missing and Noisy Features, Bayesian Belief Networks, Compound Bayesian Decision Theory and Context.

MAXIMUM-LIKELIHOOD AND BAYESIAN PARAMETER ESTIMATION

Introduction, Maximum-Likelihood Estimation, Bayesian Estimation, BayesianParameter Estimation: Gaussian Case, Bayesian Parameter Estimation: General Theory, Sufficient Statistics, Problems of Dimensionality, Component Analysis and Discriminants, Expectation Maximization (EM), Hidden Markov Models.

NONPARAMETRIC TECHNIQUES

Introduction, Density Estimation, Parzen Windows, Kn– Nearest-Neighbors Estimation, the Nearest-Neighbor Rule, Metrics and Nearest-Neighbor Classification, Fuzzy Classification, Reduced Coulomb Energy Networks, Approximations by Series Expansions.

UNSUPERVISED LEARNING AND CLUSTERING

Introduction, Mixture Densities and Identifiability, Maximum-Likelihood Estimates, Application to Normal Mixtures, Unsupervised Bayesian Learning, Data Description and Clustering, Criterion Functions for Clustering, Iterative Optimization, Hierarchical Clustering, the Problem of Validity, On-line Clustering, Graph-Theoretic Methods, Component Analysis, Low Dimensional Representations and Multidimensional Scaling (MDS)

TEXT BOOKS

1. Pattern Classification and Scene Analysis, R. O. Duda, P. E.Hart, Pearson Education, 2002.
2. Pattern Classification, Earl Gose, TMH 1998.
3. Syntactic Methods in Pattern Recognition, K. C. Fu, Academic Press, 1980.

REFERENCES

1. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley, 2001.
2. Pattern Recognition, S.Theodoridis and K.Koutroumbas, Academic Press, 4th Edition, 2009.
3. Pattern Recognition and Machine Learning, C.M.Bishop, Springer, 2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2.	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17AIEC17	KERNEL METHODS FOR MACHINE LEARNING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course helps the students to know how kernel methods can be used in various machine learning tasks, including classification, ranking and preference learning, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To familiarize on the concepts of kernel based machine learning
2.	To study on the methods for dimensionality reduction
3.	To gain knowledge on the unsupervised models for cluster analysis
4.	To implement various models for Kernel- ridge regression and SVMs

COURSE OUTCOMES

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

CO1: Understand the fundamental concepts in kernel based machine learning	Understand
CO2: Understand the various methods for dimensionality reduction	Apply
CO3: Understand and apply how unsupervised models work for cluster analysis	Apply
CO4: Apply and analyze various Kernel-Ridge regression models	Analyse
CO5: Apply and analyze various Support Vector Machines and its variants	Analysee

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	-	-	-	S	-	M	-
CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF KERNEL BASED MACHINE LEARNING:
Feature representation and dimension reduction – The learning subspace property (LSP) and "kernelization" aof learning models – Unsupervised learning for cluster discovery – Supervised learning for linear classifiers – Gnereralized inner products and kernel function – Performabce metrics Kernel-induced vector spaces: Mercer kernels and kernel-induced similiarity metrics – Training data independent intrinsic feature vectors – Training data- dependent empirical feature vectors – The kernel-trick for nonvectorial data analysis

DIMENSION_REDUCTION:FEATURE SELECTION AND PCA/KPCA:
Subspace projection and PCA - Numerical methods for computation of PCA – Kernel principal component analysis (KPCA) – Kernel principal component analysis(KPCA) Feature Selection: The filtering approach to feature selection – The wrapper approach to feature selection – Application studies of the feature selection approach

UNSUPERVISED LEARNING MODELS FOR CLUSTER ANALYSIS:
Unsupervised learning for cluster discovery: The similarity metric and clustering strategy – K-means clustering Models – Expectation-maximization(EM) learning models – Self-organizing maps(SOM) learning models – Bi-clustering data analysis Kernel methods for cluster analysis: Kernel based K-means learning models – Kernel K-means for nonvectorical data analysis – K-means learning models in kernel-induced spectral space – Kernelized K-means learning models – Kerrnel- induced SOM learning models – Neighbor-joining hierarchical cluster analysis

KERNEL RIDGE REGRESSORS AND VARIANTS:
Kernel-based regression and regularization analysis: Linear least-squares-error analysis - Kernel-based regression analysis – Regularization via radial basis function (RBF) networks Linear Regression and discriminant analysis for supervised classification: Characterization of supervised learning models – Supervised learning models over-determined formulation – A regularization method for robust learning: training versus prediction performances – Kernelized learning models in empirircal space: linear kernels Kernel ridge regression for supervised classification: Kernel-based discriminant analysis(KDA) – Kernel ridge regression (KRR) for supervised classification - Perturbational discriminant analysis(PDA): Decision component and the regression ratio in special space – Application studies: KDA versus KRR – Trimming detrimental (anti-support) vectors in KRR learning models – Multi-class and multi-label supervised classification – Supervised subspace projection methods

SUPPORT VECTOR MACHINES AND VARIANTS:
Support vector machines: Linear support vector machines – SVM with fuzzy separation : roles of stack variables – Kerrnel-based support vector machines – Application case studies – Empirical space SVM for trimming of training vectors Support vector learning models for outlier detection – Support vector regression(SVR) – Hyperplane based one-class SVM learning models – Hypersphere-based one class SVM – Support vector clustering Ridge-SVM learning models – Roles of C and o on WECs of KRR and SVM – Ridge-SVM learning models - Impacts of design parameters on the WEC of ridge SVM – Prediction accuracy versus training time – Application case studies

TEXT BOOKS

1. Kernel Methods and Machine Learning, S.Y.Kung, Cambridge University Press, 2014.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Associate Professor	CSE / AVIT	rjaichandran@avit.ac.in
2.	Mrs.T.Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

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 know about various encryption techniques.
3	To understand the concept of Public key cryptography.
4	To study about message authentication and hash functions
5	To impart knowledge on Network security

COURSE OUTCOMES

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

CO1: Classify the symmetric encryption techniques	Understand
CO2: Illustrate various Public key cryptographic techniques	Apply
CO3: Evaluate the authentication and hash algorithms.	Apply
CO4: Discuss authentication applications	Apply
CO5: Summarize the intrusion detection and its solutions to overcome the attacks.	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	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	-	-
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	L	L	-	M	-	-	-	-	-	-	M	-	M	M

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.

REFERENCES

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education, Second Edition, 2007.

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 / AVIT	rjaichandran@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSEC10	GAME THEORY	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Game Theory

PREREQUISITE

ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1	To introduce the student to the notion of a game, its solutions concepts, and other basic notions and
2	To study tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
3	To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications
4	To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
5	To introduce contemporary topics in the intersection of game theory, computer science, and economics

COURSE OUTCOMES

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

CO1: Explain the concept of basic notion of a game, its solutions concepts, and other issues	Understand
CO2: Develop a strategic game theory with perfect information	Apply
CO3: Analyze a formal notion of strategic thinking and rational choice by using tools of game theory	Analyze
CO4: Identify the non-cooperative game theory form.	Apply
CO5: Analyze the connections between game theory, computer science, and economics, especially emphasizing the computational 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	S	-	-	M	M	-	-	L	-	L	-	-	**S**	M	M
CO2	M	-	-	M	L	-	S	-	-	M	-	-	**S**	-	-
CO3	S	M	M	M	L	-	-	-	-	L	S	L	-	S	-
CO4	S	M	M	S	M	-	-	M	-	M	-	-	-	-	M
CO5	S	M	M	M	M	-	-	-	-	M	-	L	M	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-noncooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).

GAMES WITH PERFECT INFORMATION

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies Nash equilibria- theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions mixed strategy equilibrium- zero-sum games- Extensive Games with Perfect Information repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.

GAMES WITH IMPERFECT INFORMATION

Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions –Information aspects – Illustrations - Extensive Games with Imperfect -Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining.

NON-COOPERATIVE GAME THEORY

Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibria of two-player, zero-sum games -Computing Nash equilibria of twoplayer, general-sum games - Identifying dominated strategies.

MECHANISM DESIGN

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.

TEXT BOOKS

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
2. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.
3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress 2005.
5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
2	Mrs.T.Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17AIEC18	COMPUTER VISION	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

In this course students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Apllications to 3D modelling, video analysis, video surveillance, object recognition and vision based control will be discussed**.**

PREREQUISITE NIL

COURSE OBJECTIVES

1	To learn the fundamental image processing techniques required for computer vision
2	To learn about Image formation process and perform shape analysis
3	To learn about image features, analysis of Images and generate 3D models
4	To apply techniques to build computer vision applications
5	To learn about video processing, motion computation and 3D vision and geometry

COURSE OUTCOMES

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

CO1: Implement fundamental image processing techniques required for computer vision	Understand
CO2: Understand Image formation process and perform shape analysis	Apply
CO3: Extract features form Images and do analysis of Images and generate 3D models	Analyze
CO4: Develop applications using computer vision techniques	Apply
CO5: Understand video processing, motion computation and 3D vision and geometry	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	L	-	-	M	-	-	-	M	-	-	L	S	-	-
CO2	M	L	-	-	M	-	-	-	M	L	-	M	S	-	-
CO3	M	L	-	-	M	-	-	-	M	L	-	M	-	M	-
CO4	M	L	-	-	M	-	-	-	M	L	-	S	-	M	M
CO5	M	L	-	-	-	-	-	-	M	L	-	M	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction : Image Processing, Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality

Image Formation Models : Monocular imaging system , Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection,Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete) , Edge detection, **Motion Estimation** : Regularization theory , Optical computation , Stereo Vision , Motion estimation , Structure from motion, **Shape Representation and Segmentation :** Contour based representation, Region based representation, Deformable curves and surfaces , Snakes and active contours, Level set representations , Fourier and wavelet descriptors , Medial representations , Multiresolution analysis

Object recognition : Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis , Shape priors for recognition, **Image Understanding** : Pattern recognition methods, HMM, GMM and EM

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

REFERENCE BOOKS

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall
Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
3. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
4. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
5. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
6. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
7. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
8. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
9. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSEC09	ETHICAL HACKING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

To analyze the basic concepts of security and hacking process

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand Technical foundation of cracking and ethical hacking
2	To identify Aspects of security, importance of data gathering, foot printing and system hacking
3	To understand evaluation of computer security
4	To understand Practical tasks will be used to re-enforce and apply theory to encourage an analytical and problem based approach to ethical hacking
5	To discuss about security tools and its applications

COURSE OUTCOMES

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

CO1: Identify and analyse the stages an ethical hacker requires to take in order to compromise a target system.	Understand
CO2: Identify tools and techniques to carry out a penetration testing.	Understand
CO3: Critically analyze security techniques used to protect system and user data.	Apply
CO4: Demonstrate systematic understanding of the concepts of security at the level of policy and strategy in a computer system.	Apply
CO5: Apply information security features 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	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to Hacking, Types of Hacking, Hacking Process, Security – Basics of Security- Elements of Security, Penetration Testing, Scanning, Exploitation- Web Based Exploitation. Simple encryption and decryption techniques implementation.

HACKING TECHNIQUES

Building the foundation for Ethical Hacking, Hacking Methodology, Social Engineering, Physical Security, Hacking Windows, Password Hacking, and Privacy Attacks, Hacking the Network, Hacking Operating Systems- Windows & Linux, Application Hacking, Footprinting, Scanning, and Enumeration. Implementing System Level Hacking- Hacking Windows & Linux.

WEB SECURITY

Evolution of Web applications, Web application security, Web Application Technologies- Web Hacking, Web functionality, How to block content on the Internet, Web pages through Email, Web Messengers, Unblocking applications, Injecting Code- Injecting into SQL, Attacking Application Logic. Check authentication mechanisms in simple web applications. Implementation of Web Data Extractor and Web site watcher. Implementation of SQL Injection attacks in ASP.NET.

WIRELESS NETWORK HACKING

Introduction to Wireless LAN Overview, Wireless Network Sniffing, Wireless Spoofing, Port Scanning using Netcat, Wireless Network Probing, Session Hijacking, Monitor Denial of Service (DoS) UDP flood attack, Man-in-the-Middle Attacks, War Driving, Wireless Security Best Practices, Software Tools, Cracking WEP, Cracking WPA & WPA-II. Implementation- Locate Unsecured Wireless using Net-Stumbler/ Mini-Stumbler.

APPLICATIONS

Safer tools and services, Firewalls, Filtering services, Firewall engineering, Secure communications over insecure networks, Case Study: Mobile Hacking- Bluetooth-3G network weaknesses, Case study: DNS Poisoning, Hacking Laws. Working with Trojans using NetBus.

TEXT BOOKS

1. Stuart McClure, Joel Scambray, George Kurtz, “Hacking Exposed 6: Network Security Secrets & Solutions”, Seventh edition, McGraw-Hill Publisher, 2012.
2. Kevin Beaver, “Hacking for Dummies” Second Edition, Wiley Publishing, 2007.
3. Dafydd Stuttard and Marcus Pinto, “The Web Application Hacker’s Handbook: Discovering and Exploiting Security Flaws” Wiley Publications, 2007.
4. Ankit Fadia, “An Unofficial Guide to Ethical Hacking” Second Edition, Macmillan publishers India Ltd, 2006.

REFERENCES

1. Hossein Bidgoli, “The Handbook of Information Security” John Wiley & Sons, Inc., 2005.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor(G-II)	CSE / AVIT	rjaichandran@avit.ac.in
2	M. Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSEC11	GREEN COMPUTING	Category	L	T	P	Credit
		EC(PS)	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
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: Explain the significance knowledge to adopt green computing practices	Understand
CO2: Design and develop the green asset used to minimize negative impacts on the environment	Apply
CO3: Identify an appropriate cooling technologies and infrastructure for optimizing the cost of data center operations	Apply
CO4: Make use of an knowledge about energy saving practices ,the impact of e-waste and carbon waste	Apply
CO5: Analyze about green compliance, implementation using IT and derive the case study.	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	-	-	-	-	-	**S**	M	S
CO2	S	S	M	-	L	-	S	S	-	M	-	M	M	M	S
CO3	S	M	M	-	-	M	S	M	-	-	-	-	M	-	S
CO4	S	S	-	-	-	-	S	S	-	M	-	M	M	S	M
CO5	S	M	M	-	-	S	M	-	M	-	M	S	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS

Green IT Fundamentals: Business, IT, and the Environment – Benefits of a Green Data Centre - Green Computing:Carbon Foot 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, Systems Seamless Sharing Across. 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.

REFERENCES

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	Associate Professor	CSE / AVIT	karthik@avit.ac.in
2	Mrs.T.Narmadha	Assistant Professor	CSE / VMKVEC	narmadha@vmkvec.edu.in

17CSEC15	INTERNET SECURITY AND COMPUTER FORENSICS	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course provides a way to understand Internet Security and different types of Cyber forensic technologies and enable the student to have a foundation in this emerging area.

PREREQUISITE

Cyber Security

COURSE OBJECTIVES

1	To study the Importance of Firewalls and their types
2	To analyze and validate computer forensics data
3	To study various threats associated with security and information warfare
4	To study about evidence collection and forensics tools
5	To study about various forensics and analysis and validation

COURSE OUTCOMES

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

CO1: Understand the Network Layer Security &Transport Layer Security	Understand
CO2: Understand the Importance of Firewalls and their types	Apply
CO3: Apply Computer Forensics Fundamentals	Apply
CO4: Understand evidence collection and forensics tools	Analyze
CO5: Analyzing and validating the forensic data	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	-	M	-	-	-	M	S	S	S
CO2	S	S	S	-	M	L	-	L	-	-	-	M	S	S	M
CO3	S	S	S	-	M	M	-	M	-	-	-	M	S	S	S
CO4	S	S	S	L	S	S	-	M	-	-	-	M	M	S	M
CO5	S	M	M	L	M	M	-	M	-	-	-	M	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

NETWORK LAYER SECURITY &TRANSPORT LAYER SECURITY

IPSec Protocol – IP Authentication Header – IP ESP – Key Management Protocol for IPSec. Transport layer Security: SSL protocol, Cryptographic Computations – TLS protocol.

E-MAIL SECURITY & FIREWALLS

PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls - Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

INTRODUCTION TO COMPUTER FORENSICS

Computer Forensics Fundamentals – Types of Computer Forensics – Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

EVIDENCE COLLECTION AND FORENSICS TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensic Tools: Software/Hardware Tools.

ANALYSIS AND VALIDATION

Validating forensic data- Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

TEXT BOOKS

1. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms and Protocols”, Wiley Publications, 2012

REFERENCES

1.Nelson, Phillips, Enfinger, Steuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2012

2.John R.Vacca, “Computer Forensics”, Firewall Media, 2015

3.Richard E.Smith, “Internet Cryptography”, Pearson Education, 3rd Edition, 2010

4.Marjie T.Britz, “Computer Forensics and Cyber Crime”: An Introduction”, Pearson Education, 1st Edition, 2012.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in
2	T.Geetha	Assistant Professor	CSE / VMKVEC	geetha@vmkvec.edu.in

17CSEC19	MOBILE COMPUTING	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

To learn the standards and issues in Mobile Computing.

PREREQUISITE

COMPUTER NETWORKS

COURSE OBJECTIVES

1	To Learn wireless transmission Basics
2	To learn different Architectures of Communication Systems
3	To learn protocols in Mobile Network and Transport Layer

COURSE OUTCOMES

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

CO1: Explain the basics of wireless transmission and signal processing	Understand
CO2: Understand the concept of cellular network	Understand
CO3: Understand the concept of wireless lan network	Understand
CO4: Apply the concept of mobile network and transport layer	Apply
CO5: Identify and learn the adhoc wireless network	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	-	-	-	-	-	-	S	M	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	S	M	M	-
CO3	S	M	L	-	M	-	-	-	-	-	-	M	-	S	-
CO4	S	M	L	-	M	-	-	-	-	-	-	M	S	S	S
CO5	S	M	L	-	M	-	-	-	-	-	-	M	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction – wireless transmission – radio propagation – signals and propagation – antennas – multiplexing and modulation – spectrum - operation of cellular systems, planning a cellular system, analog & digital cellular systems.

MOBILITY AND BANDWIDTH MANAGEMENT IN CELLULAR NETWORKS

Call setup in mobile IP Network - Handoff Management - Mobility Models - Bounds on Bandwidth - Algorithms for Channel Assignment - Coalesced CAP - Localization of Mobile Nodes - Benchmark Instances.

WIRELESS LAN

Wireless LAN – IEEE 802.11 standards – HIPERLAN – Blue tooth technology and protocols. Wireless Local Loop technologies.

MOBILE NETWORK LAYER AND TRANSPORT LAYER

Reference model -Handover Location Management -Mobile QOS-Access Point Control Protocol, Mobile IP-DHCP-Mobile transport layer-Traditional TCP-Indirect snooping-Mobile TCP- Wireless Application protocol.

ADHOC WIRELESS NETWORKS

Introduction-Issues in Adhoc Wireless Networks-Adhoc Wireless Internet-Routing protocols in Ad Hoc networks-Security in Ad hoc networks. Case Studies: Automatic transfer of Plans- Identifying the callee.

TEXT BOOKS

1. Jochen Schiller, “Mobile Communications”, Addison Wesley, 2000.
2. C.Siva Ram Murthy and B.S Manoj “Ad hoc Wireless Networks”, Pearson Education,2007.
3. K. Sinha, S.C. Ghosh and Bhabani P. Sinha "Wireless Networks and Mobile Computing", CRC Press, 2015.

REFERENCES

1. Mobile Computing Principles-Reza B’Far-Cambridge University Press-2005.
2. Uyless Black, “Mobile and Wireless Networks”, Prentice Hall , 1996.
3. Willian C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Jaichandran	Assitant Professor (G-II)	CSE / AVIT	rjaichandran@avit.ac.in
2.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in

17CSEC21	NANO TECHNOLOGY	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course provides a detailed understanding of the industrial applications of Nanotechnology.

PREREQUISITE

PHYSICAL SCIENCES

COURSE OBJECTIVES

1	To Learn Nano computing challenges
2	To Apply reliability evaluation strategies
3	To Use Nano scale quantum computing

COURSE OUTCOMES

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

CO1: Explain the concept of Nano computing, technology processing and challenges.	Understand
CO2: Analyze a architecture design of electronic nano computer	Analyze
CO3: Develop the concept of reliability of nano computing from Law of Large Numbers	Apply
CO4: Apply the concept of nano scale quantum computing	Apply
CO5: Analyze the nano industrial 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	S	M	L	-	-	-	-	-	-	-	-	L	S	M	S
CO2	S	M	M	-	M	-	-	-	-	-	-	M	S	S	M
CO3	S	M	M	-	-	M	-	-	-	-	-	M	S	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	S	M	S
CO5	S	M	L	-	-	M	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

NANOCOMPUTING-PROSPECTS AND CHALLENGES

Introduction - History of Computing - Nanocomputing - Genesis of Nanocomputing - Quantum Computers – Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates.

LOGIC DESIGN AND ARCHITECTURE OF ELECTRONIC NANO COMPUTER

Wireless Ground state Computing - Adaptations of wireless computing Designs - Quantum cellular neural networks - nanometre scale nonlinear networks - approaches to parallelism

RELIABILITY OF NANOCOMPUTING

Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behaviour from Law of Large Numbers.

NANO SCALE QUANTUM COMPUTING

Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules.

INDUSTRIAL APPLICATION

Nanotechnology in electrical and electronics Industry - biomedical and pharmaceutical industry - Chemical industry - Agriculture and Food technology - Textiles.

TEXT BOOKS

1. Sahni V. and Goswami D., "Nano Computing", McGraw Hill Education Asia Ltd,2008
2. Sandeep K. Shukla and R. Iris Bahar., Nano, Quantum and Molecular Computing, Kluwer Academic Publishers 2004.

REFERENCES

1. Jennifer Kuzma and Peter VerHage, “Nanotechnology in agriculture and food production”, Woodrow Wilson International Center, 2006.
2. Brown P. J. and K. Stevens, “Nanofibers and Nanotechnology in Textile’s, Woodhead Publishing Limited, Cambridge, 2007
3. Michael S. Montemerlo "Technologies and Designs for Electronic Nanocomputers", MITRE, 1997
4. Neelina H. Malsch (Ed.), “Biomedical Nanotechnology”, CRC Press, 2005

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. N. Viswanathan	Professor	Physics / AVIT	viswanathan@avit.ac.in
2	Dr. S. MOHAMMED HARSHULKHAN	Asst.Prof	Physics / VMKVEC	harshulkhan@vmkvec.edu.in

17CSEC32	VIRTUAL REALITY	Category	L	T	P	Credit
		EC(PS)	3	0	0	3

PREAMBLE

This course provides a detailed understanding of the concepts of Virtual Reality and its application.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Learn Geometric modeling and Virtual environment
2	To Learn Virtual Hardware and Software
3	To Learn Virtual Reality applications

COURSE OUTCOMES

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

CO1: Differentiate between Virtual, Mixed and Augmented Reality platforms.	Understand
CO2: Identify appropriate design methodologies for immersive technology development, especially from a physiological perspective.	Apply
CO3: Demonstrate foundational literacy in designing gaming systems	Apply
CO4: Categorize the benefits/shortcomings of available immersive technology platforms.	Analyze
CO5: To apply the VR concepts to various 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	L	-	M	-	-	-	-	-	-	M	M	M	M
CO2	S	M	L	L	M	-	-	-	-	-	-	L	M	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	M	M	M
CO4	S	L	L	L	M	-	-	-	-	-	-	M	M	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	L	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer graphics – Flight Simulation – Virtual environments –requirement – benefits of virtual reality- **3D Computer Graphics** : Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modelling – Illumination models – Reflection models – Shading algorithms

GEOMETRIC MODELLING

Geometric Modelling: Introduction – From 2D to 3D – 3D space curves – 3D boundary representation **- Geometrical Transformations**: Introduction – Frames of reference – Modelling transformations – Instances – Picking – Flying – Scaling the VE – Collision detection **- A Generic VR system**: Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction – VR System

CONTENT CREATION AND INTERACTION ISSUES

Gestalt perceptual organization - real world content - field of view - paradigm shift from real environment to virtual environment - reusing existing content - transition to VR content Human factors : Direct Vs Indirect Interaction - Modes and flow - Input device characteristics - viewpoint and control patterns.

DESIGN ISSUES

Optimizing performance - optimizing target hardware and software **- VR Hardware** : Introduction – sensor hardware – Head-coupled displays –Aquatic hardware – Integrated VR systems-**VR Software**: Introduction – Modelling virtual world –Physical simulation- VR toolkits - multiplayer environment - multiplayer networking architecture.

APPLICATION

Engineering – Entertainment – Science – Training – classroom.

TEXT BOOKS

1. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2002
2. Jason Jerald, "The VR book: Human centered design for virtual reality", CRC Press, 2015

REFERENCES

1. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
2. Grigore C. Burdea, Philippe Coiffet, “Virtual Reality Technology” , WileyInterscience,1 Edition,1994.
3. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application, and Design”, Morgan Kaufmann, 1st Edition,2002.
4. Jonathan Linowes, "Unity Virtual Reality Projects- Explore the world of virtual reality by building immersive and fun VR Projects using Unity 3D", Packt Publishing, 2015.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Muthuselvan	Assistant Professor	CSE / VMKVEC	muthuselvan@avit.ac.in
2	T.Geetha	Assistant Professor	CSE / AVIT	geetha@vmkvec.edu.in

17MBHS04	TOTAL QUALITY MANAGEMENT	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE:

Quality is the mantra for success or even for the survival of any organization in this competitive global market. Total Quality Management (TQM) is an enhancement to the traditional way of doing business. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach for providing quality of products and processes. 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 Total Quality Management concepts.

2. To practice the TQM principles.

3. To apply the statistical process control

4. To analyze the various TQM tools

5. To adopt the quality systems.

COURSE OUTCOMES:

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

CO1: Understand the importance of quality and TQM at managerial level.	Understand
CO2: Practice the relevant quality improvement tools to implement TQM.	Apply
CO3: Analyse various TQM parameters with help of statistical tools.	Analysing
CO4: Assess various TQM Techniques.	Evaluate
CO5: Practice the Quality Management Systems in a different organization 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	M	-	-	-	-	-	L	L	L	M	L	M	L	-	-
CO2	M	-	-	-	L	L	-	L	M	M	-	L	L	-	-
CO3	S	S	M	S	S	-	-	L	-	L	-	L	-	M	-
CO4	L	M	S	L	M	-	L	-	L	M	L	M	-	-	-
CO5	L	L	M	-	L	M	S	S	M	L	L	M	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS:

INTRODUCTION

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- Quality Council – Quality Statements- Strategic Planning- Deming Philosophy- TQM Implementation – Barriers.

TQM PRINCIPLES

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's Trilogy- PDSA Cycle- 5S – Kaizen - Basic Concepts.

STATISTICAL PROCESS CONTROL (SPC)

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 Managementtools.

TQM TOOLS

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

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 reprint2002).
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 (ISBN0-324-06680-5).
2. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd - Oxford.1989.
3. Narayana V and Sreenivasan - N.S. Quality Management – Concepts and Tasks- New Age International 1996.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	A. Mani	Associate Professor	MBA / VMKVEC	mani@vmkvec.edu.in
2.	Dr. V. Sheela Mary	Associate Professor	MBA / AVIT	sheelamary@avit.ac.in

17MBHS03	ENGINEERING MANAGEMENT AND ETHICS	Category	L	T	P	Credit
		EC(OS)	3	0	0	3

PREAMBLE:

Engineering management provides technological problem-solving ability of engineering and the organizational to oversee the operational performance of complex engineering enterprises to Engineers. Engineers require honesty, impartiality, fairness, and equity, and dedication to the protection of the public health, safety, and welfare. Ethics emphasises the importance of moral issues, rights and duties of the employees through basic ethics confronting individuals and organizations engaged. It also emphasise values that are morally desirable in engineering practice and research. It allows them to understand various occupational crimes and learn the moral leadership.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1. To Understand the principles of planning at various levels of the organisation.

2. To analyse and practice the concepts of organizing, staffing to higher productivity.

3. To apply the concepts related to directing and controlling.

4. To understand and apply the case studies to practice code of ethics in organisation.

5. To apply the ethical principles in working environment.

COURSE OUTCOMES:

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

CO1: Understand the importance of planning principles in organization	Understand
CO2: Apply the various strategies of organising and staffing process.	Apply
CO3: Analyse various leadership skills and control techniques for shaping the organization.	Analyse
CO4: Understand and apply best ethical practices in organisation	Analyse
CO5: Analyse and Apply relevant ethical practices in engineering.	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	S	M	M	L	S	S	S	S	S	S	M
CO2	M	L	L	-	M	M	M	L	M	S	M	M	M	M	M
CO3	M	M	L	-	M	M	M	L	L	S	S	M	M	M	M
CO4	L	M	-	M	-	M	S	S	S	S	-	M	M	-	L
CO5	M	M	-	L	-	M	S	S	S	S	-	M	L	M	L

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING

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 differentconditions.

ORGANIZING & STAFFING

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

DIRECTING & CONTROLLING

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

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

ETHICS IN ENGINEERING

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, 8thedition.

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 South-western, 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	Designation	Department	Mail ID
1.	M. Manickam	Associate Professor	MBA / VMKVEC	manickam@vmkvec.edu.in
2.	C. M. Muthukrishna	Assistant Professor	MBA / AVIT	muthukrishna.mba@avit.ac.in

17MBHS05	MARKETING TECHNIQUES FOR ENGINEERS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE:

Marketing is enveloping trend in modern competitive world as it contributes greatly for the productivity of firms. Marketing includes advertising, promotions, public relations, and sales and procedure of introducing and promoting the product or service into the market and enhancing sales from the buying public. Marketing techniques are significant management process that includes the distribution of marketing activities. Marketing techniques for engineers emphasises the ways to Work closely with advertising and marketing teams to promote understanding of the product,Gives technical presentations and demonstrations on products and makes the engineers to Participatein product Development cycle giving input about clients potential needs.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1. To understand the concept of marketing.

2. To analyse various indicators of marketing

3. To assess the product Promotion and relevant Strategies.

4. To evaluate market channel for Promotion .

5. To Apply and practice Promotional activities covering online Marketing.

COURSE OUTCOMES:

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

CO1: Understand the basics of marketing opportunities	Understand
CO2: Analyse the relevant marketing engineering strategies	Analyse
CO3: Apply analytical skills in solving Product promotional challenges	Apply
CO4: Assess the marketing distribution strategies	Analyse
CO5: Analyse the digital marketing techniques for both Product and Market Promotion	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	-	-	-	L	-	L	M	M	L	S	-	L	L	-	-
CO2	-	-	-	L	L	L	M	M	M	M	-	M	-	-	L
CO3	L	-	-	L	L	L	-	-	M	M	L	M	-	M	M
CO4	L	-	-	M	L	L	-	-	-	M	M	M	-	M	L
CO5	L	M	M	M	M	M	-	-	M	M	M	M	M	M	M

SYLLABUS:

Basics of Marketing

Meaning – Definition and Importance of Marketing – Difference between Selling and Marketing – Approaches to the study of Marketing – Marketing concept – Market Segmentation – Basic for segmenting the consumer market – Marketing Environment - macro and micro components and their impact on marketing decisions - Buyer Behaviour

Marketing Engineering:

Marketing engineering – importance – Marketing environment decision – Marketing Engineering approach- Marketing Engineering opportunities – Re-engineering Marketing –tools for Marketing engineering –Dynamic effects of Marketing engineering.

Product Promotion

Product – Meaning and Definition – Product Policy – Classification of Products – Product mix – product line strategies – Branding– Product life cycle – New Product Development case studies - Pricing – Importance of Price – Objectives of Pricing- Factors affecting Price determination – Pricing Policies – kinds of Pricing – Pricing of New products – Discounts and Allowance- Resale – Price maintenance.

Market Promotion

Channels of Distribution – Factors influencing the choice of a channel – Channel of Distribution for consumer and Industrial goods – Middlemen – Kinds of Wholesalers and retailers and their functions- Promotional mix- Factors determining promotional mix – Sales promotion – Objectives – Types- Advertising Budget – Personal Selling – Kinds of Advertising – Benefits — Personal selling – kinds of salesmen – Function – Qualities of a good salesmen- process of selling.

Marketing Research and Online Marketing

Marketing Research: Meaning and scope of marketing research; Marketing research process- Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing. The evolution of online marketing technologies – Difference between online and traditional advertising - Difference between search engines and search advertising – Measuring the effectiveness of online advertising- improving paid search engines.

TEXT BOOK:

1. Philip Kotler, Marketing Management,Millennium Edition, Prentice HallPublication.
2. KS Chandrasekar, "Marketing management Text and Cases", Tata McGrawHill - Vijaynicole, Firstedition,2010
3. Gary L. Lilien (Author), Arvind Rangaswamy (Author), De Bruyn, Arnaud (Author) "Principles of Marketing Engineering and Analytics"– April 21,2017

REFERENCES:

1. Ramasamy &Namakumari, Marketing Management, MacmillanPub.
2. Arunkumar, Meenakshi, Marketing Management, VikasPub.
3. Sherlaker.S.A, Marketing Management,HPH
4. Rajan Saxena, Marketing Management,TMH
5. Beri. C. G, Marketing Research, Sultan ChandPub.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	mail id
1.	Dr. P. Marishkumar	Associate Professor	MBA / VMKVEC	marishkumarp@vmkvec.edu.in
2.	Dr. L. Rajeshkumar	Asst. Professor	MBA /AVIT	rajesh.mba@avit.ac.in

17CVEC07	DISASTER MITIGATION AND MANAGEMENT	Category	L	T	P	Credit
		EC(OE)	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 isreduced.

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	-	-	-	-	-	-	-	-	-	-	-
CO2	M	M	L	L	-	M	-	-	-	-	-	-	L	-	-
CO3	S	M	S	M	-	L	-	M	-	-	-	-	-	-	-
CO4	S	M	S	-	L	-	-	-	-	-	-	-	-	-	-
CO5	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 DevelopmentBank, Bangkok,1991.
3. Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi2007.

REFERENCE BOOKS

1. AbarquezI. &MurshedZ. CommunityBasedDisasterRiskManagement:FieldPractitioner's Handbook, ADPC, Bangkok,2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London1990.
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.

S.No	Name of the Faculty	Designation	Department	Mail id
1.	M.Senthilkumar	Asst. Professor	Civil / VMKVEC	senthilkumar@vmkvec.edu.in
2.	Dr.D.S.Vijayan	Asst. Prof	Civil / AVIT	vijayan@avit.ac.in

17EEEC22	SCADA	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE
Communication tool to analyze the power system date in real time applications.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To understand the fundamentals of SCADA.
2.	To analyze the SCADA Components.
3.	To apprise the communication in SCADA.
4.	To learn the Concept of Monitoring and Control unit of SCADA.
5.	To analyze the application of SCADA in power System.

COURSE OUTCOMES

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

CO1. Estimate the system components of SCADA.	Evaluate
CO2. Outline the fundamentals of SCADA.	Analyze
CO3. Compare the various SCADA communication protocol.	Analyze
CO4. Illustrate the SCADA communication.	Apply
CO5. Explain the monitoring and control unit of SCADA.	Understand
CO6. Describe the applications of SCADA in power 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	L	L	L	M	M	-	-	-	-	-	-	L	L	M
CO2	M	-	-	-	M	M	-	-	-	-	-	-	L	-	L
CO3	L	M	-	-	M	M	-	L	-	S	-	L	M	L	M
CO4	L	M	-	-	M	M	-	-	-	S	-	L	M	L	M
CO5	L	-	-	-	L	M	-	-	-	-	-	L	M	M	M
CO6	S	S	-	-	L	M	-	-	-	-	-	L	L	L	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO SCADA

Evolution of SCADA, SCADA definitions, SCADA Functional requirements and Components, SCADA Hierarchical concept, SCADA architecture, General features, SCADA Applications, Benefits.

SCADA SYSTEM COMPONENTS

Remote Terminal Unit (RTU), Interface units, Human- Machine Interface Units (HMI), Display Monitors/Data Logger Systems, Intelligent Electronic Devices (IED), Communication Network, SCADA Server, SCADA Control systems and Control panels.

SCADA COMMUNICATION

SCADA Communication requirements, Communication protocols: Past, Present and Future, Structure of a SCADA Communications Protocol, Comparison of various communication protocols, IEC61850 based communication architecture, Communication media like Fiber optic, PLCC etc. Interface provisions and communication extensions, synchronization with NCC, DCC.

SCADA MONITORING AND CONTROL

Online monitoring the event and alarm system, trends and reports, Blocking list, Event disturbance recording. Control function: Station control, bay control, breaker control and disconnector control.

SCADA APPLICATIONS IN POWER SYSTEM

Applications in Generation, Transmission and Distribution sector, Substation SCADA system Functional description, System specification, System selection such as Substation configuration, IEC61850 ring configuration, SAS cubicle concepts, gateway interoperability list, signal naming concept. System Installation, Testing and Commissioning

TEXT BOOKS:

1. Stuart A. Boyer: SCADA-Supervisory Control and Data Acquisition, Instrument Society of America Publications,USA,2004
2. Gordon Clarke, Deon Reynders: Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems, Newnes Publications, Oxford,UK,2004.

REFERENCES:

1. William T. Shaw, Cybersecurity for SCADA systems, PennWell Books,2006
2. David Bailey, Edwin Wright, Practical SCADA for industry, Newnes,2003
3. Michael Wiebe, A guide to utility automation: AMR, SCADA, and IT systems for electric Power,PennWell 1999.
4. Dieter K. Hammer, Lonnie R.Welch, Dieter K. Hammer, “Engineering of Distributed Control Systems”,Nova Science Publishers, USA, 1st Edition, 2001

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	V.MANJULA	Assistant Professor	EEE/VMKVEC	manjula@vmkvec.edu.in
2.	L.CHITRA	Associate Professor	EEE/AVIT	chitra@avit.ac.in

17EEEC03	COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

To understand and familiarize the principle, Concepts of Computer Aided Design technology for the design of Electrical Machines.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	Learn the importance of computer aided design method.
2.	Understand the basic electromagnetic field equations and the problem formulation for CAD applications.
3.	Become familiar with Finite Element Method as applicable for Electrical Engineering.
4.	Know the organization of a typical CAD package.
5.	Apply Finite Element Method for the design of different Electrical apparatus.

COURSE OUTCOMES

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

CO1: Understand the concept of electromagnetic energy conversion and designing parameters.	Understand
CO2: Familiarize the mathematical expressions for different field problems.	Understand
CO3: Implement the concepts of FEM to design the apparatus	Apply
CO4: Analyze the performance of electrical apparatus through the concepts of CAD	Analyze
CO5: Design the electrical apparatus.	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	-	-	-	-	-	-	-	-	S	M	M
CO2	S	M	-	-	-	-	-	-	-	-	-	-	M	M	M
CO3	S	S	M	M	M	-	-	-	-	-	-	-	M	S	M
CO4	S	S	M	M	M	-	-	-	-	-	-	-	M	S	M
CO5	S	S	S	M	S	-	-	-	-	-	-	--	M	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Conventional design procedures – Limitations – Need for field analysis based design –Review of Basic principles of energy conversion – Development of Torque/Force.

MATHEMATICAL FORMULATION OF FIELD PROBLEMS

Electromagnetic Field Equations – Magnetic Vector/Scalar potential – Electrical vector / Scalar potential – Stored energy in Electric and Magnetic fields – Capacitance – Inductance- Laplace and Poisson's Equations – Energy functional.

PHILOSOPHY OF FEM

Mathematical models – Differential/Integral equations – Finite Difference method – Finite element method – Energy minimization – Variational method- 2D field problems – Discretisation – Shape functions – Stiffness matrix – Solution techniques.

CAD PACKAGES

Elements of a CAD System –Pre-processing – Modelling – Meshing – Material properties- Boundary Conditions – Setting up solution – Post processing.

DESIGN APPLICATIONS

Voltage Stress in Insulators – Capacitance calculation – Design of Solenoid Actuator – Inductance and force calculation – Torque calculation in Switched Reluctance Motor.

TEXT BOOKS:

1. S.J Salon, 'Finite Element Analysis of Electrical Machines', Kluwer Academic Publishers, London,1995.
2. Nicola Bianchi, 'Electrical Machine Analysis using Finite Elements', CRC Taylor& Francis,2005.

REFERENCES:

1. Joao Pedro, A. Bastos and Nelson Sadowski, 'Electromagnetic Modeling by Finite Element Methods', Marcell Dekker Inc.,2003.
2. P.P.Silvester and Ferrari, 'Finite Elements for Electrical Engineers', Cambridge University Press,1983.
3. D.A.Lowther and P.P Silvester, 'Computer Aided Design in Magnetics', Springer Verlag, New York,1986.
4. S.R.H.Hoole, 'Computer Aided Analysis and Design of Electromagnetic Devices', Elsevier, New York,1989.
5. User Manuals of MAGNET, MAXWELL & ANSYSSoftwares.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.G.Ramakrishnaprabu	Associate Professor	EEE/VMKVEC	ramakrishnaprabu@vmkvec.edu.in
2.	Mr.S.Prakash	Assistant Professor Professor (Gr-II)	EEE/AVIT	sprakash@avit.ac.in

17EEEC21	NON CONVENTIONAL ENERGY SOURCES	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

Non Conventional sources of energy are generally renewable sources of energy. This type of energy sources include anything, which provides power that can be replenished with increasing demand for energy and with fast depleting conventional sources of energy such as coal, petroleum, "natural gas etc. The non- conventional sources of energy such as energy from sun, wind, biomass, tidal energy, geo thermal energy and even energy from waste material are gaining importance. This energy is abundant, renewable, pollution free and eco-friendly. It can also be more conveniently supplied to urban, rural and even remote areas. Thus, it is also capable of solving the twin problems of energy supply in a decentralized manner and helping in sustaining cleaner environment. 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 gridapplications

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To impart the knowledge of basics of different non conventional types of power generation & power plants
2.	To understand the need and role of Non-Conventional Energy sources.
3.	To learn economical and environmental merits of solar energy for variety applications.
4.	To learn modern wind turbine control & monitoring.
5.	To learn various power converters in the field of renewable energy technologies.
6.	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	Identify the different non conventional sources and the power generation techniques to generate electrical energy.	Understand
CO2	Explore the Solar Radiation, different Methods of Solar Energy Storage and its Applications.	Analyse
CO3	Familiarize the Winds energy as alternate form of energy and to know how it can be tapped	Understand
CO4	Explore the Geothermal Energy Resources and its methods.	Understand
CO5	Identify the Bio mass and Bio gas resources and its tapping technique	Analyze
CO6	Investigate the Tidal, Wave and OTEC Energy, 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	L	-	M	M	-	L	L	-	L	-	-	M	L	-	-
CO2	-	L	-	L	M	-	S	-	M	L	M	S	S	S	M
CO3	-	M	M	S	L	M	L	-	-	L	S	-	S	S	-
CO4	M	L	-	-	-	S	-	S	S	L	M	S	M	L	S
CO5	-	M	L	M	L	L	M	L	S	M	S	L	-	-	S
CO6	L	-	-	-	-	-	M	-	S	S	-	M	L	M	S

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

Introduction to Solar Energy - Radiation and its measurement, Solar Energy conversion and its types - Introduction to Solar Energy Collectors and Storage, Applications of Solar Energy: Solar Thermal Electric Conversion Systems, Solar Electric power Generation, Solar Photo-Voltaic, Solar Cell Principle, Semiconductor Junctions, Conversion efficiency and power output, Basic Photo Voltaic System for Power Generation, Stand-alone, Grid connected solar powersatellite

WIND ENERGY CONCEPT

Introduction - Basic Principles of Wind energy conversion-The nature of wind- The power in the wind (No derivations) - Forces on the Blades (No derivations)-Site Selection considerations-Basic components of a wind energy conversion system (WECS)-Advantages & Limitations of WECS-Wind turbines (Wind mill)- Horizontal Axis wind mill-Vertical Axis wind mill-performance of wind mills-Environmental aspects - Determination of torque coefficient, Induction typegenerators

GEOTHERMAL AND BIOMASS ENERGY

Geothermal Sources - Hydro thermal Sources - a. Vapor dominated systems b. Liquid dominated systems -Prime movers for geothermal energy conversion - Biomass Introduction - Biomass conversion techniques-Biogas Generation-Factors affecting biogas Generation-Types of biogas plants- Advantages and disadvantages of biogas plants-urban waste to energy conversion - MSW incinerationplant.

TIDAL AND OTEC ENERGY

Tidal Energy-Basic Principles of Tidal Power-Components of Tidal Power Plants- Schematic Layout of Tidal Power house-Advantages & Limitations of Tidal, Wave, OTEC energy - Difference between tidal and wave power generation, OTEC power plants, Design of 5 Mw OTEC pro-commercial plant, Economics of OTEC, Environmental impacts ofOTEC.

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.
3. Non Conventional Energy Resources, Shobh Nath. Singh, Pearson Education India, 2016, e – ISBN : 978933255906 -6

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.

Non – Conventional Energy Sources.Rai.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	e-Mail ID
1.	P. LOGANATHAN	Assistant Professor	EEE / VMKVEC	loganathan@vmkvec.edu.in

17MEPI04	NON-DESTRUCTIVE TESTING	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

Preamble

To study and understand the various Non Destructive Evaluation and Testing methods, theory and their industrial applications.

Prerequisite : NIL

Course Objective

1.	To expose to the concept of overview of NDT
2.	To familiarize with the applications of differential equations, surface NDE Methods
3.	To understand the concept of thermography and Eddy current testing
4.	To understand the concept of ultrasonic testing and acoustic emission
5.	To understand the concept of Radiography (RT)

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

CO1.	Explain the concept of overview of NDT	Understand
CO2.	To familiarize with the applications of differential equations, surface NDE Methods	Understand
CO3.	Experiment with the concept of thermography and Eddy current testing	Apply
CO4.	Experiment with the concept of ultrasonic testing and acoustic emission	Apply
CO5.	Experiment with the concept of Radiography (RT)	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	M	M	M	L	-	-	-	-	-	-	-	L	-	-
CO3	S	L	M	M	M	-	-	-	-	-	-	-	L	-	-
CO4	S		S	S	M	-	-	-	-	-	-	-	L	-	-
CO5	S	M	L	M	-	-	-	-	-	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

OVERVIEW OF NDT

NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection – Unaided and aided

SURFACE NDE METHODS

Liquid Penetrant Testing – Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

THERMOGRAPHY AND EDDY CURRENT TESTING

Thermography- Principles, Contact and non contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation – infrared radiation and infrared detectors, Instrumentations and methods, applications.Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Typesof arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE)

Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique –Principle, AE parameters, Applications

RADIOGRAPHY (RT)

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films – graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts,Radiographic equivalence. Fluoroscopy- Xero-Radiography, Computed Radiography, Computed Tomography

Text Books

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa PublishingHouse.

2.Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New AgeInternational Publishers.

Reference Books

1.ASM Metals Handbook,"Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA, 200,Volume-17.

2.Paul E Mix, "Introduction to Non-destructive testing: a training guide", Wiley, 2nd Edition New Jersey

3.Charles, J. Hellier," Handbook of Nondestructive evaluation", McGraw Hill, NewYork.

Course Designers

S.No	Faculty Name	Designation	Department/ Name of the College	Email id
1.	S.ASHOKKUMAR	Asst.Professor G-II	MECH / AVIT	ashokkumar@avit.ac.in

17MESE17	MODERN MANUFACTURING METHODS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

Preamble

This course aims to teach the variousadvancedmanufacturing processes used in industries for making products. The students will get complete knowledge of the unconventional processes in terms ofaspects stated above.

Prerequisite – NIL

Course Objective

1.	To discuss the basic concepts of various unconventional machining processes
2.	To Demonstrate the Mechanical energy based unconventional machining processes.
3.	To Demonstrate the Electrical energy based unconventional machining processes.
4.	To Demonstrate the Chemical & Electro-Chemical energy based unconventional machining processes.
5.	To Demonstrate the Thermal energy based unconventional machining processes.

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

CO1.	Discuss the basic concepts of various unconventional machining processes	Understand
CO2.	Explain the Mechanical energy based unconventionalmachining processes	Apply
CO3.	Illustrate the Electrical energy based unconventional machining processes	Apply
CO4.	Explain the Chemical & Electro-Chemical energy based unconventional machining processes	Apply
CO5.	Illustrate the Thermal energy based unconventional machining processes	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	-	-	M	M	-	-	-	-	-	M	-	L	-	-
CO3	S	-	-	M	M	-	-	-	-	-	M	-	L	-	-
CO4	S	-	-	M	M	-	-	-	-	-	M	-	L	-	-
CO5	S	-	-	M	M	-	-	-	-	-	M	-	L	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Unconventional machining Process – Need – classification – Brief overview–merits –demerits– Applications

MECHANICAL ENERGY BASED PROCESSES

Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining - Ultrasonic Machining. Working Principles & Applications – equipment used – process parameters – MRR - Variation in techniques used.

ELECTRICAL ENERGY BASED PROCESSES

Electric Discharge Machining - working principle and applications – equipments - process parameters - surface finish and MRR- Power and control circuits–Wire cut EDM – working principle and Applications.

CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES

Chemical machining and Electro-Chemical Machining- Electro Chemical Grinding and Electro chemical Honing-working principle and applications-Process Parameters -Surface finish and MRR -Etchants–Maskants

THERMAL ENERGY BASED PROCESSES

Laser Beam Machining and drilling, Plasma Arc Machining and Electron Beam Machining Working principles & Applications – Equipment –Types - Beam control techniques. Micromachining and Nanofabrication Techniques

Text Books

1.	Vijay.K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd.
2.	P.K.Mishra , " Non Conventional Machining "- - The Institution of Engineers (India) Text Books: Series.

Reference Books

1.	Benedict. G.F. "Nontraditional Manufacturing Processes" Marcel Dekker Inc., NewYork
2.	Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill, New Delhi.
3.	Paul De Garmo, J.T.Black, and Ronald.A.Kohser, "Material and Processes in Manufacturing"

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
2.	M SARAVANAN	Asst Prof	Mech / VMKVEC	saravananm@vmkvec.edu.in

17ECCC07	MICROCONTROLLERS & ITS APPLICATIONS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

Microcontroller is used as the main controller in most of the embedded systems nowadays. Due to the development in VLSI technology, microcontrollers evolve which function similar to microprocessors but they have most of the peripherals built on-chip. This course makes the students to be familiar with the architecture and programmingof Microcontrollers. This course also introduces the architecture and hardware features of PIC 16F877 and ARM7 (LPC2148) microcontrollers.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To learn the concepts of microprocessors and knowledge of interfacing devices.
2.	To study the Architecture of 8051 microcontroller
3.	To develop skill in simple program writing of microcontroller
4.	To study the interfacing and applications of microcontroller
5.	To study the advanced microcontrollers.

COURSE OUTCOMES

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

CO1. Explain the concept of microprocessor and interfacing devices.	Understand
CO2. Explain the architecture and function of 8051 microcontroller	Apply
CO3. Design and implement programs on 8051 Microcontroller	Analyze
CO4. Design and implement applications using 8051 Microcontroller	Analyze
CO5. Illustrate various applications using advanced Microcontrollers.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO1	S	S	M	-	M	-	-	-	-	-	-	M	S	M	-
CO2	S	S	S	-	M	-	-	-	-	-	-	M	-	-	-
CO3	S	M	M	-	M	M	-	-	-	-	-	M	-	-	-
CO4	S	S	M	-	M	M	-	-	-	-	-	M	M	-	-
CO5	S	M	S	-	M	M	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTEL 8086 MICROPROCESSOR & I/O INTERFACING

Introduction to 8086 - Architecture of 8086 - Register organization – Signal Description of 8086 - Addressing modes – Data Transfer Instruction – Arithmetic Instruction - Branching Instruction - Program Transfer Instruction – simple programs- Programmable Peripheral Interface 8255 – Programmable Communication Interface 8251 USART – Programmable Interrupt Controller 8259A – Direct Memory Access Controller 8257- Programmable Interval Timer 8253 Keyboard/Display Controller8279.

INTEL 8051MICROCONTROLLER

Introduction to 8 bit microcontroller – architecture of 8051- Signal descriptions of 8051- Role of PC and DPTR- Flags and PSW- CPU registers- Internal RAM & ROM- Special Function Register-Counter & Timers- SerialCommunication.

ASSEMBLY LANGUAGE PROGRAM OF INTEL 8051

Interrupt- Addressing Mode- Data Transfer Instruction- Arithmetic Instruction- Logical Instruction- Jump Loop & Call Instruction- I/O Port Programming.

INTERFACING AND APPLICATION OF INTEL 8051

LCD Interfacing - A/D and D/A Interfacing- Sensor Interfacing- Relays and Optoisolators- Stepper Motor Interfacing- DC MotorInterfacing.

ADVANCED MICROCONTROLLERS

PIC 16F877 microcontroller – Architecture On chip ADC, I^2C – SPI – Watchdog timer – ARM7 (LPC2148) microcontroller – Architecture and applications.

TEXTBOOKS:

1. Muhammad Ali Mazidi and Janica Gilli Mazidi, The 8051 microcontroller and embedded systems, Pearson Education, 5th Indian reprint,2003.
2. Frank D. Petruzella. “Programmable Logic Controllers”, McGraw–Hill Book, Company,1989

REFERENCE BOOKS:

1. B.P. Singh, Microprocessors and Microcontrollers, Galcotia Publications (P) Ltd, First edition, New Delhi,1997.
2. Embedded Controller Hand book, Intel Corporation,USA.
3. Microcontroller Hand Book, INTEL,1984.
4. Ajay V.Deshmukh, “Microcontrollers- Theory and applications”, Tata McGraw-Hill,publisher,2005.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.S.Selvam	Assistant Professor	ECE/AVIT	selvam@avit.ac.in
2.	Mr.R.Ramani	Assistant Professor	ECE / VMKVEC	ramani@vmkvec.edu.in
3.	Mr.G.Sureshkumar	Assistant Professor	ECE / VMKVEC	sureshkumar@vmkvec.edu.in

17MBHS02	FINANCE AND ACCOUNTING FOR ENGINEERS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE:

Engineers are in a position to do Decision Making during every activity in the industry. The activities ranging from Operation to Non-Operation during the routine functions of the organization. Especially, Finance and Accounting also becomes the part of responsibility of every engineer to do data analysis activities. His interpretation through data analysis and reporting in every transaction helps the organization to do decision making to run the organization effectively and efficiently. Finance and Accounting Practices enable the engineers to handle the resources to do cost and Financial decisions with optimum resources for the betterment of the organization.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1. To understand the concepts and conventions to prepare Income Statement, and Balance Sheet.

2. To apply the various methods to claim depreciation and

3. To practice fundamental investment decision through capital budgeting techniques.

4. To analyse cost-volume profit analysis for decision making and analyse standard costing techniques.

5. To estimate the working capital requirements for day-to-day activities and handling inventories with economic ordering quantities.

COURSE OUTCOMES:

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

CO1: Understand the importance of recording, book keeping and reporting of the business transaction.	Understand
CO2: Identify and Apply suitable method for charging depreciation on fixed assets.	Apply
CO3: Analyse the various methods of capital budgeting techniques for investment decision.	Apply
CO4: Justify the scope of cost-volume-profit analysis, standard costing, and marginal costing techniques for decision making.	Analyse
CO5: Estimation of working capital requirements of the organization.	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	-	-	M	L	S	M	-	S	-	M	M	L	M	L	M
CO2	L	-	-	L	M	-	L	L	-	-	L	M	L	L	-
CO3	-	M	-	M	L	-	-	L	S	M	-	L	-	L	M
CO4	L	L	-	S	-	-	L	-	-	L	M	L	M	L	M
CO5	L	-	L	S	L	-	-	M	M	L	-	L	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction:

Business Environment – Forms of business – Book Keeping and Accounting – Accounting Concepts and Conventions – Journal – Subsidiary books - Ledger – Trial Balance – Final Accounts **Deprecation:** Meaning – Causes - Methods of Calculating Depreciation: Straight Line Method, Diminishing Balance Method and Annuity Method.

Capital Budgeting Decisions:

Meaning – Nature & Importance of Investment Decisions – Types - Evaluation Techniques – Non-Discounting Cash Flow Techniques: Pay Back Period – Accounting Rate of Return – Discounting Cash Flow Techniques: NPV – IRR - ProfitabilityIndex.

Costing Accounting:

Concepts - Elements of Cost - Preparation of Cost Sheet - Types of Costs – Marginal Cost - Breakeven Analysis - Cost Volume Profit Relationship - Applications of Standard and marginal Costing Techniques.

Working Capital Management:

Types of Working Capital – Operating Cycle – Determinants of Working Capital - Receivables Management – ACP, Aging schedule –Inventory Management – Need for holding inventories – Objectives – Inventory Management Techniques: EOQ & Reorder point – ABC Analysis - Cash Management – Motives for holding cash.

Text Book

1. Kesavan, C. Elenchezhian, and T. Sunder Selwyan, "Engineering Economics and Financial Accounting", Firewall Media,2005.
2. Kasi Reddy .M and Saraswathi .S, "Managerial Economics and Financial Accounting",PHI Learning Pvt., Ltd.2007.

Reference Book

1. Periyasamy .P, "A Textbook of Financial, Cost and Management Accounting",Himalaya Publishing House,2010.
2. Palanivelu V.R., "Accounting for Managers", Lakshmi Publications,2005.
3. Mark S Bettner, Susan Haka, Jan Williams, Joseph V Carcello, "Financial and Management Accounting", Mc-Graw-Hill Education, 2017

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	M.Manickam	Associate Professor	MBA / VMKVEC	manickam@vmkec.edu.in
2.	Dr. Rajeshkumar	Assistat Professor	MBA / AVIT	rajesh.mba@avit.ac.in

17MBHS09	INTELLECTUAL PROPERTY RIGHTS AND ALTERNATE DISPUTE RESOLUTION	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE: IPR & ADR

Intellectual Property Rights are valuable assets and the most essential for any kind of business development. IPR helps to set the business to show individuality from market competitors. It prevents duplication and provide authentication as a unique selling point to compete in the market and built confidence over the product among the customers. ADR is a new legal mechanism to sort out disputes among industries and helps to get easily solved through mediation and counselling. It provides instant solutions to both the parties with meagre loss in a faster way and less expensive through arbitrator.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand and practice the basic concept of IPR and Patent filing procedure.
2. To describe the various procedure for getting grants of patent, trademark and trade secrets.
3. To apply various legal aspects in patent ownership and transfer.
4. To implement the best practices and laws relating to the Intellectual property rights.
5. To examine the practices of ADR mechanism in the technological advancement contexts.

COURSE OUTCOMES:

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

CO1: Understand the concept and development of intellectual property rights.	Understand
CO2: Explain the procedure and requirement of to apply New IPR development and related system in India and across the Globe.	Understand
CO3: Solve the various issues of transfer of patent ownership with reference to International Patent Law.	Apply
CO4: Analyse the present system of Patent Act in India and changes aligned with international standards.	Analyse
CO5: Criticise the present dispute mechanism and how ADR supports and solution to business issues.	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	L	M	M	-	-	S	L	M	L	M	-	L	-	-	-
CO2	-	-	M	L	M	M	S	L	M	L	L	L	-	-	M
CO3	-	-	M	M	-	L	M	-	M	L	L	M	L	M	-
CO4	M	-	-	L	M	-	L	-	-	L	L	M	-	-	L
CO5	-	L	-	L	M	L	-	M	L	-	M	L	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS:

UNIT – I: Introduction To IPRs

Basic concepts of Intellectual Property- Patents Copyrights, Geographic Indicators, History of IPRs- the way from WTO to WIPO- TRIPS, Nature of Intellectual Property, Industrial Property, Technological Research, Inventions and Innovations - Defining Intellectual Property and Patents, Patent Searches and Application.

UNIT – II: New Developments in IPR

Procedure for grant of Patents, TM, GIs, Trade Secrets, Patenting under PCT, Administration of Patent system in India, Patenting in foreign countries - International Treaties and conventions on IPRs, The TRIPs Agreement.

UNIT – III: Patent Ownership and Transfer

Defining Intellectual Property and Patents, Patent Searches and Application, Patent Ownership and Transfer, Patent Infringement, New Developments and International Patent Law

UNIT – IV: Legislation of IPRs

The Patent Act of India, Patent Amendment Act (2005), Design Act, Trademark Act, Geographical Indication Act, Bayh- Dole Act and, IPR strength in India - Patent Ownership and Transfer, Patent Infringement, New Developments and International Patent Law

UNIT – V: Alternate Dispute Resolution

Alternate Dispute Resolution and Arbitration – ADR Initiatives - Reason for Choosing ADR – Advantages and Disadvantages of ADR – Assessment of ADR's – Litigation – Arbitration - Effective Mechanism for Business Issues.

TEXT BOOK:

1. Deborah E. Bouchoux, Intellectual Property Rights, Delmar, Cengage Learning, 2005.

REFERENCES:

1. V. Sople Vinod, Managing Intellectual Property by (Prentice hall of India Pvt.Ltd), 2006.
2. A. Primer, R. Anita Rao and Bhanoji Rao, Intellectual Property Rights, Lastain Book company. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2006.
3. Tejaswini Apte, A single guide to Intellectual property rights, Biodiversity and Traditional knowledge.
4. WIPO Intellectual Property Hand book.
5. Intellectual Property rights and copyrights, Ess Ess Publications.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail id
1	Dr. G. Palaniappan	Associate Professor	MBA / VMKVEC	palaniappan@vmkvec.edu.in
2	Mr. C. M. Muthukrishna	Assistant Professor	MBA / AVIT	muthukrishna.mba@avit.ac.in

17ATEC14	COMPUTER CONTROLLED VEHICLE SYSTEMS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

Preamble

This course introduces the role of sensors and actuators for controlling the engine, drive line. It also provide

PREREQUISITE: NIL

COURSE OBJECTIVES:

1.	To know the control Autonomy of vehicles
2.	To study computer controlled fuel, Ignition , Speed and knock system of IC engine
3.	To learn the computer controlled drive line system of Automobile
4	To study about the computer control transportation system
5.	To learn about the smart safety devices of Automobile

COURSE OUTCOMES:

After Successful completion of this course, the students will be able to:

CO1.	Summarize sensors and actuators used in vehicle control system	Understand
CO2.	Identify Control of fuel, Ignition , speed and knock in IC engine	Apply
CO3.	Make use of Drive line system, Steering and suspension systems	Apply
CO4.	Examine intelligent transportation system	Analyze
CO5.	Analyze the smart safety Devices used in Automobiles	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	M	M	--	--	--	M	--	--	--	M	M	--	--
CO2	S	M	M	M	--	--	M	M	M	--	--	M	M	--	--
CO3	S	S	S	M	--	--	M	M	M	--	--	M	M	--	--
CO4	S	S	S	M	--	--	M	M	M	--	--	M	M	--	--
CO5	S	S	S	M	--	--	M	M	M	--	--	M	M	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Understanding autonomy – Review of the role of control in autonomy (speed control, suspension control & integrated vehicle dynamics) - Role of sensors and actuators. Examples of autonomy cruise control

ENGINE CONTROL SYSTEM

Fuel control-Ignition control in SI engines- Lambda control- idle speed control- Knock control- cylinder balancing

DRIVE LINE CONTROL SYSTEM

Speed control – gear shifting control – traction /braking- steering- suspension – vehicle handling and ride characteristics of road vehicles- adaptive cruise control

INTELLIGENT TRANSPORTATION SYSTEM

Overview – control architecture – collision avoidance, pitch, yaw, bounce control – traffic routing system-automated high way systems- lane warning system- driver information system- data

SAFETY IMPACTING DEVICES

Vision enhancement- driver conditioning warming- anti-lock braking systems – route guidance and navigation systems – in-vehicle computing – commercial vehicle diagnostic/ prognostics – hybrid/ electric and future cars- case study.

TEXT BOOK:

1. Automotive control systems, U.Kienckeand L. Nielson, SAE and springer-Verlag, 2000

REFERENCES:

1. Crouse, W.H. &Anglin, D.L., Automotive Mechanics, Intl. Student edition, TMH, NewDelhi.
2. Artamonov, M.D., Harionov, V.A. & Morin, M.M. Motor Vehicle, Mir Publishers, Moscow1978.,
3. Heitner, J., Automotive Mechanics, CBS Publishers, New Delhi1987.
4. Stockel Martin W and Stocker Martin T., Auto Mechanics Fundamentals, GoodheartWilcox,

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department/College	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.	M.Saravana Kumar	Assistant. Professor GRII	Auto / AVIT	saravanakumar@avit.ac.in
4.	B. Samuvel Michael	Assistant. Professor GRII	Auto / AVIT	samuvelmichael@avit.ac.in

17CVSE55	REMOTE SENSING AND GIS FOR ENVIRONMENTAL APPLICATION	Category	L	T	P	Credit
		EC(OE)	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	-	-	-	-	-	-	-	-	L	L	L
CO2	S	L	M	L	M	-	-	-	-	-	-	-	L	-	L
CO3	S	M	M	L	M	M	-	-	-	-	-	-	L	-	M
CO4	S	S	M	L	-	-	-	-	-	-	-	-	M	M	S
C05	S	-	M	-	M	S							M	M	S

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.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	C. Nivetha	Assistant Professor	Civil / AVIT	nivethachandru92@gmail.com
2	Dr.S.P.Sangeetha	HoD	Civil / AVIT	sangeetha@avit.ac.in

17CVEC03	GEOGRAPHICAL INFORMATION SYSTEM	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

Preamble

GeographicalInformationSystemistheapplicationofthegeologicsciencestoengineeringpracticeforthepurposeofassuringthatthegeologicfactorsaffectingtheengineeringworksarerecognized and adequately provided for. Engineering geologic studies may be performedduringtheplanning 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:

After Successful completion of this course, the 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	M	-	M
CO2	S	M	M	L	L	M	M	L	L	L	L	M	L	L	M
CO3	S	S	S	S	L	L	M	L	L	L	L	L	L	M	M
CO4	S	S	S	M	M	S	S	L	L	L	M	M	L	M	L
CO5	S	S	S	S	S	S	S	S	S	S	S	S	L	M	M

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 baseModel

TEXT BOOK:

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,)hn Wiley Publications, 1999

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	C.Kathirvel	Asst. Prof	CIVIL / VMKVEC	geologykathir@gmail.com
2.	SUDIP DAS	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE02	ENTERPRISE WIDE INFORMATION SYSTEMS	Category	L	T	P	Credit
		EC(OE)	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:

After Successful completion of this course, the students will be able to:

CO1.	Understand Enterprise resource planning	Understand
CO2.	How 'best business practices' are incorporated in an ERP	Understand
CO3.	The role of an ERP in carrying out business processes in a company	Understand
CO4.	Expedite production planning and control using tools provided in an ERP system	Apply
CO5.	Apply appropriate methods to collect the Materials requirement planning, billing & work centers.	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	L	--	M	--	--	--	--	--	--
CO3	M	M	M	--	--	M	L	--	M	--	M	--	--	--	--
CO4	M	M	M	M	--	M	M	--	M	--	--	--	--	L	L
CO5	L	--	M	L	--	--	--	--	--	--	--	--	--	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION:

Overview - database applications -Business function vs business process- Introduction to Enterprise Resource Planning (ERP)

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.

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 BOOK:

1. Enterprise Resource Planning, 3rd Edition, by Bret Wagner and Ellen Monk, ISBN: 9781423901792,2009SAP R/3, Business Blueprint, 2nd Edition, by Thomas A. Curran & Andrew Ladd,Prentice

2. 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	Department/College	Mail ID
1.	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE47	ICT BASED CITY AND INFRASTRUCTURE PLANNING	Category	L	T	P	Credit
		EC(OE)	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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	M	M	S	M	M	-	S	L	-
CO2	-	L	-	-	M	M	M	-	-	L	-	-	S	M	M
CO3	-	-	L	L	L	-	L	M	M	M	M	M	-	M	M
CO4	M	M	-	L	-	L	-	L	L	L	-	M	-	L	L
CO5	-	L	-	M	M	-	-	L	-	L	-	-	M	M	M

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

S. No	Name of the Faculty	Designation	Department / College	Mail ID
1.	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2.	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17EESE03	ARTIFICIAL INTELLIGENCE APPLICATION TO POWER SYSTEMS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBL

To Study about the Artificial Intelligence application to Power Systems.

PREREQUISITE-NIL

COURSE OBJECTIVES

1.	To Understand about the Introduction of Neural networks.
2.	To Understand about the Application of Neural networks to Power System
3.	To study the introduction to fuzzy logic.
4.	To under stand applications to power systems.
5.	To study genetic algorithm and its applications to power systems.

COURSE OUTCOMES

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

CO1: Describe the Basics of ANN-Perceptron-Delta learning rule and Algorithm	Understand
CO2: Relate the application of neural networks to power system problems.	Apply
CO3: Analyse the various types of fuzzy logic and their working proramme for various application.	Analyze
CO4: Select to develop fuzzy set theory for various model of power system control	Evaluate
CO5: Design the basic idea genetic algorithm.	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	S	L	-	M	-	M	S	-	-	M	M	L	-
CO2	S	M	M		-	M	-	M	S	-	-	-	M	L	-
CO3	M	M	S	M	-	M	-	M	S	-	-	M	M	L	-
CO4	M	M	S	L	-	M	-	M	S	-	-	-	L	M	-
CO5	M	S	-	L	-	-	-	-	S	-	-	-	L	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO NEURAL NETWORKS

Basics of ANN-Perceptron-Delta learning rule –Back Propagation Algorithm-Multilayer Feed forward network- Memory models-Bi-directional associative memory-Hopfield network

APPLICATIONS TO POWER SYSTEM PROBLEMS

Application of Neural Networks to load forecasting, Contingency Analysis-VAR control, Economic Load Dispatch.

INTRODUCTION TO FUZZY LOGIC

Crispness-Vagueness-Fuzziness-Uncertainty-Fuzzy set theory Fuzzy sets-Fuzzy set operations-fuzzy measures-fuzzy relations-fuzzy function. Structure of fuzzy logic controller- fuzzification models-data base-rule base-inference engine defuzzification module.

APPLICATIONS TO POWER SYSTEMS

Decision making in Power system Control through fuzzy set theory-Use of fuzzy set models of LP in Power systems scheduling problems-Fuzzy logic based power system stabilizer.

GENETIC ALGORITHM AND ITS APPLICATIONS TO POWER SYSTEMS

Introduction – Simple Genetic Algorithm – Reproduction,. Crossover, Mutation, Advanced Operators in Genetic Search – Applications to voltage Control and Stability Studies.

TEXT BOOKS:

1. Laurence Fausett, "Fundamentals of Neural Networks", Prentice Hall, Englewood Cliffs, N.J.,1992
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill Inc., 2000.

REFERENCES

1. James.A.Freeman and B.M.Skapura "Neural Networks, Algorithms Applications and Programming techniques"- AddisonWesley,1990.
2. George Klir and Tina Folger,.A., "Fuzzy sets, Uncertainty and Information", Prentice Hall of India Pvt.Ltd.,1993.
3. Zimmerman,H.J. "Fuzzy Set Theory and its Applications", Kluwer AcademicPublishers,1994.
4. IEEE tutorial on "Application of Neural Network to Power Systems",1996
5. Loi Lei Lai , "Intelligent System Applications in Power Engineering", John Wiley and Sons Ltd., 1998
6. EthemAlpaydin, "Introduction to Machine learning (Adaptive Computation and Machine Learning series)', MIT Press, Second Edition,2010.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department / College	Mail ID
1.	Mr.A.Balamurugan	Associate Professor	EEE/VMKVEC	balamurugan@vmkvec.edu.in
2.	Mr.S.Prakash	Assistant Professor (Gr-II)	EEE/AVIT	sprakash@avit.ac.in

17BMCC03	BIOSENSORS AND TRANSDUCERS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The course is designed to make the student acquire conceptual knowledge of the transducers and biological components used for the detection of an analyte. The relation between sensor concepts and biological concepts is highlighted. The principles of biosensors that are currently deployed in the clinical side are introduced.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To use the basic concepts of transducers, electrodes and its classification.
2.	To discuss the various types of electrodes.
3.	To determine the recording of biological components.
4.	To employ the knowledge in electrochemical and optical biosensors.
5.	To outline the various biological components using biosensors.

COURSE OUTCOMES

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

CO1. Describe the working principles of transducers.	Understand
CO2. Explain the various types of electrodes.	Understand
CO3. Utilize various FET sensors for recording of biological components.	Apply
CO4. Distinguish various biosensors like electrochemical and optical biosensors.	Analyze
CO5. Analyze the biological components using biosensors in various applications.	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	L	--	M	--	M	--	--	L	--	--	M	--	--	--
CO2	M	L	--	M	--	M	--	--	L	--	--	M	--	--	--
CO3	S	M	L	S	--	S	M	M	M	--	--	M	--	--	--
CO4	S	S	L	S	--	S	M	M	S	--	--	M	M	S	M
CO5	S	S	L	S	--	S	M	M	S	--	--	S	M	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: General measurement system, Transducers and its classification, Resistance transducers, capacitive transducer, Inductive transducer.

TRANSDUCERS:
Temperature transducers, piezoelectric transducers, Piezo resistive transducers, photoelectric transducers.

BIO POTENTIAL ELECTRODES:
Half cell potential, Types of Electrodes –Micro electrodes, Depth and needle electrodes, Surface electrodes, Chemical electrodes, Catheter type electrodes, stimulation electrodes, electrode paste, electrode material.

BIOSENSORS:
Biological elements, Immobilization of biological components, Chemical Biosensor-ISFET, IMFET, electrochemical sensor, chemical fibro sensors.

APPLICATIONS OF BIOSENSORS:
Bananatrode, blood glucose sensors, non invasive blood gas monitoring, UREASE biosensor, Fermentation process control, Environmental monitoring, Medical applications.

TEXT BOOKS:

1. H.S. Kalsi, **"Electronic Instrumentation & Measurement"**, Tata McGraw HILL,1995.
2. Brain R Eggins, **"Biosensors: An Introduction",** John Wiley Publication,1997.
3. Shakthi chatterjee, **"Biomedical Instrumentation"**, Cengage Learning,2013.
4. John G Webster, **"Medical Instrumentation: Application and design"**, John Wiley Publications,2001.

REFERENCES:

1. K.Sawhney, **"A course in Electronic Measurements and Instruments"**, Dhapat Rai & sons,1991.
2. John P Bentley, **"Principles of Measurement Systems"**, 3rd Edition, Pearson Education Asia, (2000 Indianreprint).
3. Geddes and Baker, **"Principles of Applied Biomedical Instrumentation"**, 3rd Edition, John Wiley Publications, 2008.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department / College	Mail ID
1.	Mrs.S.Vaishnodevi	Assistant Professor	BME / VMKVEC	vaishnodevi@vmkvec.edu.in
2.	Mr.V.Prabhakaran	Assistant Professor (Gr-II)	BME / AVIT	prabhakaran@avit.ac.in
3.	Dr.N.Babu	Professor	BME / VMVKEC	babu@vmkvec.edu.in

17BMEC06	APPLIED NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS IN MEDICINE	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

To understand about the basic concepts of Neural Networks and Fuzzy Logic and learn to design and use them for biomedical applications.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To understand the basic concepts of artificial neural networks.
2.	To study the various ANN Models.
3.	To familiarize about the Self organizing maps and competitive networks.
4.	To study the basic concepts of fuzzy Logic systems.
5.	To apply the concepts of ANN and Fuzzy Logic in Biomedical applications.

COURSE OUTCOMES

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

CO1. Explain the basic concepts of artificial neural networks.	Understand
CO2. Discuss about basics of the fuzzy logic.	Understand
CO3. Apply the concepts of ANN and Fuzzy Logic in Biomedical applications.	Apply
CO4. Illustrate the artificial neural network models.	Analyze
CO3. Summarize Self organizing maps and competitive networks.	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	M	--	--	--	--	L	--	--	--	--	--	M	M	M	M
CO2	M	--	--	--	-	L	--	--	--	--	--	M	M	M	M
CO3	S	--	S	M	--	M	--	M	M	--	--	S	M	S	S
CO4	S	M	S	S	M	M	--	M	M	--	--	S	S	S	S
CO5	S	S	S	S	M	M	--	S	S	--	--	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

ARTIFICIAL NEURAL NETWORKS - AN OVERVIEW

Neural Networks Basics-Biological Neural nets, Processing elements-Mc Culloh Pitts Model, Types of Learning, Network Parameters-Weights, Activation, Threshold Functions, Hebb Rule, Delta Rule, Perception learning Algorithm.

ARTIFICIAL NEURAL NETWORKS MODELS

Mapping, training of Feed forward networks-Perception, Mapping, training of Recurrent Networks-Hopfield Network, Radial Basis Function Network, Training of Feed Forward Back Propagation Network, Applications of BPN.

SELF ORGANIZING MAPS (SOM)

Self organizing maps-Pattern clustering, SOM-Topological Mapping, Kohonen"s SOM, K-means clustering algorithm, competitive models – Min, Max Net, Adaptive Resonance Theory (ART) – Introduction, Network and Processing in ART, Associative memory model.

INTRODUCTION TO FUZZY LOGIC

Fuzzy logic-Basic concepts -Fuzzy Vs Crisp set, Linguistic variables, Membership functions, Fuzzy IF-THEN rules, Variable inference techniques, De-fuzzification techniques, Basic fuzzy inference algorithm.

NEURAL NETWORK AND FUZZY LOGIC APPLICATIONS IN MEDICINE

Neural Networks in Biomedical Applications, Cancer, Cardiovascular Applications, Medical Image Analysis using neural networks, Fuzzy Logic Applications, Fuzzy Logic Controller, Neuro fuzzy systems – Applications inmedicine.

TEXT BOOKS:

1. Mohamad H. Hassoun, **"Fundamentals of Artificial Neural Network"**, Cambridge, The MIT Press, 1st Edition, 1995.
2. Laurene Fausett, **"Fundamentals of Neural Networks: Architectures, Algorithms, and Applications"**, Pearson Education India, 3rd Edition,2008.

REFERENCES:

1. C.M.Bishop, **"Pattern Recognition and Machine Learning"**, Springer-Verlag,2006.
2. Timothy J. Ross, **"Fuzzy Logic with Engineering Applications"**, John Wiley and Sons, 2nd Edition,1995.
3. B.Yegnanarayana, **"Artificial Neural Networks"**, Prentice Hall of India, 3rd Edition2006.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.D.Vinodkumar	Professor	BME / VMKVEC	vinodkumar@vmkvec.edu.in
2.	Mr. R. Ezhilan	Assistant Professor	BME / VMKVEC	ezhilan@vmkvec.edu.in
3.	Ms.R.Sandhiya	Assistant Professor (Gr-I)	BME / AVIT	sandhiya@avit.ac.in

17BMSE17	BRAIN COMPUTER INTERFACE	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

Brain-computer interface (BCI) is a collaboration between a brain and a device that enables signals from the brain to direct some external activity, such as control of a cursor or a prosthetic limb. The interface enables a direct communications pathway between the brain and the object to be controlled.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To learn the basics of brain computer interfacing and to study about data acquisition, hardware and software requirements.
2.	To study about the BCI approaches.
3.	To get an idea about EEG Feature Extraction methods.
4.	To acquire knowledge about EEG Translation methods.
5.	To acquire knowledge about MATLAB tools for BCI.

COURSE OUTCOMES Describe about the BCI approaches.

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

CO1. Describe about the brain computer interface approaches.	Understand
CO2. Examine the development of brain computer interfacing.	Apply
CO3. Outline the knowledge about EEG Translation methods.	Analyze
CO4. Evaluate the data acquisition, hardware and software requirements.	Evaluate
CO5. Develop MATLAB based tools for brain computer interface.	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	--	--	--	--	--	--	M	S	M	M
CO2	S	M	M	--	M	L	--	--	L	--	--	S	S	S	S
CO3	S	S	S	--	M	M	--	--	M	--	L	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	M	M	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to Brain computer interfaces, The Evolution of BCIs, Brain signals for BCIs: Neuronal Activity inmotor cortex and related areas, Electrical and Magnetic fields produced by the brain, Signals reflecting brain metabolic activity, ConceptofBCI,InvasiveandNon-invasiveTypes,EEGStandards,SignalFeatures,SpectralComponents,EEG Data Acquisition, Pre-processing, Hardware and Software, Artifacts, Methods to Remove, Near Infrared BCI.

BCI APPROACH METHODS

Mu Rhythm – Movement Related EEG Potentials – Mental States – Visual Evoked Potential Based – P300 component.

EEG FEATURE EXTRACTION METHODS

Time/Space Methods – Fourier Transform – Wavelets – AR models – Band pass filtering PCA – Laplacian Filters – Linear and Non-linear Features.

EEG FEATURE TRANSLATION METHODS

LDA – Regression – Memory Based – Vector Quantization – Gaussian Mixture Modeling – Hidden Markov Modeling.

MATLAB-BASED TOOLS FOR BCI

Introduction, Data Streaming: Field Trip, Data-Suite: Data-River and Mat-River, EEGLAB Online Data Processing: A minimalistic BCI script using native MATLAB code, Other MATLAB BCI Classification tools,BCILAB.

TEXT BOOKS:

1. Jonathan R. Wolpaw, Elizabeth Winter Wolpaw, **"Brain computer interfaces principles and practice"**, Oxford University Press -2012.
2. Desney S, Tan & Anton Nijholt, **"Brain Computer interfaces: Applying our minds to human computer interaction"**, Springer Science and Business Media,2010.

REFERENCES:

1. Bernhard Graimann, Brendan Allison, Gert P furtscheller, **"Brain computer interfaces Revolutionizing Human – Computer interaction"**,Springer-2010.
2. Special Issue on **"Brain Control Interfaces"**, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Vol 14, June 2006.
3. Andrew Webb, **"Statistical Pattern Recognition"**, Wiley International, Second Edition,2002.
4. R.Spehlmann, "**EEG Primer"**, Elsevier Biomedical Press,1981.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.A.Nagappan	Professor & Principal	BME / VMKVEC	principal@vmkec.ac.in
2.	Dr. M.Ravindiran	Professor & Head	BME / AVIT	ravindiran@avit.ac.in
3.	Mr.R.Ezhilan	Assistant Professor	BME / VMKVEC	ezhilan@vmkvec.edu.in

17BMSE18	ROBOTICS & AUTOMATION IN MEDICINE	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The purpose of learning this course on automation and robotics in medicine to acquire knowledge and understand the basic function and to create new application of robotic and automation system in medical field especially in surgery.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To understand the basics of Robotics, Kinematics.
2.	To understand the basics of Inverse Kinematics.
3.	To explore various kinematic motion planning solutions for various Robotic configurations.
4.	To study the basic inverse Kinematic motion planning solutions.
5.	To explore various applications of Robots in Medicine.

COURSE OUTCOMES

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

CO1. Understand the basics of robotic systems.	Understand
CO2. Illustrate the application of automation and robotics in medicine.	Apply
CO3. Categorize the level of planning for various Robotic configurations.	Analyze
CO4. Compare Robotics system and formulate Kinematics.	Evaluate
CO5. Design Robotic systems for Medical application.	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	--	--	M	M	M	S
CO2	S	--	M	M	--	--	--	M	M	--	--	S	M	S	S
CO3	S	S	S	M	M	--	L	M	M	--	L	S	M	S	S
CO4	S	S	S	S	S	S	M	S	S	M	M	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	M	S	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction Automation and Robots, Classification, Application, Specification, Notations, Direct Kinematics Dot and cross products, Coordinate frames, Rotations, Homogeneous coordinates Link coordination arm equation – Five-axis robot, Four-axis robot, Six-axis robot.

KINEMATICS

Inverse Kinematics – General properties of solutions tool configuration, Five axis robots, Three Four axis, Six axis Robot, Workspace analysis and trajectory planning work envelope and examples, workspace fixtures, Pick and place operations, Continuous path motion, Interpolated motion, Straight-linemotion.

ROBOT VISION

Robot Vision Image representation, Template matching, Polyhedral objects, Shane analysis, Segmentation – Thresholding, region labeling, Shrink operators, Swell operators, Euler numbers, Perspective transformation, Structured illumination, Camera calibration.

PLANNING

Task Planning Task level programming, Uncertainty, Configuration, Space, Gross motion, Planning, Grasp Planning, Fine-motion planning, Simulation of planar motion, Source and Goal scenes, Task Planner simulation.

APPLICATIONS

Applications in Biomedical Engineering – Bio Engineering, Biologically Inspired Robots, Neural Engineering, Application in Rehabilitation – Interactive Therapy, Bionic Arm, Clinical and Surgical – Gynaecology, Orthopaedics, Neurosurgery.

TEXT BOOKS:

1. Robert Schilling, "**Fundamentals of Robotics-Analysis and control"**, Prentice Hall,2003.
2. J.J.Craig, **"Introduction to Robotics"**, Pearson Education,2005.

REFERENCES:

1. Staugaard, Andrew C, **"Robotics and Artificial Intelligence: An Introduction to Applied Machine Learning"**, Prentice Hall Of India,1987
2. Grover, Wiess, Nagel, Oderey, **"Industrial Robotics: Technology, Programming and Applications"**, McGraw Hill,1986.
3. Wolfram Stadler, **"Analytical Robotics and Mechatronics"**, McGraw Hill,1995.
4. Saeed B. Niku, **"Introduction to Robotics: Analysis, Systems, Applications"**, Prentice Hall,2001.
5. K. S. Fu, R. C. Gonzales and C. S. G. Lee, **"Robotics"**, McGraw Hill,2008.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.V.Prabhakaran	Assistant Professor (Gr-II)	BME / AVIT	prabhakaran@avit.ac.in
2.	Mr.R.Ezhilan	Assistant Professor	BME / VMKVEC	ezhilan@vmkvec.edu.in
3.	Mr. S.Kannan	Assistant Professor	BME / VMKVEC	kannan@vmkvec.edu.in

17ECCC04	SIGNALS AND SYSTEMS	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

Signals and Systems arise in a wide variety of fields. These concepts and techniques associated with in areas of science and technology. Signals are functions of one or more independent variables contain information about the behavior or nature of some phenomenon. Signals vary continuous / discrete in time. Systems respond to particular signals by producing other signals (output) having some desired behavior. It introduces the students to analyze signals and systems and to design systems to enhance or restore signals that have been degraded in some way.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To understand the various classifications of Continuous time and Discrete time Signals and Systems.
2.	To learn about the spectral analysis of Periodic and Aperiodic Signals using Fourier series.
3.	To impart the knowledge in analysis and characterization of the CT system through Laplace transforms.
4.	To learn about the analysis and characterization of the DT system through Discrete Fourier Transforms and Z Transform.

COURSE OUTCOMES

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

CO1. Classify the type of signals and systems.	Understand
CO2. Determine the time and frequency domain characteristics of continuous time periodic and aperiodic signals with the properties of Fourier Series and Fourier transform respectively.	Apply
CO3. Find the response of a continuous time LTI System using convolution.	Apply
CO4. Determine the time and frequency domain characteristics of discrete time periodic and aperiodic signals using the properties of DTFT, DFT & Z-Transforms respectively.	Apply
CO5. Compute DFT and IDFT coefficients of a given discrete time sequence using Fast Fourier Transform algorithms.	Apply
CO6. Apply and characterize the causality and stability of Discrete LTI system using Z- Transforms.	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	-	-	-	-	-	-	-	-	-	M	-	-
CO2	S	M	M	-	M	-	-	-	M	-	-	M	-	-	M
CO3	S	M	M	-	M	-	-	-	M	-	-	M	-	-	-
CO4	S	M	M	-	M	-	-	-	M	-	-	M	-	-	-
CO5	S	M	M	-	M	-	-	-	M	-	-	M	M	M	-
CO6	S	M	M	-	M	-	-	-	M	-	-	M	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

CLASSIFICATION OF SIGNALS AND SYSTEMS

Continuous time signals, Discrete time signals, Unit step, Unit ramp, Unit impulse – Representation of signals in terms of unit impulse, Classification of continuous time signals & Discrete time signals-Continuous time systems- Discrete time systems- Classification of continuous time systems and Discrete time systems.

ANALYSIS OF CONTINUOUS TIME SIGNALS

Fourier series analysis-Representation of Continuous time Periodic signals – Trigonometric and exponential- Spectral Properties of Periodic power signals - Properties of Continuous time Fourier series – Parseval's relation for power signals, Fourier transform analysis-Representation of Continuous time signals- Properties of Continuous time Fourier transform – Fourier transform of a Periodic function, Rayleigh's Energytheorem.

LTI CONTINUOUS TIME SYSTEM

Convolution Integral, Impulse response, Solution of Differential equation with initial conditions- Zero state response and Zero input response, Block diagram representation, Fourier methods for analysis, Laplace transform analysis.

ANALYSIS OF DISCRETE TIME SIGNALS AND SYSTEMS

Representation of sequences – Discrete Time Fourier Transform (DTFT) - Discrete Fourier Transform (DFT) and its properties –Fast Fourier Transform- FFT Algorithm, DIF & DIT-Z Transform-Inverse Z Transform, Unilateral Z-Transform.

LTI DT SYSTEM

Convolution sum - Impulse response and properties of LTI systems - Difference equations - Z Transform analysis - System stability and causality - Frequency response - Block Diagramrepresentation.

TEXT BOOKS:

1. Alan V.Oppenheim, Ronald W. Schafer, "Discrete time signal processing", Pearson education , 2nd edition,2007.
2. John G. Proakis and Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson Education, 4thEdition,2007.

REFERENCE BOOKS:

1. B.P. Lathi, "Linear Systems & Signals", Oxford Press, Second Edition,2009.

2. Rodger E Ziemer, William H. Tranter, D. Ronald Fannin, "Signals and Systems – continuous and Discrete", Pearson Education, 4th Edition,2009.

3. Douglas K Linder, "Introduction to Signals and Systems",Mc-Graw Hill, 1st Edition,1999.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Muthumanickam	Professor & Head	ECE / VMKVEC	muthumanickam@vmkvec.edu.in
2.	Mr.S.Selvaraju	Associate Professor	ECE / VMKVEC	selvaraju@vmkvec.edu.in
3.	Mr.P.Subramanian	Associate Professor	ECE / AVIT	subramanian@avit.ac.in

17ECCC01	SEMICONDUCTOR DEVICES	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The course is designed to teach the physical principles and operational characteristics of semiconductor devices with emphasis on metal-oxide systems, bipolar, high-electron mobility, and field-effect transistors. Topics also include SCR, TFET, HEMT, Silicon Nano Wire tubes. The course provides advanced background in solid state electronic devices and is intended to help students to develop their basic analytical skills and continue advanced research in the varied branches of semiconductor devices.

PRERQUISITE: NIL

COURSE OBJECTIVES

1.	To emphasis the physics of semiconductors and the working of semiconductor devices like PN and Zener diodes with their applications.
2.	To impart knowledge on working principle, configuration, operational characteristics and limitation of BJTs.
3.	To understand the construction and Characteristics of JFETs and MOSFETs.
4.	To study the working principle and applications of discrete and integrated voltage regulators
5.	To familiarize with several special semiconductor devices like SCR, MISFET, TFET, HEMT and Silicon Nano Wire tubes.

COURSE OUTCOMES

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

CO1. Explain the electron transport properties and operation of semiconductor devices like Diode and their relevant applications like HWR, FWR, Clipperand Clamper, etc.,	Understand
CO2. Quantify the specification and characteristics of BJT in different configuration.	Apply
CO3. Demonstrate RMS and ripple factor values of RC filters in simple power supply and voltage regulatorscircuits	Apply
CO4. Relate the construction and characteristics of JFET and its families.	Apply
CO5. Examine the characteristics and applications of special devices like Shockley Diode, Unijunction Transistor, Phototransistors, MISFETs, MESFETs, etc.,	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	-	-	-
CO3	M	M	M	-	-	-	M	-	M	-	-	M	M	-	-
CO4	S	M	M	M	-	-	M	-	M	-	-	M	-	-	-
CO5	S	M	-	M	-	-	-	-	M	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

SEMICONDUCTOR DIODES AND APPLICATIONS

Introduction, Semiconductor Materials - Ge, Si, and GaAs, Covalent Bonding and Intrinsic Materials, Energy Levels, n- Type and p-Type Materials, Semiconductor Diode, Resistance Levels, Diode Equivalent Circuits, Transition and Diffusion Capacitance, Reverse Recovery Time, Diode Specification Sheets, Semiconductor Diode Notation, Diode Testing, Zener Diodes, Light-Emitting Diodes, Sinusoidal Inputs; Half-Wave Rectifier, Full-Wave Rectifier, Clipper, Clamper, Zener Diode, Voltage-Multiplier Circuits, PracticalApplications.

BIPOLAR JUNCTION TRANSISTORS

Introduction, Transistor Construction, Transistor Operation, Common-Base Configuration, Common-Emitter Configuration, Common-Collector Configuration, Limits of Operation, Transistor Specification Sheet, Transistor Testing, Transistor Casing and TerminalIdentification.

FIELD EFFECT TRANSISTORS

Introduction, Construction and Characteristics of JFETs, Transfer Characteristics, Important Relationships, Depletion-Type MOSFET, Enhancement-Type MOSFET, MOSFET Handling.

VOLTAGE REGULATORS

Introduction, General Filter Considerations, Capacitor Filter, RC Filter, Discrete Transistor Voltage Regulation, IC Voltage Regulators.

SPECIAL PURPOSE DEVICES

Introduction, Silicon-Controlled Rectifier, Basic Silicon-Controlled Rectifier Operation, SCR Characteristics and Applications, Shockley Diode, Diac, Triac, Unijunction Transistor, Phototransistors, MISFETs, MESFETs, TFETs, HEMTs, Silicon Nano WireTransistor.

TEXT BOOK:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, 11th Edition,2013.

REFERENCE BOOKS:

1. Jacob Millman, Christos C Halkias, Satyabrata Jit, "Electron Devices and Circuits", Tata McGraw Hill,2010.

2. David A Bell, "Fundamentals of Electronic Devices and Circuits", Oxford Press,2009.

3. B L Theraja, R S Sedha, "Principles of Electronic Devices and Circuits", S.Chand,2004.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.P.Selvam	Professor	ECE / VMKVEC	hodeee@vmkvec.edu.in
2.	Dr.T.Sheela	Associate Professor	ECE / VMKVEC	sheela@vmkvec.edu.in
3.	Mr.N.Manikanda Devarajan	Assistant Professor	ECE / VMKVEC	manikandadevarajan@vmkvec.edu.in
4.	Mr. R. Karthikeyan	Assistant Professor	ECE / AVIT	rrmdkarthikeyan@avit.ac.in

17ECCC15	ANALOG & DIGITAL COMMUNICATION	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

This course provides a thorough introduction to the basic principles of Analog and Digital Communications. It also deals with Analog and Digital Modulation techniques, Communication Transmitter & Receiver design, Baseband and Bandpass Communication Techniques, Noise Analysis and Multiplexing techniques.

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	To Understand the basic elements of analog communication system
2.	To learn the basic concepts behind the transmission and reception of Angle Modulation
3.	To impart the knowledge about Analog to Digital Transition Systems &Information Theory
4.	To Analyze & design the performance of various digital carrier transmission.
5.	To Apply the knowledge of Digital Communication circuits in various fields.

COURSE OUTCOMES

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

CO1. Interpret the various Analog communication systems.	Understand
CO2. Illustrate the principle and operation behind various Modulators , Demodulators in Analog communications	Apply
CO3. Apply different coding theory to estimate Entropy, Mutual information, Information rate etc.	Apply
CO4. Demonstrate the concept of various digital carrier modulation and determine their error probability.	Apply
CO5. Analyze the major classifications of spread spectrum techniques.	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	S	-	-
CO2	S	M	M	-	M	-	-	-	-	-	-	M	M	-	-
CO3	S	M	M	M	-	-	-	-	-	-	-	M	-	-	-
CO4	S	S	M	M	-	-	-	-	-	-	-	M	-	M	M
CO5	S	M	M	M	L	-	-	-	-	-	-	L	-	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

Analog Communication Systems

Principles of Amplitude Modulation – AM Modulators- Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM Demodulators,AM transmitters-Low level & High level Transmitters, AM Receivers – TRF, Super Heterodyne Receiver, Double conversion AMreceivers.

Angle Modulation: Transmission And Reception

Angle Modulation - FM and PM, Modulation Index, Frequency Modulators and Demodulators, Phase Modulators, FM transmitters- Direct & Indirect transmitters, Angle Modulation Vs Amplitude Modulation, FM Receivers, Frequency Vs Phasemodulation.

Analog to Digital Transition Systems & Information Theory

Pulse Amplitude Modulation, Pulse Position Modulation, Pulse Code Modulation, Sampling Rate, DPCM, Delta Modulation, Time Division Multiplexing, Information Theory- Uncertainty, Information and entropy, source coding theorem, Discrete Memoryless channels, Mutual Information, Channel capacity, Channel coding theorem.

Digital Transmission

Pulse Transmission – Inter Symbol Interference, Eye pattern, Digital carrier Modulation-Binary Amplitude Shift Keying, Binary Frequency Shift Keying, Binary Phase Shift Keying, QPSK, bit and baud rate, BER Analysis

Spread Spectrum Modulation

Pseudo noise sequences, Direct sequence Spread Spectrum with coherent BPSK, Frequency hop spread spectrum modulation, Multiple Access Techniques – Wireless Communication, TDMA and FDMA

TEXT BOOK:

1. Simon Haykin and Michael Moher, "Communication systems" John Wiley & Sons, Fifth Edition, 2016

REFERENCE BOOKS:

1. Simon Haykin and Michael Moher, "An Introduction to Analog and Digital Communications", John Wiley & Sons, second Edition,2006.

2. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI,2002

3. WayneTomasi,"ElectronicCommunicationSystems:FundamentalsThroughAdvanced",PearsonEducation, 2001.

4. B. Carlson, "Introduction to Communication systems", 3rd Edition, McGraw Hill,1989

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.B.Rajasekaran	Associate Professor	ECE / VMKVEC	rajasekaran@vmkvec.edu.in
2.	Mrs.S.Valarmathy	Associate Professor	ECE / VMKVEC	valarmathy@vmkvec.edu.in
3.	Mr.P.Subramanian	Associate Professor	ECE / AVIT	subramanian@avit.ac.in

17EEEC20	MATHEMATICAL MODELLING AND SIMULATION	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

Introduce the students to study the fundamentals of computing and modeling software environments for electrical engineering. This Course contains Programming in numerical computing and modeling software environments for electrical engineering. No prior programming experience or knowledge of SCILAB is assumed, and the course is structured to allow thorough assimilation of ideas through hands-on examples and exercises.

PREREQUISITE :NIL

COURSE OBJECTIVES

1.	To study basic concepts of scientific programming using SCILAB.
2.	To learn about the Basics of Program of SCILAB and related Mathematical Applications.
3.	Analyze the concepts of Program of SCILAB.
4.	To understand the different tools in SCILAB and ODE, DAE
5.	To apply a software program to Electrical circuits and solve the simulation based solutions.

COURSE OUTCOMES

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

CO1	Understand the main features of the SCILAB program development environment to enable their usage in the higher learning.	Understand
CO2	Understand the need for simulation/implementation for the verification of mathematical functions.	Understand and Analyze
CO3	Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.	Analyze
CO4	Interpret and visualize simple mathematical functions and operations thereon using plots/display.	Create and Apply
CO5	Analyze the program for correctness and determine/ estimate/ predict the output and verify it under simulation environment using SCILAB tools	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	M	
CO2	M		L					L		L		L	L	M	
CO3	S	M	L		L		L	L	M	M	L		M	L	L
CO4	S	M	M	L	M	M	M		S	M	M	M	M	L	M
CO5	S	S	L	M	M	L	S	L	M	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to SCILAB – Constants – Data types – SCILAB Syntax – Data type related functions – Over loading.

GRAPHICAL ANALYSIS USING SCILAB

The media – global plot parameters – 2D and 3D plotting – examples – printing graphics and exporting to Latex.

SCILAB PROGRAMMING

Linear algebra – Polynomial and rational function manipulation – Sparse matrices – random numbers – cumulative distribution functions and their inverse – building interface programs – inter SCI – dynamic linking – static linking.

SCILAB TOOLS

Systems and control toolbox – improper systems – system operation – control tools classical control – state space control – model reduction – identification – linear matrix inequalities – integrating ODEs – integrating DAEs.

APPLICATIONS

Resistive circuits – inductive and capacitive circuits – transients – steady state analysis – logics circuits – electronic devices - DC machines

TEXT BOOK

1. Claude Gomez Engineering and Scientific Computing with SCILAB, Birkhauserpublications

REFERENCES

1. Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientificand Engineering Applications, A. Vande Wouwer, P. Saucez, C. V.Fernández 2014ISBN: 978-3319067896

2. SCILAB(a Free Software to Matlab), Er. HemaRamachandran and Dr. Achutsankar Nair, S.Chand Publishers, ISBN-10: 8121939704,2011

3.http://in.mathworks.com/

4. https://www.scilab.org/resources/documentation/tutorialshttp://www.scilab.org/

5. SCILAB: A Begineer's Approach, Anil Kumar Verma, Cengage Learning India Pvt. Ltd.; Firstedition (2018), ISBN-10: 9386858932, ISBN-13:978-9386858931

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	e-Mail ID
1.	P. LOGANATHAN	Assistant Professor	EEE / VMKVEC	loganathan@vmkvec.edu.in
2.	R. SATHISH	Assistant Professor	EEE/ VMKVEC	sathish@vmkvec.edu.in

17BMSE16	WEARABLE TECHNOLOGY	Category	L	T	P	Credit
		BM(OE)	3	0	0	3

PREAMBLE
This course makes the students to understand the fundamentals and applications of the wearable technology.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To understand the fundamentals of sensors and wearable technology.
2.	To ascertain the design and integration of the smart textiles.
3.	To understand the electronic textiles.
4.	T endeavor various sensor in sports wearable application.
5.	To understand the cloud storage of wearable devices.

COURSE OUTCOMES

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

CO1. Discuss the fundamentals of sensor and wearable technology.	Understand
CO2. Illustrate the electronic textiles and its applications.	Apply
CO3. Analyze the sensor for different wearable applications.	Analyze
CO4. Compare the various data storage of wearable systems.	Evaluate
CO5. Design of smart clothing.	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	--	--	S	S	M	M
CO2	S	M	L	L	--	--	--	--	M	--	--	S	S	M	M
CO3	S	M	M	M	S	M	L	--	M	--	--	S	S	M	M
CO4	S	S	S	S	S	S	M	M	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF SENSORS AND WEARABLE TECHNOLOGY

Introduction to sensors – Sensor Physical Properties – Electric (Resistive, Capacitive and Inductive) – Piezoelectric – Optic – Photo elastic - Thermoelectric – Electrochemical.Wearable computers – Wearable Electronics – Intelligent Clothing – Industry on wearable technology – Current Trends – Market Forecast.

SMART CLOTHING

Introduction – Design of Smart Cloths – 2D Design for smart wearables – Textile Development – 3D Design for smart wearables – Construction of smart wearables – Integration – Prototype Development.

ELECTRONIC TEXTILES

Conductive Fibers for textiles – Conductive for Polymers textiles – Carbon Nanotubes yarns – Textile and Electronics Integration - Embroidered Antenna – Electronic textiles for Military Applications.

SENSOR FOR WEARABLE APPLICATIONS

Load and Pressure Measurement sensor – Sports Applications – Inertial Sensor – Sports Application – Optical Sensor – Sports Application – Angle & Displacement Sensor – Sports Application.

DATA STORAGE FOR WEARABLE TECHNOLOGY

Introduction – Storage in Consumer wearable - Cloud storage – Remote Cloud – Sensor Cloud – Cloudlet - Cloud storage Architecture – Confidential disk and Cloud storage with encryption – Two-layer confidentialstorage.

TEXT BOOKS:

1. Patrick F. Dunn, **"Fundamentals of Sensors for Engineering and Science"**, CRC Press, Taylor &Francis.
2. Jane McCann, David Bryson, **"Smart Clothes and Wearable Technology"**, CRC Press, Woodhead Publishing Ltd.

REFERENCES:

1. Daniel A. James, Nicola Petrone, **"Sensors and Wearable Technologies in Sport: Technologies, Trends and Approaches forImplementation"**.
2. Marrington, Andrew, Kerr, Don, **"Management Association, Information Resources Managing Security Issues and the Hidden Dangers of WearableTechnologies"**.
3. Tilak Dias, **"Electronic Textiles: Smart Fabrics and Wearable Technology"**, Elsevier, WoodheadPublishing.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. M.Ravindiran	Professor & Head	BME / AVIT	ravindiran@avit.ac.in
2.	Mr.R.Ezhilan	Assistant Professor	BME / VMKVEC	ezhilan@vmkvec.edu.in
3.	Mrs.S.Vaishnodevi	Assistant Professor	BME / VMKVEC	vaishnodevi@vmkvec.edu.in

17ECSE21	WIRELESS SENSOR NETWORKS AND IOT	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

To understand the fundamental concepts of wireless sensor networks and Internet of Things, have an enhanced knowledge of the various protocols with Internet of Things in the real world scenario.

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	To understand the various sensor network concepts
2.	To Know the physical layer issues and analyze Medium Access Control Protocols
3.	To identify with the IoT Reference Architecture and Real World Design Constraints
4.	To recognize the various IoT Protocols (Datalink, Network, Transport, Session, Service)
5.	To Understand IoT value chain structure (device, data cloud), application areas and technologies involved

COURSE OUTCOMES

CO1. Describe and explain radio standards and communication protocols for wireless sensor networks	Understand
CO2. Explain the function of the node architecture and use of sensors for various applications.	Understand
CO3. Expose the architectures, functions and performance of wireless sensor networks Systems and platforms.	Understand
CO4. Describe the basic concepts in IoT.	Understand
CO5. Develop web services to access/control IoT devices	Apply
CO6. Deploy an IoT application using Raspberry Pi.	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	S	M	-
CO2	S	S	S	-	M	-	-	-	-	-	-	M	M	-	-
CO3	S	M	M	-	L	-	-	-	-	-	-	L	-	-	-
CO4	S	S	S	-	M	M	-	-	-	-	-	M	-	M	-
CO5	S	M	M	-	M	M	-	-	-	-	-	M	M	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTIONTOWIRELESSSENSORNETWORKS

Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture Hardware Platforms: Motes, Hardwareparameters

INTRODUCTION TO NS-3

Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example.

MEDIUM ACCESS CONTROL PROTOCOL DESIGN

Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis (Markov Chain)

FUNDAMENTALS OF IOT

Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies –IoT Levels – Domain Specific IoT – IoT vs. M2M.

IOT DESIGN METHODOLOGY & BUILDING IOT WITH RASPBERRY PI

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development. Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services

TEXT BOOKS:

1. W.DargieandC.Poellabauer(2010).FundamentalsofWirelessSensorNetworks–TheoryandPractice. Wiley.
2. ArshdeepBahga,VijayMadisetti(2015).InternetofThings–Ahands-onapproach. UniversitiesPress.

REFERENCE BOOKS:

1. KazemSohraby,DanielMinoliandTaiebZnati(2007).Wirelesssensornetworks -Technology,Protocols,and Applications. Wiley Inter science.
2. Manoel Carlos Ramon (2014). Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for LinuxProgrammers.
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann (2010). Wireless Sensor Network Technologies for the Information Explosion Era.Springer.
4. Marco Schwartz (2014). Internet of Things with the Arduino Yun. PacketPublishing

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.R.Ramani	Assistant Professor	ECE / VMKVEC	ramani@vmkvec.edu.in
2.	Mr.R.Karthikeyan	Assistant Professor (Gr-II)	ECE / AVIT	rrmdkarthikeyan@avit.ac.in

17ECSE22	WIRELESS TECHNOLOGIES FOR IOT	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The course follows the evolution of mobile and wireless security, and the underlying principles. The course is designed to educate the purpose of defending systems from unauthorized wireless attacks. This course also discovers the latest security standards and practices in mobile and wireless network.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	Understand the wireless technologies, wireless network standards.
2.	Gain the knowledge on wireless networks, denial of service attacks and client-side threats.
3.	Build an understanding of mobile data network standards.
4.	To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)
5.	To classify Real World IoT Design Constraints, Industrial Automation in IoT.

COURSE OUTCOMES

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

CO1. Knowledge on various wireless technologies, wireless network standards and their threats.	Understand
CO2. Show how hackers and auditors alike test wireless networks for vulnerabilities such as rogue access points, denial of service (DoS) attacks and client-side threats	Apply
CO3. Demonstrate the mobile data network standards and its challenges.	Apply
CO4. Summarize the vulnerabilities and mis-configurations at wireless transport layer.	Evaluate
CO5. Invent how an attacker might attempt to subvert and bypass Wireless security measures in Bluetooth and WiFi.	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	M	M	M	-	-	-	-	-	-	-	-	-	-
CO2	M	L	M	M	M	-	-	-	-	-	-	-	-	-	-
CO3	S	L	M	M	M	-	-	-	M	-	-	-	S	M	-
CO4	S	L	S	S	M	-	-	-	M	M	-	M	S	-	-
CO5	S	M	S	S	S	-	-	L	M	M	M	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

MOBILE & WIRELESS TECHNOLOGIES:

Introduction to wireless technologies-Mobile cellular networks -Personal Area Networks -Transmission Media – WLAN standards, controllers -Securing WLAN -Countermeasures -Wired Equivalence Protocol(WEP).Wireless threats:Kinds of security breaches-Eavesdropping -Communication Jamming -RF interference -Covert wireless channels -DOS attack –Spoofing -Theft of services -Traffic Analysis-Cryptographic threats -Wireless security Standards.

MOBILE NETWORKS SECURITY:

Wireless Device security issues -CDPD security (Cellular Digital Packet Data)-GPRS security (General Packet Radio Service) -GSM (Global System for Mobile Communication) security –IP security -3G / 4G security.

WIRELESS TRANSPORT LAYER SECURITY:

Secure Socket Layer -Wireless Transport Layer Security -WAP Security Architecture -WAP Gateway -Wireless Intrusion Detection and Prevention Systems (WIDS/WIPS)

BLUETOOTH & WIFI SECURITY:

Basic specifications -Pico nets –Scatter nets -Bluetooth security architecture –Security at the baseband layer and link layer –Frequency hopping –Security manager –Authentication –Encryption -WiFi Hot spot architecture -Wireless honey pots -Security in IEEE 802.11.

WIRELESS SENSOR NETWORK SECURITY

Attacks on wireless sensor network and Preventive mechanisms: authentication and traffic analysis, Case study: centralized and passive intruder detection Case studies:Public safety wireless networks, Case study 2 –Satellite communications systems , Case study 3 –Wide Area Wireless Data Services (CDPD, GPRS, etc.), Case study 4– Wireless LANs (802.11, etc.), Case study 5 –Wireless Metropolitan Area Networks (e.g., 802.16)

Text Books

1.Wireless Security-Models, Threats and Solutions,Nichols and Lekka, Tata McGraw –Hill, New Delhi, 2006. 2.Wireless Security, Merritt Maxim and David Pollino, Osborne/McGraw Hill, New Delhi, 2005.

Reference Books

1.Wireless and Mobile Network Security-Security basics, Security in On-the-shelf andemerging technologies,Hakima Chaouchi, Maryline Maknavicius, ISBN:9781848211179,2010.
2.Mobile and Wireless Network Security and Privacy, Springer, ISBN: 0387710574, edition2007.
3.Wireless Network Security: Theories and Applications, Springer,ISBN:978-3642365102,2013

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.R.Karthikeyan	Assistant Professor (Gr-II)	ECE / AVIT	rrmdkarthikeyan@avit.ac.in
2.	Mrs.A.Malarvizhi	Assistant Professor	ECE / VMKVEC	malarvizhi@vmkvec.edu.in

17ECSE07	SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEM	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The subject introduces the students to the modern technologies used in developing embedded software for better software quality. The introduction is both theoretical and practical. The subject shows why modern embedded software systems are complex, it lists the consequences of complexity, and details how we handle complexity in this context, and how we define and increase software quality. The subject then iterate through the modern solutions available to keep control over the softwaredevelopment process, and how we can increase software quality.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To learn the concepts of software architecture, analysis, design & maintenance.
2.	To study the Data representation.
3.	To familiarize about the mixing C and assembly
4.	To know about input and output programming
5.	To study the memory management

COURSE OUTCOMES

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

CO1. Explain the concept of software architecture, analysis, design & maintenance.	Understand
CO2. Explain the different Data representation.	Understand
CO3. Illustrate the concept of input and output programming	Apply
CO4. Examine the memory management	Apply
CO5. Analyze and implement the mixing C and assembly language programming	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

SOFTWARE TECHNOLOGY: Software Architectures, Software development Tools, Software Development Process Life Cycle and its Model, Software Analysis, Design and Maintenance.

INTRODUCTION TO DATA REPRESENTATION: Data representation ,Two's complement, Fixed point and Floating Point Number Formats ,Manipulating Bits in -Memory, I/O Ports, Low level programming in C ,Primitive data types , Arrays, Functions ,Recursive Functions, Pointers, Structures & Unions ,Dynamic Memory Allocation ,File handling ,Linked lists, Queues, Stacks. Conventions ,Typical use of Addressing Options, Instruction Sequencing , Procedure Call and Return , Parameter passing ,Retrieving Parameters , Everything in pass by value ,Temporary variables

INPUT/ OUTPUT PROGRAMMING: I/O Instructions, Synchronization, Transfer Rate & Latency, Polled Waiting Loops, Interrupt – Driven I/O, Writing ISR in Assembly and C, Non Maskable and Software Interrupts

MEMORY MANAGEMENT: Direct Memory Access, Local and Global Scope, Automatic and Static Allocation, Distinguishing Static from Automatic Object Creation, Initialization and Destruction,

MIXING C AND ASSEMBLY: C and assembly, Programming in assembly ,RegisterUsage

Text Books

Reference Books

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.S.Selvam	Assistant Professor (Gr-II)	ECE / AVIT	selvam@avit.ac.in
2.	Mr.G.Ramachandran	Assistant Professor	ECE / VMKVEC	ramachandran@vmkvec.edu.in

17MECC12	COMPUTER INTEGRATED MANUFACTURING	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

Preamble

The students completing this course are expected to understand the nature and role of computers in manufacturing. The course includes computer aided design, fundamentals of CNC machines, programming of CNC machines, group technology, computer aided process planning techniques, shop floor control and flexible manufacturing systems. It exposes the students to various currenttrends followed in the industries.

Prerequisite: NIL

Course Objective

1.	To understand the importance of CAD and CAM
2.	To enable student to learn about Solid modelling techniques and various graphics standards in CAD
3.	To understand about the fundamentals and programming of CNC machines
4.	To gain knowledge about GT and CAPP
5.	To enable students to learn about FMS and SFC

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

CO1.	Discuss the basic concepts of Computer Aided Design and Manufacturing	Apply
CO2.	Apply the concept of Modeling techniques for designing the products	Apply
CO3.	Discuss the basics, working principles of various components of CNC machines.	Apply
CO4.	Write the CNC programs for various mechanical components with different operations.	Apply
CO5.	Apply the concepts of Group technology and discuss the concepts of Computer aided process planning techniques.	Apply
CO6.	Analyze the functions of various components of Shop Floor Control and Flexible Manufacturing 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	M	L	-	-	-	-	-	-	-	-	-	-	M	-	-
CO2	S	M	L	-	-	-	-	-	-	-	-	-	M	-	-
CO3	S	M	L	-	-	-	-	-	-	-	-	-	M	-	-
CO4	S	S	M	L	-	-	-	-	-	M	-	-	M	-	-
CO5	S	S	S	M	-	-	-	-	-	M	-	-	M	-	-
CO6	S	S	S	M	S	-	-	-	-	S	-	-	M	-	-

S- Strong; M-Medium; L-Low

Syllabus

INTRODUCTION TO CAD/CAM

The design process - Morphology of design, Product cycle - Computer Aided Design, Benefits of CAD. Role of computers - principles of computer graphics - Current trends in manufacturing engineering - Design for Manufacturing and Assembly - Sequential and concurrent engineering -Rapid prototyping.

SOLID MODELING

Graphic software: coordinate representation- graphic functions, software standards. Graphical Kernel system (GKS) - Initial graphics exchange system (IGES) - Graphic packages. Geometric Modeling - Wire frame, Surface and Solid models - Constructive Solid Geometry (CSG) and Boundary Representation (B-REP) Techniques - Features of Solid Modeling Packages.

FUNDAMENTALS OF CNC MACHINES

CNC Technology - Functions of CNC Control in Machine Tools - Classification of CNC systems - Contouring System - Interpolators, open loop and closed loop CNC systems - CNC Controllers, Direct Numerical Control (DNC Systems). - Work holding devices and tool holding devices-Automatic Tool changers. Feedback devices - Principles of Operation-Machining Centers - Tooling for CNCmachines
Numerical control codes - Standards - Manual Programming - Canned cycles and subroutines - Computer Assisted Programming, CAD / CAM approach to NC part programming – APT language, machining from 3D models.

GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING

Introduction to CIM and its related activities-History of group technology- role of G.T. in CAD/CAM integration - part families - classification and coding - DCLASS and MICLASS and OPITZ coding systems-facility design using G.T. - benefits of G.T. - cellular manufacturing. Process planning - role of process planning in CAD/CAM integration - approaches to computer aided process planning - variant approach and generative approaches - CAPP and CMPP process planning systems.

SHOP FLOOR CONTROL AND INTRODUCTION OF FMS

Shop floor control-phases-factory data collection system -automatic identification methods- Bar code technology-automated data collection system. FMS-components of FMS - types -FMS workstation -material handling and storage systems- FMS layout -computer control systems- application and benefits.

Text Books

1.	Mikell.P.Groover “Automation, Production Systems and Computer Integrated manufacturing”, Pearson Education 2001.
2.	Radhakrishnan P, Subramanyan.S. and Raju V., “CAD/CAM/CIM”, 2nd Edition New Age International (P) Ltd., New Delhi, 2000.

Reference Books

1.	Yoremkoren, “Computer Integrated Manufacturing System”, McGraw-Hill, 1983.
2.	Ranky, Paul G., “Computer Integrated Manufacturing”, Prentice Hall International, 1986.
3.	David D.Bedworth, Mark R.Hendersan, Phillip M.Wolfe “Computer Integrated Design and Manufacturing”, McGraw-Hill Inc.
4.	Roger Hanman “Computer Integrated Manufacturing”, Addison – Wesley, 1997.

Course Designers

S.No	Faculty Name	Designation	College	Email id
1.	J.SATHEES BABU	Associate Professor	Mech / VMKVEC	jsathees@gmail.com
2.	M.SARAVANAN	Assistant Professor	Mech / VMKVEC	msaravanan94@gmail.com

17BTSE05	INDUSTRIAL WASTE MANAGEMENT	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

This course will provide an overview of management techniques for industrial wastes, as well as State and Central Pollution Board regulations for waste management. The course will also highlight the business profitability, legal framework, and the economic feasibility of the environmentally sustainable technologies for waste management.

PREREQUISITE:NIL

COURSE OBJECTIVES

1.	To discuss the present scenario of industrial waste management in India
2.	To explain the knowledge on sources and characteristics of various industrial wastes and strategies for its prevention and control
3.	To execute about the onsite pollution from major industries
4.	To outline the various effects and disposal options for the industrial waste.
5.	To outline the maintenance of hazardous waste

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1: Summarise the insight into the pollution from major industries including the sources and characteristics of pollutants	Understand
CO2: Identify the plan minimization of industrial wastes	Understand
CO3: Illustrate the facilities for the processing and reclamation of industrial waste water	Apply
CO4: Correlate the various treatments for disposals of industrial waste.	Analyse
CO5: Examine the physio chemical treatment for hazardous waste.	Analyse

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO INDUSTRIAL POLLUTION

Types of Industries And Industrial Pollution, Characteristics Of Industrial Wastes, Population Equivalent, Bioassay Studies, Effects Of Industrial Effluents On Streams, Sewer, Land, Sewage Treatment Plants And Human Health Environmental Legislations Related to Prevention And Control Of Industrial Effluents And Hazardous Wastes

CLEANER PRODUCTION

Waste Management Approach, Waste Audit, Volume And Strength Reduction, Material And Process Modifications, Recycle, Reuse And Byproduct Recovery – Applications.

POLLUTION FROM MAJORINDUSTRIES

Sources, Characteristics, Waste Treatment Flow Sheets For Selected Industries Such As Textiles, Tanneries, Pharmaceuticals, Electroplating Industries, Dairy, Sugar, Paper, Distilleries, Steel Plants, Refineries, Fertilizer, Thermal Power Plants, Wastewater ReclamationConcepts

TREATMENT TECHNOLOGIES

Equalisation, Neutralisation, Removal of Suspended and Dissolved Organic Solids, Chemical Oxidation, Adsorption, Removal of Dissolved Inorganics, Combined Treatment Of Industrial And Municipal Wastes, Residue Management, Dewatering, Disposal.

HAZARDOUS WASTE MANAGEMENT

Hazardous Wastes, Physico Chemical Treatment, Solidification, Incineration, Secure Land Fills.

TEXT BOOKS:

1. Rao M. N. & Dutta A. K. "Wastewater Treatment", Oxford – IBH Publication,1995.
2. Eckenfelder W.W. Jr., "Industrial Water Pollution Control", McGraw Hill Book Company, New Delhi,2000.
3. Patwardhan. A.D., Industrial Wastewater Treatment", Prentice Hall of India, New Delhi2010.

REFERENCES:

1. Shen T.T., "Industrial Pollution Prevention", Springer,1999.
2. Stephenson R.L. and Blackburn J.B., Jr., "Industrial Wastewater Systems Handbook", Lewis Publisher, New York,1998
3. Freeman H.M., "Industrial Pollution Prevention Hand Book", McGraw Hill Inc., New Delhi,1995.
4. Pandey, "Environmental Management" Vikas Publications,2010.
5. Industrial Wastewater Management, Treatment and Disposal",(WEF – MOP – FD3) McGraw Hill,2008

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. S. Chozhavendhan	Associate professor	Biotechnology / AVIT	chozhavendhan@avit.ac.in
2.	Mrs.C.Nirmala	Associate professor	Biotechnology / VMKVEC	nirmala@vmkvec.edu.in

17BMEC04	MEMS AND ITS BIOMEDICAL APPLICATIONS	Category	L	T	P	Credit
		EC(OE)	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. Discuss the concepts of microfluidic systems.	Understand
CO2. Explain about the basics of working of MOEMS Technology.	Understand
CO3. Illustrate the working principle of MEMS & Microsystems.	Apply
CO4. Analyze the nanomaterial in various biomedical applications.	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	M	--	--	--	--	--	--	--	L	--	--	M	--	--	--
CO2	M	--	L	--	--	--	--	--	L	--	--	M	M	--	--
CO3	S	M	M	--	--	--	--	--	M	--	--	S	M	M	M
CO4	S	S	M	L	M	M	M	M	M	--	--	S	M	M	S
CO5	S	S	S	M	M	S	M	S	M	--	--	S	M	S	S

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 Edition,2008.
2. Nitaigour Premch and Mahalik, **"MEMS"**, Tata McGraw Hill, 2nd Reprint2008.
3. Wanjun Wang & Steven A. Soper, **"BioMEMS – Technologies and applications"**, CRC Press, First Edition2007.

REFERENCES:

1. Steven S. Saliterman, **"Fundamentals of BioMEMS & Medical Microdevices"**, International Society for Optical Engineering, 1st Edition2006.
2. Gerald A Urban, **"BioMEMS"**, Springer, 1st Edition2006.
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.	Dr. M.Ravindiran	Professor & Head	BME / AVIT	ravindiran@avit.ac.in
2.	Mr. R. Ezhilan	Assistant Professor	BME /VMKVEC	ezhilan@vmkvec.edu.in
3.	Mr.S.Kannan	Assistant Professor	BME /V MKVEC	kannan@vmkvec.edu.in

17CVEC14	AIR POLLUTION MANAGEMENT	Category	L	T	P	Credit
		EC(OE)	3	0	0	3

PREAMBLE

The course work offers the basic knowledge on various sources of air pollutantsand their possible effects local, regional and global environment. It provides various techniques for sampling and analyzing the 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.

PREREQUISITE – NIL

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	apply
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. Suggest remedies for the possible effects of air pollution 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	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

REFERENCES:

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997 2.
2. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company,New Delhi, 1991.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	A.Fizoor Rahman	Assistant Professor	CIVIL /VMKVEC	fizoorr@gmail.com
2.	M.Senthilkumar	Assistant Professor	CIVIL /VMKVEC	Senthilkumar@vmkvec.edu.in
3.	C.Nivetha	Assstant Professor	CIVIL / AVIT	nivetha.c@avit.ac.in

17BTPI05	INDUSTRIAL BIOSAFETY	Category	L	T	P	Credit
		E C(OE)	3	0	0	3

PREAMBLE

Industrial biosafety deals with the microbial hazards caused to an individual and to the society. In the subject the learners could grasp the knowledge on biosafety levels and the roles of various regulatory committees in avoiding the risk. Biosafety often use pioneering techniques along with other applied fields of research like biotechnology, genetic engineering, biochemistry to study microbes and their complex mechanisms. Knowledge of these principles will enable practice well in handling pathogenic microorganisms carefully in thelaboratory.

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	To recognize the basic knowledge on biosafety levels.
2.	To discuss various hazards caused by the GMOs.
3.	To classify the role of regulatory committees in controlling the risk
4.	To outline the risk involved in using GMOs and LMOs.
5.	To design the biosafety procedure in lab and research institutions on handling pathogenic microorganisms.

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1: Recall the various biosafety levels.	Remember
CO2: Explain the various biosafety guidelines	Understand
CO3: Identify the role of regulatory committees in controlling the risk	Understand
CO4: Analyze the risk involved in using GMOs and LMOs products	Analyse
CO5: Differentiate the various safety procedures followed in various industries.	Analyse

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO1 2	PSO 1	PSO2	PSO3
CO1	L	L	L	L	-	-	-	-	-	L	-	L	-	-	-
CO2	M	M	-	M	-	-	-	-	-	-	L	L	-	-	-
CO3	S	-	M	L	M	-	-	L	-	-	-	-	-	-	-
CO4	L	L	L	L	L	-	S	M	-	-	-	M	-	-	-
CO5	L	L	L	-	L	-	-	-	-	-	-	-	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF BIOSAFETY

Introduction, Historical Background, Introduction to Biological Safety Cabinets, Primary Containment for Biohazards, Biosafety Levels, Biosafety Levels of Specific Microorganisms, Biosafety guidelines - Overview of National Regulations and relevant International Agreements including Cartegana Protocol.

BIOSAFETY IN BIOTECHNOLOGY INDUSTRIES

Hazard assessment, Use of genetically modified organisms & their release in environment; special procedures for rDNA based product production (Vaccine and Insulin); Biosafety in laboratory, Laboratory

PRINCIPLES OF BIOSAFETY

Introduction, Historical Background, Introduction to Biological Safety Cabinets, Primary Containment for Biohazards, Biosafety Levels, Biosafety Levels of Specific Microorganisms, Biosafety guidelines - Overview of National Regulations and relevant International Agreements including Cartegana Protocol.

BIOSAFETY IN BIOTECHNOLOGY INDUSTRIES

Hazard assessment, Use of genetically modified organisms & their release in environment; special procedures for rDNA based product production (Vaccine and Insulin); Biosafety in laboratory, Laboratory associated infections and other hazards; Prudent biosafety practices in laboratory

BIOSAFETY – REGULATORY FRAMEWORKS

Biotechnology and bio-safety concerns at the level of individuals, institutions, society, region, country and world. Regulatory framework in India governing GMOs-Recombinant DNA Advisory Committee (RDAC), Institutional Biosafety Committee (IBC), Review Committee on Genetic Manipulation, Genetic Engineering Approval Committee (GEAC), State Biosafety Coordination Committee (SBCC), District Level Committee (DLC). Rules for the manufacture, use/import/export and storage of hazardous microorganisms/genetically engineered organisms or cells.

RISK ASSESMENT

Definition of GMOs & LMOs, GMO applications in food and agriculture, Risk Analysis, Risk Assessment, Risk management and communication Risk assessment in various industries- pharmaceuticals, food and beverages etc., steps towards minimizing the risk operations in industries.

SAFETY AND BIOSAFETY - CASE STUDIES

Recommended Biosafety Levels for Infectious Agents and Infected Animals, Rules and regulation for handling of microbes in laboratory purposes, lab construction procedure, decontamination and discarding procedure of laboratory used microorganisms. Case studies -swine flu spreading, Bhopal tragedy etc.,

TEXT BOOKS:

1. R.C. Dubey., 2014. A Text Book of Biotechnology Fifth Revised Edition, S.ChandPublications

2. Anupam Singh, Ashwani Singh, 2012. Intellectual property rights and Bio-Technology (Biosafetyand Bioethics), Published by Bio-Green Books, NewDelhi.

3. Mueller, M.J., "Patent Law", 3rd Edition, Wolters Kluwer Law &Business,2009.

REFERENCES:

1. V Sreekrishna, 2017. Bioethics and Biosafety in Biotechnology by New ageInternationalpublishers.

Sateesh, M.K., 2008. Bioethics and Biosafety, IK InternationalPublishers.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. Chozhavendhan.S	Associate professor	Biotechnology / AVIT	chozhavendhan@avit.ac.in
2.	Dr. B. Prabasheela	Associate professor	Biotechnology / AVIT	prabasheela@avit.ac.in
3.	Mr.N.Jawahar	Asst. Prof	Biotechnology	jawahar@vmkvec.edu.in

17BTEC29	GREEN BUILDING AND SUSTAINABLE ENVIRONMENT	Category	L	T	P	Credit
		EC(OE)	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 efficientmodelling.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To define, develop and & Plan the details of Implementation.
2.	To summarize the fundamentals of electric power systems and building electric wiring.
3.	To demonstrate about the Bioclimatic design and concepts.
4.	To construct the water conservation & water management systems.
5.	To assess the key components of remodelling project.

COURSE OUTCOMES

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

CO1. Interpret the basics of green building	Understand
CO2. Explain the advantages and benefits of green building practices	Understand
CO3. Construct low energy architecture features in residential and commercial buildings	Apply
CO4. Develop proper water conservation systems to make up a healthy building	Apply
CO5. Analyse the green sustainable materials and practices	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	M	M	-		L	-	-	-	-	-	-	S	-	-	-
CO4	M	M	-	-	S	-	L	-	-	-	-	-	-	-	-
CO5	M	M	L	L	S	S	-	L	-	-	-	-	M	M	M

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/observationsystems.

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 Autoclave 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 REMODELLING

Key components of remodelling 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."SustainableConstruction:GreenBuildingDesignandDelivery,"SecondEdition,NewYork: John Wiley & Sons, Inc.,2008.
2. Thermal analysis and design of passive solar buildings by A. K. Athienitis and MatSantamouris.
3. Passive building desing 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	Department	Mail ID
1.	Dr.S.P.Sangeetha	Professor & Head	Biotechnology / AVIT	sangeetha@avit.ac.in
2.	Ms.R.Subashini	Assistant Professor	Biotechnology / VMKVEC	subashini@vmkvec.edu.in

17CSPI01	PROJECT WORK	Category	L	T	P	Credit
		PI	0	0	18	9

PREAMBLE

This course enables the students to exercise some of the knowledge and/or skills developed during the programme to new situation or problem for which there are number of engineering solutions. This course include planning of the tasks which are to be completed within the time allocated, and in turn, helps to develop ability to plan, , use, monitor and control resources optimally and economically. By studying this course abilities like creativity, imitativeness and performance qualities are also developed in students. Leadership development and supervision skills are also integrated objectives of learning thiscourse.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To develop quality software solution.
2.	To involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation.
3.	To understand and gain the knowledge of the principles of software engineering practices.
4.	To Get good exposure and command in one or more application areas and on the software.
5.	To participate and manage a large software engineering projects in future.

COURSE OUTCOMES

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

1. Describe the Systems Development Life Cycle (SDLC).	Apply
2. Design of Modules.	Apply
3. Perform coding.	Apply
4. Analyze and Apply various types of testing techniques and prepare documentation.	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	-	S	-	M	M	M
CO2	S	S	M	M	S	M	-	-	S	-	M	-	S	S	S
CO3	L	M	L	L	M	M	-	-	M	-	L	-	M	M	M
CO4	S	S	M	L	S	M	-	-	S	-	S	-	M	M	M

S- Strong; M-Medium; L-Low

- Not more than one student is permitted to work on aproject.
- Each Student should be involved in each and every phase of Project Development. If it is found that student is not involved in any phase; for example coding phase, it may lead to the rejection/disqualifying of the project at any stage.
- Title of the project should be kept the same throughout theproject.

Guidelines for preparing the Project Dissertation

This document lists the contents required for the academic project report done as part of the MCA Curriculum. Section names have been listed with description. The descriptions have been provided in italics. Important: This page and the text in italics present throughout this document are to give you guidance. Please do not include them in your projectreport.

Work allocation matrix:

Prepare work allocation matrix along with provision of follow-up remarks and notes.

Project execution:

Execute project preparation activities as per work allocation matrix.

Documentation and presentation:

Documentation of final project report which includes following in sequence.

a. Title page-(Suggested as perAnnexure-II.)
b. Certificate –As perAnnexure-III.
c. Index.
d. Preface/Acknowledgement.
e. Courseoutcomes.
f. Projecttitle.
g. Assembly and detail productiondrawings.
h. List of activities (suggested as per Annexure – IV) and work allocationmatrix.
i. Plant layout withdimensions.
j. List and specifications of machineries, equipments andtools.
k. Bill of material with make or buy decision.
l. Specifications of bought outparts.
m. Process sheets-As per format given in course Industrialengineering.
n. Flow processcharts.
o. Specification and consumption ofconsumables.
p. Details of inspection / testing carriedout.
q. Details of rework / rectifications carried out.
r. Costestimation.
s. Monitoring and controlreport/sheet.
t. Notes ontroubleshooting.
u. Notes on individual achievement of skills / experience /problems / solutions.
v. References.
w. Day to day logbook as perAnnexure-V.
x. Presentation including moments at work-video/photographs inaction

Notes:

Prepare project report with MS Office with following guidelines.

PAGE:	A4 (ON ONESIDE).
MARGINN:	TOP :15mm.
	BOTTOM :15mm.
	RIGHT :15mm.
	LEFT :30mm.
FONT:	ARIAL.
SIZE:	12-BOLD, CONTENT12,
	SPACING 18 POINTS,
HEADER:	TITLE OF THE PROJECT,
	PAGE NUMBER ON TOP
	RIGHT.
FOOTER:	ACADEMIC YEAR, SHORT
	NAME OF THEINSTITUTE

SUGGESTED LEARNING RESOURCES.

i. Use ofLibrary.
ii. Referencebooks.
iii. Handbooks.
iv. Encyclopedia.
v. Magazines.
vi. Periodicals.
vii. Journals.
viii. Visits of industry, organizations related as per therequirement.
ix. Internet.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.M.Nithya	Associate Professor	CSE / VMKVEC	hodcse@vmkvec.edu.in
2.	Dr.S.Rajaprakash	Associate professor	CSE / AVIT	rajaprakash@avit.ac.in.

17CSPI02	INTERNSHIP	Category	L	T	P	Credit
		PI	0	0	0	3

PREAMBLE

The Engineering Internship course is a Canvas-based course that offers students the opportunity to explore and develop their careers through professional practice. The structured plan of education impacts student work readiness through a number of professional development skill-building activities, including goal setting; analysis and reflection; feedback from employer; informational interviewing and debriefing their experience.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	An understanding of how liberal arts coursework ties to professional careers of interest.
2.	Gain insight into a possible career path of interest while learning about the industry in which the organization resides, organizational structure, and roles and responsibilities within that structure.
3.	Develop professional connections and identify a strategy for maintaining those connections
4.	Identify and articulate next steps in their career trajectory.

COURSE OUTCOMES

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

CO1. Add details about your experience including new skills developed and results obtained .	Understand
CO2. Analyze your internship experience, reflecting on lessons learned and how your liberal arts education prepared you for the internship.	Apply
CO3. Identification of additional skills that will need to be developed to ensure career readiness.	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	-	L	L	S	L	S	-	M	M	M
CO2	S	S	M	M	S	M	L	L	M	M	M	-	S	S	S
CO3	L	M	M	L	M	M	L	L	M	L	L	-	M	M	M

S- Strong; M-Medium; L-Low

General Procedure

Final Reflection Report:

I. General InformationSection

Explain your role and how your work contributed to the company

II. TechnicalSkills

Document the technical experiences you had during your work experience and discuss technical problems that you assisted in solving

III. Development of ProfessionalSkills

Describe team and leadership building opportunities on the job

IV. Assessments

- Discuss whether or not you met goals set out by your supervisor or that you set foryourself
- Evaluate your performance of assigned projects, noting both areas of strength and improvement

V. Conclusion

- Summarize by addressing the impact of the work experience on your education and careergoals
- Provide two "lessons learned" to share with any student that is considering aninternship

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.M.Nithya	Associate Professor	CSE / VMKVEC	hodcse@vmkvec.edu.in
2.	Dr.S.Rajaprakash	Associate professor	CSE / AVIT	rajaprakash@avit.ac.in.

17CSPI03	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

Business Intelligence (BI) refers to the tools, technologies, applications and practices used to collect, integrate, analyze, and present an organization's raw data in order to create insightful and actionable business information in Data mining.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To Introduce students to various business intelligence concepts
2.	To learn the concepts of data integration used to develop intelligent systems for decision support
3.	To introduce visualization tool for prepare the enterprise reporting
4.	To learn analytical components and technologies used to create dashboards and scorecards, data/text/Web mining methods
5.	To gain new insights into organizational operations in implementation of systems for Business Intelligence (BI)

COURSE OUTCOMES

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

CO1. Learn about the concepts of OLTP and OLAP for BI infrastructure development	Understand
CO2. Gained an understanding of how business professionals can use analytics techniques to formulate and solve relevant problems and how they use analytics to support decision making	Analyze
CO3. Apply Clustering, Association and Classification techniques for Data Integration	Apply
CO4. Assess BI tools to solve problems, issues, and trends using predictive analysis	Apply
Develop systems to measure, monitor and predict the enterprise variables and performance indicators for business decision-making process	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	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BUSINESS INTELLLIGENCE

Introduction to OLTP AND OLAP – BI Definition and BI Concepts – Business Applications of BI - BI Framework- Role of Data Warehousing in BI –BI Infrastructure Components- BI Process – Developing Data Warehouse – Management Framework – Business driven approach –BI Technology — BI Roles & Responsibilities.

BASICS OF DATA INTEGRATION

Concepts of Data Integration need and advantages of using Data Integration – Introduction to common data integration approaches – Introduction to ETL using SSIS – Introduction to Data Quality – Data Profiling Concepts and Applications.

INTRODUCTION TO MULTIDIMENSIONAL DATA MODELING

Introduction to Data and Dimensional Modeling – Multi Dimensional Data Model – ER modeling Vs Multi Dimensional Model – Concepts of Dimensions - facts - cubes- attributes- hierarchies- star and snowflake schema – Introduction to Business Metrics and KPIs – Creating Cubes using SSAS.

BASICS OF ENTERPRISE REPORTING

Introduction to Enterprise Reporting - Concepts of dashboards - balanced scorecards – Introduction to SSRS Architecture– Enterprise Reporting using SSRS reporting service

BI ROAD AHEAD

BI and Mobility – BI and cloud computing – BI for ERP systems - Benefits of BI in ERP-NorthWind_Traders Data-Data Analyses through Excel-Kettle Tool – Conversion of data using Kettle Tool.

TEXT BOOKS

1.RN Prasad, Seema Acharya, ”Fundamentals Of Business Analytics” Wiley India,2011

REFERENCES

1. Soumendra Mohanty, “Data Warehousing Design, Development and Best Practices”, Tata McGraw-Hill, New Delhi, 2007.

2. David Loshin, “Business Intelligence”, Morgan Kaufmann Publishsers, San Francisco, Fifth edition, 2007.

3.Larissa Terpeluk Moss and Shaku Atre, “Business Intelligence Roadmap”, Pearson Education,2007

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mrs. S. Leelavathy	Assistant Professor(G-II)	CSE / AVIT	leelavathy@avit.edu.in

17CSPI04	BUILDING ENTERPRISE APPLICATIONS	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

Enterprise Applications are complex systems. They require delicate planning and expertise for the right type of development Enterprise Applications are the instruments of administration, management, and planning for an enterprise

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To teach the students about various ways to build enterprise applications
2.	At the completion of the class, they should understand how to deploy systems to a number of different host platforms
3.	They develop graphical user interfaces, as well as character-oriented screens. They test and debug their system

COURSE OUTCOMES

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

CO1. Familiarize with concept of Enterprise Analysis and Business Modeling.	Understand
CO2. Understand requirements validation, planning and estimation. Design and document the application architecture.	Understand
CO3. Understand the importance of application framework and designing other application components	Apply
CO4. Construct and develop different solution layers.	Apply
CO5. Perform Code review, Code analysis, build process.	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	M	-	-	-	M	-	M	-	**S**	M	M
CO2	S	M	M	M	M	-	-	-	M	-	-	-	**S**	M	M
CO3	S	-	M	M	M	-	-	-	M	-	-	M	**S**	-	M
CO4	S	M	S	M	S	-	-	-	S	M	M	M	**S**	M	M
CO5	S	M	S	M	S	-	-	-	S	S	S	M	**S**	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise application

INCEPTING OF ENTERPRISE APPLICATIONS

Enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture-design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture anddesign

CONSTRUCTING OF ENTERPRISE APPLICATIONS

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and codecoverage

TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

TEXT BOOKS

1. Raising Enterprise Applications – Published by John Wiley, authored by Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, VeerakumarEsakimuthu
2. Building Java Enterprise Applications – Published by O'Reilly Media, authored by BrettMcLaughlin

REFERENCE BOOK

1. Software Requirements: Styles & Techniques – published by Addison-WesleyProfessional
2. Software Systems Requirements Engineering: In Practice – published by McGraw-Hill/OsborneMedia
3. Managing Software Requirements: A Use Case Approach, 2/e – published byPearson
4. Software Architecture: A Case Based Approach – published byPearson

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. S. Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Mr.M.Annamalai	Assistant Professor	CSE / VMKVEC	annamalaim@vmkvec.edu.in

17CSPI05	INTERNET AND WEB TECHNOLOGY	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To introduce basic concepts of internet
2.	To learn about HTML & XML
3.	To learn about internet security

COURSE OUTCOMES

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

CO1 . Analyze a web page and identify its elements and attributes.	Analyze
CO2. Create web pages using XHTML and Cascading Style Sheets.	Apply
CO3. Build dynamic web pages using JavaScript (Client side programming).	Apply
CO4. Create XML documents and Schemas	Apply
CO5. Build interactive web applications using JSP	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	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO3	S	M	L	-	L	-	-	-	M	-	-	L	**S**	M	M
CO4	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO5	S	M	L	-	M	-	-	-	M	-	-	L	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO INTERNET

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems

HTML CSS AND SCRIPTING

HTML – Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML formelements

XML

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS

INTERNET SECURITY & FIREWALLS

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI,Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication ,Authorization And Accounting).

WEBSITE PLANNING & HOSTING

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),FtpClients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat

TEXT BOOKS

1. Internet & Intranet Engineering,- Daniel Minoli, TMH.

2 .Alexis Leon and Mathews Leon – Internet for Every One, Tech World.

REFERENCES

1. Eric Ladd, Jim O'Donnel –"Using HTML 4, XML and JAVA"-Prentice Hall of India-1999.

2. "Beginning Java Script "– Paul Wilton – SPD Publications–2001

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Dr. R. Jaichandran	Associate Professor	CSE / AVIT	rjaichandran@avit.ac.in

17CSPI06	LEARNING IT ESSENTIALS BY DOING	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

The proposed elective course exposes the non-CS/IT students to IT Essentials. The core modules of this Elective includes programming , Database and web Technology amongst other related topics. This course refers to the basic tools and technologies for the right type of website development and enable student to create simple web applications

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To learn about the essentials of Information Technology
2.	To get an idea about the scripting languages.
3.	To get an idea about the internet protocols

COURSE OUTCOMES

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

CO1. Understand the networking concept internet protocols, network routing	Understand
CO2. Understand the fundamentals of web applications and its modeling	Understand
CO3. Understand and learn the scripting languages with design of web applications	Understand
CO4. Analyze the process of mobile communication and network technologies	Analyze
CO5. Build simple interactive applications, database applications and multimedia applications.	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	M	M	-	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	M	**S**	-	M
CO3	S	M	M	M	-	-	-	-	-	-	-	M	**S**	M	M
CO4	M	M	M	M	M	-	-	-	-	-	-	M	**S**	M	-
CO5	M	M	M	M	S	-	-	-	-	-	-	M	**-**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF COMPUTER ARCHITECTURE

introduction-organization of a small computer -Central Processing Unit - Execution cycle – Instruction categories – measure of CPU performance Memory – Input/output devices - BUS-addressing modes. System Software – Assemblers – Loaders and linkers – Compilers and interpreters

OPERATING SYSTEM

Introduction – memory management schemes Process management Scheduling – threads.
Problem solving with algorithms- Programming styles – Coding Standards and Best practices - Introduction to C -Programming Testing and Debugging. Code reviews -System Development Methodologies – Software development Models -User interface Design – introduction – The process – Elements of UI design & reports.

RDBMS

Data processing – the database technology – data models-ER modeling concept –notations – Extended ER features -Logical database design - normalization -SQL – DDL statements – DML statements – DCL statements
Writing Simple queries – SQL Tuning techniques – Embedded SQL - OLTP

OBJECTED ORIENTED CONCEPTS

Object oriented programming -UML Class Diagrams– relationship – Inheritance – Abstract classes – polymorphism-Object Oriented Design methodology - Common Base class -Alice Tool – Application of OOC using Alice tool.

CLIENT SERVER COMPUTING

Internetworking – Computer Networks – Working with TCP/IP – IP address – Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application - browsers and Web Servers
URL – HTML – HTTP protocol – Web Applications - Application servers – Web Security.

REFERENCES

1. Andrew S. Tanenbaum, Structured Computer Organization, PHI, 3rd ed.,1991
2. Silberschatz and Galvin, Operating System Concepts, 4th ed., Addision-Wesley,1995
3. Dromey R.G., How to solve it by Computers, PHI, 1994
4. Kernighan, Ritchie, ANSI C languagePHI,1992
5. Wilbert O. Galitz, Essential Guide to User Interface Design, John Wiley, 1997
6. Alex Berson, Client server Architecture, Mc Grew Hill International,1994
7. Rojer Pressman, Software Engineering-A Practitioners approach, McGraw Hill, 5th ed.,2001
8. Alfred V Aho, John E Hopcroft, Jeffrey D Ullman, Design and Analysis of Computer Algorithms, Addison Wesley Publishing Co.,1998
9. Henry F Korth, Abraham Silberschatz, Database System Concept,2nd ed. McGraw-Hill International editions,1991
10. Brad J Cox, Andrew J.Novobilski, Object – Oriented Programming– An evolutionary approach, Addison – Wesley,1991

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.K.Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr. K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSPI07	ESSENTIALS OF INFORMATION TECHNOLOGY	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

This course aims to provide the fundamental concepts of Computer operations like hardware and software installation, and emphasizing principles application packages. This course aims at facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data and how to manipulate them through query languages, the effective designing of relational database and how the system manages the concurrent usage of data in multi user environment..

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To provide basic knowledge of hardware and software components of computers.
2.	To study Problem solving Techniques and program development cycle.
3.	Design and test simple programs in C language
4.	Document artifacts using common quality standards
5.	Design simple data store using RDBMS concepts and implement

COURSE OUTCOMES

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

CO1. Basic knowledge on hardware and software terminologies.	Understand
CO2. Apply the knowledge of mathematics, science and computing in the core information technologies	Apply
CO3. Understand Program Devolvement Cycle and apply various Problem Solving Techniques	Apply
CO4. Develop the function programs with all the concepts in c	Analyze
CO5. Build and manipulate relational database using Structured Query Language and relational languages	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	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO2	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO3	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO4	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO5	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Basics of computer systems - Various hardware components - Data storage and various Memory units - Central Processing Unit - Execution cycle - Introduce to software and its classifications. Operating system concepts– Introduction – Memory management - Process management - Intercrosses Communication – Deadlocks - File management -Device management.

PROBLEM SOLVING TECHNIQUES

Introduction to problem solving - Computational problem and it's classification - Logic and its types - Introduction to algorithms - Implementation of algorithms using flowchart - Flowcharts implementation through RAPTOR tool - Searching and sorting algorithms - Introduction and classification to Data Structures - Basic Data Structures - Advanced Data Structures

PROGRAMMING BASICS

Introduction to Programming Paradigms and Pseudo Code - Basic programming concepts - Program Life Cycle - Control Structures - Introduction and Demonstration of 1-D Array and 2-D Array - Searching and Sorting techniques - Demonstration Concept of memory references in arrays –Strings - Compiler Concepts - Code Optimization techniques. Structured Programming – Functions – Structures - File Handling - Introduction to Software Development Life Cycle - Industry Coding Standards and Best Practices - Testing and Debugging - Code Review

PROJECT PREPARATION

Project Specification - Preparation of High level design and Detailed design document, Unit Test Plan and Integrated Test Plan - Coding and Unit Testing activities - Integration Testing.

RDBMS

Data processing – the database technology – data models-ER modeling concept –notations – Extended ER features-Logical database design - normalization -SQL – DDL statements – DML statements – DCL statements -Joins - Sub queries – Views-Database design Issues.

TEXT BOOKS

1. Information Technology Planning, Blokdyk Gerardus , Pearson 3rd Edition .

REFERENCES

1. "Computer Organization and Architecture" – William Stallings , Pearson 8th Edition
2. "Database System Concepts"- Abraham Silberschatz , Hendry F Korth – Indian 6thEdition.
3. "Computing Fundamentals and C Programming" Paperback – 1 Jul 2017 by E Balagurusamy(Author)
4. "How to solve it by computer "– R G Dromey, Pearson Edition2006.
5. " Software testing Principle and Practices - Desikan Srinivasan , Gopalaswamy Ramesh, Pearson Edition 2005.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr. K.Karthik	Assistant Professor	CSE / AVIT	karthik@avit.ac.in

17CSPI08	INTRODUCTION TO MAIN FRAMES	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

The mainframe hardware and z/OS operating system grew up together and are highly complementary for reliability, availability, serviceability, scalability, security, and performance. The operating system taught in this course is z/OS, a widely used mainframe operating system. z/OS is known for its ability to serve thousands of users concurrently and for processing very large workloads in a secure, reliable, and expedient manner..

PREREQUISITE : NIL

COURSE OBJECTIVES

1.	To get an idea about the mainframe hardware
2.	To get an idea about z/OS
3.	To learn about JCL

COURSE OUTCOMES

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

CO1. Learn the Concept of Computer Architecture ,Mainframes OS and Terminology	Understand
CO2. Learn the Concept of virtual storage and its use in z/OS..	Understand
CO3. Understand Job Control language- Various statements in JCL- JCL procedures	Understand and Apply
CO4. Build and manipulate relational database using Structured Query Language and relational languages	Apply
CO5. Analyze various forms of data representation and structures supported by the COBOL language	Apply and 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	M	M	-	-	-	-	-	-	-	-	**S**	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	**S**	-	M
CO3	S	L	M	M	-	-	-	-	-	-	-	-	**S**	M	-
CO4	S	M	M	M	-	-	-	-	-	-	-	-	**S**	M	M
CO5	S	M	M	M	-	-	-	-	-	-	-	-	**S**	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

EVOLUTION OF MAINFRAME HARDWARE

Overview of Computer Architecture - Classification of Computers - micro, mini, mainframes and super computer – Mainframe computer - key features - benefits - Evolution of Mainframes - Different hardware systems. Mainframes OS and Terminology: Operating systems on mainframes, Batch processing vs. online processing - mainframe operating system. - evolution - concepts of Address space, Buffer management - Virtual storage - paging - swapping – Dataset management inmainframes.

Z/OS AND ITS FEATURES

Z-operating system (Z/OS) - Virtual storage - Paging process - storage Managers - Program execution modes - Address space - Multiple virtual system(MVS) , MVS address space, Z/OS address space - Dataset - sequential and partial dataset - Direct access storage device(DASD) -Access methods - Record formats - Introduction to virtual storage access methods(VSAM) - Catalog –VTOC.

INTRODUCTION TO JCL

Introduction to Job Control language - Job processing – structure of JCL statements - Various statements in JCL - JOB statement - EXEC statement – DD statement - JCL procedures and IBM utilityprograms.

COBOL PROGRAMMING

Introduction – History, evolution and Features, COBOL program Structure, steps in executing COBOL. Language Fundamentals – Divisions, sections, paragraphs, sections, sentences and statements, character set, literals, words, figurative constants, rules for forming user defined words, COBOL coding sheet.. Data division – Data names, level numbers, PIC and VALUE clause, REDEIFNES, RENAMES and USAGE clause. Procedure Division – Input / Output verbs, INITIALIZE verb, data movement verbs, arithmetic verbs, sequence control verbs.

OVERVIEW OF DB2

Introduction to DB2 – System Service component, Database Service component, Locking Service component, Distributed Data Facility Services component, Stored Procedure component, catalogs and optimizer. DB2 Objects and Data Types - DB2 Objects Hierarchy, Storage groups, Database, Table space, Table, Index, Clustered index, Synonyms and aliases, Views, Data Types. DB2 SQL programming – Types of SQL statements, DCL, DDL, DML, SPUFI utility. Embedded SQL programming – Host variable, DECLGEN utility, SQLCA, single/multiple row manipulation, cursors, and scrollablecursors.

TEXT BOOKS

1. Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley,1992.
2. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley India Dream Tech,2002.
3. M.K. Roy and D. Ghosh Dastidar, “Cobol Programming”, Tata McGraw Hill, New York,1973.

REFERENCES

1. MVS JCL, Doug Lowe, Mike Murach andAssociates.

2. AS/400 Architecture and Application – The Database Machine by Jill T. Lawrence (SPDPublications)

3. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley India Dream Tech,

2002. 4.z/OS V1R4.0 MVS JCL Reference found onlineat

http://www-.ibm.com/support/docview.wss?uid=pub1sa22759706

5.z/OS V1R1.0 MVS JCL Reference found online

6.http://publibz.boulder.ibm.com/cgibin/bookmgr_OS390/BOOKS/iea2b600/CCONTENTS

7. COBOL - Language Reference, Ver 3, Release 2, IBMRedbook.

8. COBOL - Programming Guide, Ver 3, Release 2, IBMRedbook.

9. Complete CL The Definitive Control Language Programming Guide by Ted Holt and Ernie Malaga (SPD Publication).

10. Nancy Stern & Robert A Stern, "Structured Cobol Programming", John Wiley & Sons, New York,1973.

11. M.K. Roy and D. Ghosh Dastidar, "Cobol Programming", Tata McGraw Hill, New York,1973.

12. Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, New York,1973.

13. Craig S Mullins, DB2 Developer's Guide, Sams Publishing,1992.

14. Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley, 1992.

15. C J Date & Colin J White, A Guide to DB2, AddisonWesley.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mr. S. Muthuselvan	Assistant Professor (G-II)	CSE / AVIT	muthuselvan@avit.ac.in

17CSPI09	MOBILE APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		PI	3	0	0	3

PREAMBLE

In this modern era almost every hands has a handheld devices. Each handheld device have the computing capability to meet the half the needs of user such as banking, browsing, education and emergency etc. It is a must for a computer engineer to have some basic knowledge about the handheld devices platform and its supporting software development. This course will give adequate knowledge in developing a mobile applications for different such as Android, iOS, Windows.

PRE REQUISITE – NIL

COURSE OBJECTIVES

1.	Understand system requirements for mobile applications
2.	Generate suitable design using specific mobile development frameworks
3.	Generate mobile application design
4.	Implement the design using specific mobile development frameworks
5.	Deploy the mobile applications in marketplace for distribution

COURSE OUTCOMES

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

CO1. Expose to technology and business trends impacting mobile applications	Understand
CO2.Understand enterprise scale requirements of mobile applications	Understand
CO3. Familiarize in the Graphics used for Android application development	Apply
CO4. Competent with the characterization and architecture of mobile applications	Apply
CO5. Competent with designing and developing mobile applications using one application development framework.	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	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO2	S	M	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	M	L	-	-	M	-	-	-	L	**S**	M	M
CO4	S	M	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO5	S	M	M	M	L	-	-	M	-	-	-	L	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I INTRODUCTION

Introduction to mobile applications –Embedded systems -Market and business drivers for mobile applications – Publishing and delivery of mobile applications –Requirements gathering and validation for mobile applications

UNIT II BASIC DESIGN

Introduction –Basics of embedded systems design –Embedded OS -Design constraints for mobile applications, both hardware and software related –Architecting mobile applications –User interfaces for mobile applications –touch events and gestures –Achieving quality constraints –performance, usability, security, availability andmodifiability.

UNIT III ADVANCED DESIGN

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV TECHNOLOGY I – ANDROID

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI –Persisting data using SQLite–Packaging and deployment –Interaction with server side applications –Using Google Maps, GPS and Wifi –Integration with social mediaapplications.

UNIT V TECHNOLOGY II –IOS

Introduction to Objective C –iOS features –UI implementation –Touch frameworks –Data persistence using Core Data and SQLite –Location aware applications using Core Location and Map Kit –Integrating calendar and address book with social media application –Using Wifi -iPhone marketplace.

TEXT BOOKS

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.

REFERENCES

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech,2012.

2. James Dovey and Ash Furrow, “Beginning Objective C”, Apress,2012.

3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress,2013

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. Sasikala	Associate Professor	CSE / VMKVEC	sasikalak@vmkvec.edu.in
2.	Mrs. S. Leelavathy	Assistant Professor (G-II)	CSE / AVIT	leelavathy@avit.edu.in

17CSPI10	INTERNET OF THINGS	Category	L	T	P	Credit
		PI	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: Understand basics in IOT	Understand
CO2: Understand Methodology in IOT	Apply
CO3: Design IOT applications using Raspberry	Analyze
CO4: Design IOT applications using Aurdino and Intel Edison	Analyze
CO5: Apply Cloud computing in IOT	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	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

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

Bascis of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services

IOT WITH ARDUINO 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.

REFERENCES

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	Assistant professor G-II	CSE / AVIT	rjaichandran@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkv@edu.in

17CHBS01	Environmental Sciences (Common to All Branches)	Category	L	T	P	Credit
		MC	-	-	-	0

PREAMBLE

Environmental science and Engineering is an interdisciplinary field that integrates physical, chemical, biological, information sciences and provides the basic knowledge of structure and function of ecosystem and better understanding of natural resources, biodiversity and their conservation practices. The course helps to create a concern for our environment that will generate pro-environmental action, including activities we can do in our daily life to protectit.Furthermore, it deals the social issues and ethics to develop quality engineer in our country.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	Applying Science and Engineering knowledge to protect environment
2.	To provide comprehensive insight in natural resources and protect natural resources
3.	To create awareness on the various pollutions and their impact.
4.	To educate the ways and means to manage natural calamities
5.	To impart fundamental knowledge on human welfare measures

COURSE OUTCOMES

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

CO1. Comprehend the impact of engineering solutions in a global and societal context	Understand
CO2. Illustrate the contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems	Understand
CO3. Illustrate the importance of ecosystem and biodiversity	Apply
CO4. Practice to improve the environment and sustainability	Apply
CO5. Conclude the importance of conservation of resources.	Analyze
CO6. Estimate the important role of IT in healthy environment for future generations	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	-	-	-	M	S	S	M	M	-	S	M	-	M
CO2	S	-	-	-	-	S	S	S	-	-	-	S	-	M	M
CO3	S	-	-	-	-	M	S	M	L	-	-	S	-	-	M
CO4	S	-	-	-	-	M	S	S	M	M	-	S	M	-	M
CO5	S	-	-	-	-	M	S	S	M	M	-	S	M	-	M
CO6	S	-	-	-	-	M	S	S	M	M	-	S	M	M	M

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.

ENVIRONMENTALPOLLUTION

Pollution-Definition,man made 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– Disastersmanagement:Floods,earthquake,cycloneand.
land slides - 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 BOOKS:

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. Bharucha Erach "The Biodiversity of India" Mapin Publishing Pvt Ltd, Ahmedabad, India
3. TrivediR.K."HandbookofEnvironmentalLaws",Rules,Guidelines,Compliancesand tandards Vol I &II, Enviromedia.
4. Dr.J.Meenambal,EnvironmentalScienceandEngineering,MJPPublication,Chennai Gilbert M. Masters.
5. Introduction to Environmental Engineering and Science, Pearson Education Pvt Ltd., II Edition, ISBN 81-297-0277-0,2004.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	Dr. V. Anbazhagan	Professor	Chemistry / VMKVEC	anbu80@gmail.com
2.	Mr. A. Gilbert Sunderraj	Assistant Professor	Chemistry / VMKVEC	asmgill80@gmail.com
3.	Dr. R. Nagalakshmi	Professor	Chemistry / AVIT	nagalakshmi.chemistry@avit.ac.in
4.	Dr.K.Sanghamitra	Associate Professor	Chemistry / AVIT	sanghamitra.chemistry@avit.ac.in

17MBHS11	ESSENCE OF INDIAN KNOWLEDGE TRADITION	Category	L	T	P	Credit
		MC	-	-	-	0

PREAMBLE

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To facilitate the students with the concepts of Indian traditional knowledge.
2.	To understand the Importance of roots of knowledge system

COURSE OUTCOMES

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

CO1. Understand the concept of Traditional knowledge and its importance	Understand
CO2. Know the need and importance of protecting traditional knowledge.	Understand
CO3. Know the various enactments related to the protection of traditional knowledge	Understand
CO4. Understand the concepts of Intellectual property to protect the traditional knowledge	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	M	-	-	-	-	-	-	M
CO3	-	-	-	-	-	S	M	M	-	-	-	-	-	-	M
CO4	-	-	-	-	-	S	M	M	-	-	-	-	-	-	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO TRADITIONAL KNOWLEDGE: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

PROTECTION OF TRADITIONAL KNOWLEDGE: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

LEGAL FRAME WORK AND TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001. (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139.

TEXT BOOKS:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan, 2012.

REFERENCES:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino.
3. https://www.youtube.com/watch?v=LZP1StpYEPM
4. http://nptel.ac.in/courses/121106003

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	M. Manickam	Associate Professor	MBA / VMKVEC	manickam@vmkvec.edu.in
2.	C. M. Muthukrishna	Assistant Professor	MBA / AVIT	muthukrishna.mba@avit.ac.in

17MBHS11	INDIAN CONSTITUTION	Category	L	T	P	Credit
		MC	-	-	-	0

PREAMBLE

India is the largest democracy of the world. It is need of the time that a wide spectrum of young people is fully conversant with its Constitution and its successfully working is analyzed in a detailed and systematic way. This course discusses the basic traits of the Constitution of India.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	Understand the need for constitution.
2.	Appreciate the fundamental duties and rights of the citizens of India
3.	Explain the role and amendments of constitution in a democratic society.
4.	Describe the directive principles of state policy and their significance.
5.	List the key features of the constitution, union government and state government.

COURSE OUTCOMES

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

CO1. Create awareness about the constitutional values and objectives written in the Indian constitution.	Understand
CO2. List fundamental rights and fundamental duties of Indian citizens.	Understand
CO3. Identify the division of legislative, executive and financial powers between the union and state governments	Understand
CO4. Understand the working of Indian democracy ,its institutions and processes at the local,state and union levels	Understand
CO5. Explain the functions and responsibilities of election commission of india and union public service commission	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	-	-	-	-	-	-	M	-	M	-	M	-	-	-	-
CO3	-	-	-	-	-	-	M	-	M	-	M	-	-	-	-
CO4	-	-	-	-	-	-	M	-	M	-	M	-	-	-	-
CO5	-	-	-	-	-	-	M	-	M	-	M	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History of Making of the Indian Constitution: Introduction to the constitution of India, the making of the constitution and salient features of the constitution.

PHILOSOPHY OF THE INDIAN CONSTITUTION

Philosophy of the Indian Constitution: Preamble Salient Features, Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties, Amendment of the constitutional powers and procedures.

UNION GOVERNMENT

Union Government: Union Government, Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with powers and functions), president of India (with powers and functions), Prime minister of India (With powers and functions), Union judiciary (Supreme court), Jurisdiction of the supreme court.

STATE GOVERNMENT

State Government: State Government, State legislature (Legislative Assembly/ Vidhan Sabha, Legislative council/ Vidhan parishad), powers and functions of the state legislature, State executive, Governor of the state (with powers and functions), The chief Minister of the state (with powers and functions), State Judiciary (High courts)

ELECTION COMMISSION

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi.

2. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

3. The constitution of India, P.M.Bakshi, Universal Law Publishing Co.,

4. The Constitution of India, 1950 (Bare Act), Government Publication.

5. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCES:

1. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.
3. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
4. nptel.ac.in/courses/109104074/8
5. nptel.ac.in/courses/109104045/
6. nptel.ac.in/courses/101104065/ 4.
7. www.hss.iitb.ac.in/en/lecture-details
8. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email ID
1.	M. Manickam	Associate Professor	MBA / VMKVEC	manickam@vmkvec.edu.in
2.	C. M. Muthukrishna	Assistant Professor	MBA / AVIT	muthukrishna.mba@avit.ac.in