AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM

(Constituent Colleges of Vinayaka Mission's Research Foundation Deemed to be University)

NAAC Accredited

VINAYAKA MISSION'S RESEARCH FOUNDATION

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

Faculty of Engineering and Technology

Department of Computer Science and Engineering

Programme: B.E/ B.Tech – Computer Science and Engineering

Full Time (4 Years)

STRUCTURED CHOICE BASED CREDIT SYSTEM (SCBCS)

Curriculum & Syllabus

(Semester I to VIII)

Regulations 2017

VMKV ENGINEERING COLLEGE, SALEM 636 308

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

"To establish a centre of excellence in computer education and research and to create a platform for professionals thereby reaching a pinnacle of glory"

MISSION

Computer Science and Engineering is committed

- To develop innovative , competent and quality computer engineers by imparting the state-of the –art technology
- To enrich the knowledge of students through value based education
- To develop consultancy activities for industrial sectors
- To endeavour for constant up gradation of technical expertise of students to cater to the needs of the society

PROGRAMME OUTCOMES: (POS)

- **PO1. Engineering Knowledge:** Ability to apply the knowledge of Mathematics, Science and Computer Science and Engineering to solve complex engineering problems related to the design, development, testing and maintenance of computing systems.
- **PO2. Problem Analysis:** Ability to identify, formulate and analyze complex Computer Science and Engineering problems in the areas of hardware, software, theoretical Computer Science and applications to reach significant conclusions by applying Mathematics, Natural sciences, Computer Science and Engineering principles.
- **PO3. Design & Development of Solutions:** Ability to design and build a system, component, process or a program for complex engineering problems by factoring in all the requirements and various design tradeoffs, with appropriate consideration for the public health and safety, cultural, societal and environmental factors.

- **PO4. Investigation of Complex Problem:** Ability to use research based knowledge and research methods to perform literature survey, design experiments for complex problems in designing, developing and maintaining a computing system, collect data from the experimental outcome, analyze and interpret valid/interesting patterns and conclusions from the data points.

- **PO5. Modern Tool Usage:** Ability to create, select and apply state of the art tools and techniques in designing, developing and testing a computing system or its component.

- **PO6. Engineer and Society**: Ability to assess the societal, health, cultural, safety and legal issues that might arise in the context of the professional practice in Computer Science and Engineering, by applying the reasoning obtained based on the operational domain.

- **PO7. Environment and Sustainability:** Ability to demonstrate the knowledge of sustainable development of computing systems/products/solutions with an understanding of the impact of these solutions on the Society and Environment.

- **PO8. Ethics:** Ability to apply professional ethics and pledge to the norms/responsibilities in the engineering practice of Computer Science.

- **PO9. Individual and Team work:** Ability to function as an individual and as a team player or leader in multidisciplinary teams and strive towards achieving a common goal.

- **PO10. Communication:** Ability to communicate effectively on complex software/system engineering activities with the peer community and society through unambiguous spoken language, written reports, presentations and an ability to give and receive clear instructions.

- **PO11. Project Management and Finance:** Ability to apply the knowledge of Engineering and Management principles to manage projects as a team member or leader in multidisciplinary teams.

- **PO12. Life-long Learning:** Ability to spot the need for and engage in lifelong learning to cope up with the rapidly evolving disciplines of Computer Science and its allied engineering application domains.

PROGRAM SPECIFIC OUTCOMES (PSO)

The student will be able to:-

1. Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

2. Understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.

3. Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success and to be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- **PEO1**: Technical Expertise: Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.

- **PEO2**: Graduate will establish effective professionals by solving real world problems using investigative and analytical skills along with the knowledge acquired in the field of Computer Science and Engineering.

- **PEO3**: Graduate will prove a ability to work and communicate effectively as a team member and /or leader to complete the task with minimal resources, meeting deadlines.

- **PEO4**: Graduate will demonstrate his/her ability to adapt to rapidly changing environment in advanced areas of Computer Science and scale new height in their profession through lifelong learning.

PEO - PO Mapping

PEO/PO	1	2	3	4	5	6	7	8	9	10	11
1											
2											
3											
4											

 Strong Correlation  Medium Correlation  Low Correlation

Credit Requirement for Course Categories

Sl. No.	Category of Courses	Credits
01	**A. Foundation Courses (FC)**	**54 - 63**
	i. Humanities and Sciences (English and Management Subjects)	12 – 21
	ii. Basic Sciences (Maths, Physics and Chemistry Subjects)	24 – 33
	iii. Engineering Sciences (Basic Engineering Courses)	18 - 27
02	**B. Core courses (CC) relevant to the chosen programme of study.**	**81**
03	**C. Elective Courses (EC)**	**18 - 27**
	i. Programme Specific (Class Room or Online)	12 – 15
	ii. Open (Class Room or Online)	6 - 9
04	**D. Project + Internship + Industry Electives (P + I + I)**	**18**
	i. Project	9
	ii. Internship / Industry Supported Courses	9
05	**E. Employability Enhancement Courses + Co - Curricular Courses + Extra Curricular Courses (EEC)****	**9 - 18**
	Minimum Credits to be earned	**180**

**** - Mandatory, Credits would be mentioned in Mark sheets but not included for CGPA Calculations.**

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

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

(i) HUMANITIES AND SCIENCES (ENGLISH AND MANAGEMENT SUBJECTS) - CREDITS (12 - 21)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17EGHS01	TECHNICAL ENGLISH	ENGLISH	FC (HSS)	3	0	0	3	NIL
2.	17EGHS02	BUSINESS ENGLISH	ENGLISH	FC (HSS)	3	0	0	3	NIL
3.	17EGHS81	ENGLISH LANGUAGE LAB	ENGLISH	FC (HSS)	0	0	4	2	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
(ii) BASIC SCIENCES (MATHS, PHYSICS AND CHEMISTRY SUBJECTS) - CREDITS (24 - 33)									
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.	17PCBS02	PHYSICAL SCIENCES	PHYSICS & CHEMISTRY	FC (BS)	4	0	0	4	NIL
6.	17CHBS01	ENVIRONMENTAL SCIENCE AND ENGINEERING	CHEMISTRY	FC (BS)	3	0	0	3	NIL
7.	17PHBS05	SMART MATERIALS	PHYSICS	FC (BS)	3	0	0	3	NIL
8.	17PCBS81	PHYSICAL SCIENCES LAB	PHYSICS & CHEMISTRY	FC (BS)	0	0	4	2	NIL
(iii) ENGINEERING SCIENCES (BASIC ENGINEERING COURSES) - CREDITS (18 - 27)									
1.	17EEES03	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	EEE & ECE	FC(ES)	4	0	0	4	NIL
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.	17EEES82	ENGINEERING SKILLS PRACTICES LAB A. BASIC ELECTRICAL ENGINEERING B. BASIC ELECTRONICS ENGINEERING	EEE & ECE	FC(ES)	0	0	4	2	NIL

6.	17CMES81	ENGINEERING SKILLS PRACTICE LAB A.BASIC CIVIL ENGINEERING B.BASIC MECHANICAL ENGINEERING	CIVIL & MECH	FC(ES)	0	0	4	2	NIL
7.	17MEES84	ENGINEERING GRAPHICS (THEORY + PRACTICE)	MECH	FC(ES)	1	0	4	3	NIL
8.	17CSES83	PROGRAMMING IN PYTHON LAB	CSE	FC(ES)	0	0	4	2	NIL

B.E/ B.TECH. – COMPUTER SCIENCE AND ENGINEERING - SEMESTER I TO VIII									
CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME - CREDITS (81)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	17CSCC01	DATA STRUCTURES	CSE	CC	3	0	0	3	NIL
2.	17CSCC02	OBJECT ORIENTED PROGRAMMING	CSE	CC	3	0	0	3	NIL
3.	17CSCC03	DATABASE MANAGEMENT SYSTEM	CSE	CC	3	0	0	3	NIL
4.	17CSCC04	COMPUTER ARCHITECTURE	CSE	CC	3	0	0	3	NIL
5.	17CSCC05	SOFTWARE ENGINEERING	CSE	CC	3	0	0	3	NIL
6.	17CSCC06	DESIGN AND ANALYSIS OF ALGORITHM	CSE	CC	3	0	0	3	DATA STRUCTURES
7.	17CSCC07	OPERATING SYSTEM	CSE	CC	3	0	0	3	NIL
8.	17CSCC08	COMPUTER NETWORKS	CSE	CC	3	0	0	3	NIL
9.	17CSCC09	JAVA PROGRAMMING	CSE	CC	3	0	0	3	OBJECT ORIENTED PROGRAMMING
10.	17CSCC10	OBJECT ORIENTED ANALYSIS AND DESIGN	CSE	CC	3	0	0	3	OBJECT ORIENTED PROGRAMMING
11.	17CSCC11	COMPILER DESIGN	CSE	CC	3	0	0	3	NIL
12.	17CSCC12	ADVANCED JAVA PROGRAMMING	CSE	CC	3	0	0	3	JAVA PROGRAMMING
13.	17CSCC13	DATA WAREHOUSING AND DATA MINING	CSE	CC	3	0	0	3	DATABASE MANAGEMENT SYSTEM
14.	17CSCC14	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	CSE	CC	3	0	0	3	DATABASE MANAGEMENT SYSTEM
15.	17CSCC15	C# AND .NET APPLICATION DEVELOPMENT	CSE	CC	3	0	0	3	JAVA PROGRAMMING
16.	17CSCC16	CLOUD COMPUTING	CSE	CC	3	0	0	3	NIL
17.	17CSCC17	CYBER SECURITY	CSE	CC	3	0	0	3	ENGINEERING MATHEMATICS
18.	17CSCC18	RICH INTERNET APPLICATION	CSE	CC	3	0	0	3	JAVA PROGRAMMING
19.	17CSCC19	INTERNET OF THINGS	CSE	CC	3	0	0	3	NIL
20.	17CSCC20	DATA STRUCTURES LAB	CSE	CC	0	0	4	2	NIL
21.	17CSCC21	OBJECT ORIENTED PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
22.	17CSCC22	DATABASE MANAGEMENT SYSTEM LAB	CSE	CC	0	0	4	2	NIL
23.	17CSCC23	ALGORITHM LAB	CSE	CC	0	0	4	2	NIL
24.	17CSCC24	OPERATING SYSTEM LAB	CSE	CC	0	0	4	2	NIL
25.	17CSCC25	NETWORKING LAB	CSE	CC	0	0	4	2	NIL
26.	17CSCC26	JAVA PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
27.	17CSCC27	CASE TOOLS LAB	CSE	CC	0	0	4	2	NIL
28.	17CSCC28	COMPILER DESIGN LAB	CSE	CC	0	0	4	2	NIL

29.	17CSCC29	ADVANCED JAVA PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
30.	17CSCC30	C# AND .NET APPLICATION DEVELOPMENT LAB	CSE	CC	0	0	4	2	NIL
31.	17CSCC31	RICH INTERNET APPLICATION DEVELOPMENT LAB	CSE	CC	0	0	4	2	NIL
32.	17CSCC32	DESIGN PATTERN	CSE	CC	3	0	0	3	NIL
33.	17CSCC33	PROBLEM SOLVING USING COMPUTERS	CSE	CC	3	0	0	3	NIL

B.E / B.TECH. – COMPUTER SCIENCE AND ENGINEERING - SEMESTER I TO VIII

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

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

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17CSEC01	ADHOC AND SENSOR NETWORKS	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS
2.	17CSEC02	AGILE METHODOLOGIES	CSE	EC(PS)	3	0	0	3	SOFTWARE TESTING
3.	17CSEC03	BIG DATA AND ANALYTICS	CSE	EC(PS)	3	0	0	3	DATA WAREHOUSING AND DATA MINING
4.	17CSEC04	BIO METRICS	CSE	EC(PS)	3	0	0	3	NIL
5.	17CSEC05	CLOUD COMPUTING SECURITY	CSE	EC(PS)	3	0	0	3	CLOUD COMPUTING
6	17CSEC06	CRYPTOGRAPHY AND NETWORK SECURITY	CSE	EC(PS)	3	0	0	3	NIL
7.	17CSEC07	DATA CENTRE VIRTUALIZATION	CSE	EC(PS)	3	0	0	3	DATABASE MANAGEMENT SYSTEM
8.	17CSEC08	DISTRIBUTED COMPUTING	CSE	EC(PS)	3	0	0	3	OPERATING SYSTEM
9.	17CSEC09	ETHICAL HACKING	CSE	EC(PS)	3	0	0	3	NIL
10.	17CSEC10	GAME THEORY	CSE	EC(PS)	3	0	0	3	ENGINEERING MATHEMATICS
11.	17CSEC11	GREEN COMPUTING	CSE	EC(PS)	3	0	0	3	NIL
12.	17CSEC12	GRID COMPUTING	CSE	EC(PS)	3	0	0	3	ENGINEERING MATHEMATICS
13.	17CSEC13	HUMAN COMPUTER INTERACTION	CSE	EC(PS)	3	0	0	3	ESSENTIALS OF COMPUTING
14.	17CSEC14	INFORMATION RETRIEVAL TECHNIQUES	CSE	EC(PS)	3	0	0	3	DATA MINING AND DATA WAREHOUSING
15.	17CSEC15	INTERNET SECURITY & COMPUTER FORENSICS	CSE	EC(PS)	3	0	0	3	CYBER SECURITY
16.	17CSEC16	IT INFRASTRUCTURE MANAGEMENT	CSE	EC(PS)	3	0	0	3	ESSENTIALS OF COMPUTING
17.	17CSEC17	KNOWLEDGE BASED DECISION SUPPORT SYSTEM	CSE	EC(PS)	3	0	0	3	SOFTWARE ENGINEERING
18.	17CSEC18	MOBILE ADHOC NETWORK	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS
19.	17CSEC19	MOBILE COMPUTING	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS
20.	17CSEC20	MULTIMEDIA DATABASE MANAGEMENT SYSTEM	CSE	EC(PS)	3	0	0	3	DATABASE MANAGEMENT SYSTEM
21.	17CSEC21	NANO TECHNOLOGY	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
22.	17CSEC22	NETWORK DESIGN AND MANAGEMENT	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS

23.	17CSEC23	NETWORK ROUTING ALGORITHMS	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS , DATA STRUCTURES
24.	17CSEC24	OPEN SOURCE SYSTEMS	CSE	EC(PS)	3	0	0	3	NIL
25.	17CSEC25	OPTIMIZATION TECHNIQUES	CSE	EC(PS)	3	0	0	3	ENGINEERING MATHEMATICS
26.	17CSEC26	SERVICE ORIENTED ARCHITECTURE	CSE	EC(PS)	3	0	0	3	COMPUTER ARCHITECTURE
27.	17CSEC27	SOFT COMPUTING	CSE	EC(PS)	3	0	0	3	ARTIFICIAL INTELLIGENCE
28.	17CSEC28	SOFTWARE QUALITY MANAGEMENT	CSE	EC(PS)	3	0	0	3	SOFTWARE ENGINEERING
29.	17CSEC29	TCP / IP TECHNOLOGY	CSE	EC(PS)	3	0	0	3	NIL
30.	17CSEC30	UNIX INTERNALS	CSE	EC(PS)	3	0	0	3	NIL
31.	17CSEC31	USER INTERFACE DESIGN	CSE	EC(PS)	3	0	0	3	OPERATING SYSTEM
32.	17CSEC32	VIRTUAL REALITY	CSE	EC(PS)	3	0	0	3	NIL
33.	17CSEC33	VIRTUALIZATION TECHNIQUES	CSE	EC(PS)	3	0	0	3	NIL
34.	17CSEC34	WEB DESIGN AND MANAGEMENT	CSE	EC(PS)	3	0	0	3	NIL
35.	17CSEC35	WIRELESS AND SENSOR NETWORK	CSE	EC(PS)	3	0	0	3	COMPUTER NETWORKS
36.	17CSEC36	SOFTWARE TESTING	CSE	EC(PS)	3	0	0	3	SOFTWARE ENGINEERING

B.E / B.TECH. – COMPUTER SCIENCE AND ENGINEERING - SEMESTER I TO VIII

(ii) OPEN ELECTIVE CREDITS - (6 – 9)

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.	17ECCC14	DIGITAL IMAGE PROCESSING	ECE	EC(OE)	3	0	0	3	NIL
6.	17ECCC05	DIGITAL LOGIC CIRCUITS & DESIGN	ECE	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.	17ECCC21	DIGITAL SIGNAL PROCESSING	ECE	EC(OE)	3	0	0	3	NIL
13.	17ATEC14	COMPUTER CONTROLLED	AUTOMOBILE	EC(OE)	3	0	0	3	NIL

		VEHICLE SYSTEMS							
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.	17BMCC01	BIOMEDICAL CIRCUITS & NETWORKS	BME	EC(OE)	3	0	0	3	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING
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.	17ECEC03	SATELLITE COMMUNICATION	ECE	EC(OE)	3	0	0	3	DIGITAL COMMUNICATION
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. – COMPUTER SCIENCE ENGINEERING - SEMESTER I TO VIII

DETAILS OF ELECTIVE COURSES FOR DEGREE WITH SPECIALISATION

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

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

(i) SPECIALIZATION – BIO-INFORMATICS

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTCC02	CELL BIOLOGY	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
2.	17BTCC01	ESSENTIALS OF BIO CHEMISTRY	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
3.	17BTEC03	PRINCIPLES OF BIO-INFORMATICS	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
4.	17BTEC32	BIOLOGICAL DATABASE	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
5.	17CSSE01	COMPUTATIONAL BIOLOGY & DATA MINING	CSE	SE	3	0	0	3	NIL
6.	17CSSE02	CGI & WEB PROGRAMMING	CSE	SE	3	0	0	3	NIL
7.	17CSSE03	BIO INFORMATICS ALGORITHM	CSE	SE	3	0	0	3	NIL
LAB									
8.	17CSSE04	JAVA & CGI PROGRAMMING LAB	CSE	SE	0	0	4	2	NIL
9.	17CSSE05	DATA MINING LAB	CSE	SE	0	0	4	2	NIL
10.	17BTCC82	CELL BIOLOGY LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL
11.	17BTCC81	BIO CHEMISTRY LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL
12.	17BTCC93	BIO INFORMATICS LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL

B.E / B.TECH. – COMPUTER SCIENCE AND ENGINEERING - SEMESTER I TO VIII

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

(i) PROJECT - CREDITS (9)

(i) INTERNSHIP + INDUSTRY ELECTIVES - CREDITS (9)

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	MINI PROJECT	CSE	PI	0	0	6	3	NIL
3.	17CSPI03	INTERNSHIP	CSE	PI	0	0	0	3	NIL
4.	17CSPI04	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	CSE	PI	3	0	0	3	DATA MINING AND DATA WAREHOUSING
5.	17CSPI05	BUILDING ENTERPRISE APPLICATIONS	CSE	PI	3	0	0	3	NIL
6.	17CSPI06	INTERNET AND WEB TECHNOLOGY	CSE	PI	3	0	0	3	RICH INTERNET APPLICATION
7.	17CSPI07	LEARNING IT ESSENTIALS BY DOING	CSE	PI	3	0	0	3	NIL
8.	17CSPI08	ESSENTIALS OF INFORMATION TECHNOLOGY	CSE	PI	3	0	0	3	NIL
9.	17CSPI09	INTRODUCTION TO MAIN FRAMES	CSE	PI	3	0	0	3	COMPUTER ARCHITECTURE
10.	17CSPI10	MOBILE APPLICATION DEVELOPMENT	CSE	PI	3	0	0	3	NIL

B.TECH. – COMPUTER SCIENCE ENGINEERING - SEMESTER I TO VIII

CATEGORY E – EMPLOYABILITY ENHANCEMENT COURSES, CO - CURRICULAR COURSES AND EXTRA CURRICULAR COURSES (EEC) - CREDITS (9 - 18)**

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

(i) EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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)

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)

1.	17CSEE05	EXTRA CURRICULAR COURSES - I	CSE	EE	15 HOURS	1	NIL
2.	17CSEE06	EXTRA CURRICULAR COURSES - II	CSE	EE	15 HOURS	1	NIL
3.	17CSEE07	EXTRA CURRICULAR COURSES - III	CSE	EE	15 HOURS	1	NIL
4.	17CSEE08	EXTRA CURRICULAR COURSES -IV	CSE	EE	15 HOURS	1	NIL
5.	17CSEE09	EXTRA CURRICULAR COURSES –V	CSE	EE	15 HOURS	1	NIL
6.	17CSEE10	EXTRA CURRICULAR COURSES - VI	CSE	EE	15 HOURS	1	NIL

17EGHS01	TECHNICAL ENGLISH	Category	L	T	P	Credit
		HS	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, understand and respond to others in different scenario.	Understand
CO2. Speak fluently and correctly with correct pronunciation in different situation.	Apply
CO3. To make the students experts in professional writing.	Apply
CO4. To make the students recognize the role of technical writing in their careers in business, technical and scientific field.	Apply
CO5. To make the students good communicators at the work place and to be theoretically strong.	Apply
CO6. To make the students in proficient technical communicator.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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.

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.

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.

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.

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

TEXTBOOK

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

REFERENCES

1. “English for Effective Communication”, Department of English, VMKV & AVIT, SCM Publishers, 2009.
2. “Practical English Usage”, Michael Swan (III edition), Oxford University Press.
3. “Grammar Builder- I, II, III, and IV”, Cambridge University Press.
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	Mail ID
1.	Dr.P.Saradha	Associate Professor	English	saradhap@vmkvec.edu.in

17EGHS02	BUSINESS ENGLISH	Category	L	T	P	C
		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 English, the international language plays a vital role as a propeller for the advancement of knowledge in 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:

After Successful completion of this course, the 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 ommunication is adjusted in different scenario	Apply
CO3.	Strengthening of oral and written skills in the business context	Apply
CO4.	Create interest among the students about a topic by exploring thoughts and ideas	Understand
CO5.	Make the students to start with pleasing note and make them to give different	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	**L**	**M**	**M**	**-**	**M**	**L**	**M**	**M**	**M**	**S**	**-**	**M**	**-**	**-**	**-**
CO2	**L**	**-**	**-**	**L**	**-**	**M**	**-**	**-**	**-**	**S**	**M**	**L**	**-**	**-**	**-**
CO3	**-**	**L**	**M**	**-**	**-**	**-**	**L**	**-**	**M**	**S**	**-**	**-**	**-**	**-**	**-**
CO4	**M**	**M**	**-**	**-**	**L**	**S**	**-**	**M**	**S**	**S**	**-**	**L**	**-**	**-**	**-**
CO5	**M**	**-**	**-**	**-**	**-**	**M**	**-**	**M**	**M**	**S**	**-**	**-**	**-**	**-**	**-**
CO6	**S**	**M**	**M**	**-**	**-**	**S**	**M**	**-**	**-**	**S**	**-**	**-**	**-**	**-**	**-**

S- Strong; M-Medium; L-Low

Syllabus

SUBJECT -VERB AGREEMENT

Subject and Verb Agreement (concord) - Preposition and Relative Pronoun - Cause and effect - Phrasal ıs and phrases-Listening Comprehension -Listening to Audio Files and Answering Questions-Framing legotiation Skills-Presentation Skills and Debating Skills.

STRESS

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

READING SKILLS

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

CORPORATE COMMUNICATION

Corporate Communication -Recommendation-Instruction-Check List- Circulars-Inter Office Memo- Minutes , and Writing Agenda - Discourse Markers - Rearranging Jumbled Sentences - Technical Articles - Project 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 r Quotation, Placing Orders and Complaint Letters) - Expansion of an Idea-Creative Writing.

TEXT BOOK:

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

REFERENCES:

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

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department/College	Mail ID
1	Dr. P. Saradha	Associate Professor	English / VMKVEC	saradhap@vmkvec.edu.in

17EGHS81	ENGLISH LANGUAGE LAB	Category	L	T	P	Credit
		HS	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.

PRERQUISITE – 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.	Understand
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	--	--	--	--
CO2	M	--	--	--	--	--	--	--	M	S	--	M	--	--	--
CO3	M	--	--	--	--	--	--	--	--	S	--	M	--	--	--
CO4	M	--	--	--	--	--	--	--	--	M	--	--	--	--	--
CO5	M	--	--	S	--	--	--	--	--	M	--	--	--	--	--
CO6	--	M	M	--	--	--	--	--	--	M	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

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.

Telephone Etiquette, Dining Etiquette, Meeting Etiquette.

Case study of Etiquette in different scenario.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.P.Saradha	Associate Professor	English	saradhap@vmkvec.edu.in

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

PREAMBLE:

A startup is a company initiated by individual creator 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: Not Required

COURSE OBJECTIVES:

1. To understand the Startups Management basics and its components.
2. To impart the startups fund management practices
3. To inculcate the various kinds of stocks and employment considerations in startups.
4. To inculcate the importance of intellectual property rights and its procedures.
5. Explore the entrepreneurial mindset and culture that has been developing in companies of all sizes and industries.

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 in startups business.	Apply
CO3: Analyze the various kinds of stocks and employment opportunities consideration in startups business.	Apply
CO4: Compare and contrast the different forms of intellectual property protection in terms of their key differences and similarities.	Apply
CO5: Explore the entrepreneurial mindset and culture that has been developing in companies of all sizes and industries.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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 – Employment Contracts.

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 – Disability Insurance.

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, Professional Publications.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 Edition Dream 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	Mail ID
1.	Dr. G. Palaniappan	Asso. Professor	Management Studies	Palani.sunn@gmail.com
2.	Dr. G. Murugesan	Professor	Management Studies	selvasahana.m@gmail.com

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

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

PREREQUISITE
NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

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

UNIT IV. SPEAKING SKILLS: Hard and soft Skills; Feedback Skills; Skills of Effective Speaking; Component of an

effective Talk; how to make an effective oral presentation

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

TEXTBOOK

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

REFERENCES

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:

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Dr. P.Saradha/Associate Professor - English	saradhap@vmkvec.edu.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 the sciences. Matrices have been found to be of great utility in many branches of engineering applications such as theory of electric circuits, aerodynamics, and mechanics and so on. Many physical laws and relations can be expressed mathematically in the form of differential equations. Based on this we provide a course in matrices, calculus and differential equations. Vector calculus is a form of mathematics that is focused on the integration of vector fields. An Engineer should know the Transformations of the Integrals, as Transformation of Line Integral to surface and then to volume integrals.

PREREQUISITE –Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.G.Selvam	Associate Professor	Maths	selvam@vmkvec.edu.in
2.	Dr. M.Vijayarakavan	Associate Professor	Maths	vijayarakavan@vmkvec.edu.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. Based on this, the course aims at giving adequate exposure in Ordinary differential equations, Laplace transforms, Applications of Laplace transforms, Fourier transforms and Z-transforms.

PREREQUISITE

Engineering Mathematics

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

ORDINARY DIFFERENTIAL EQUATIONS

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

LAPLACE TRANSFORMS

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

INVERSE LAPLACE TRANSFORMS AND APPLICATIONS

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

FOURIER TRANSFORMS

Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

Z – TRANSFORMS

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

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

17MABS14	NUMERICAL METHODS AND NUMBER THEORY	Category	L	T	P	Credit
		FC(ES)	2	0	2	3

PREAMBLE

An Under Graduate Computer Science Engineering student needs to know sufficient numerical tools and techniques for solving engineering problems arises in their field. This course aims at developing the ability to formulate an engineering problem in a mathematical form appropriate for subsequent computational treatment and to choose an appropriate numerical approach.

Number theory encodes properties of the integers, primes or other number-theoretic objects and it has various applications in the field of security, memory management, authentication and coding theory. Number theory is probably one of the most important areas of mathematics used in computer science, and the basis behind almost all of modern cryptography.

PRERQUISITE

ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1	To know the derivatives, properties and implementation of fundamental numerical methods for a few partial differential equations.
2	Ability to Implement advanced numerical methods for the solutions of partial differential equations efficiently and to modify and adopt numerical algorithms
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 be familiar with the classical theorems

COURSE OUTCOMES

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

CO1. Apply the use of numerical methods in modern scientific computing	Apply
CO2. Analyze the numerical interpolation and approximation of functions.	Apply
CO3. Apply tools to find integration, derivatives of one and two variable functions.	Apply
CO4. Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization	Apply
CO5. Compute solutions to a system of linear congruence's and some important theorems.	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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	S	-	M	-	-	-	-	-	-	-	-	-	-	-
CO3	S	S	-	-	S	-	-	-	-	-	-	-	-	-	-
CO4	S	M	-	-	-	-	-	-	-	-	-	L	-	-	-
CO5	S	S	-	M	-	-	-	-	-	-	-	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 Hill Edition, 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.

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

PREAMBLE

Engineering Physics is the application of the concepts of physics to various technological applications. Understanding the concepts of laser, types of lasers, the propagation of light through fibers, applications of optical fibers in communication and different types of non-destructive techniques will help an engineer to analyze and design various equipments.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To recall the properties of laser and to explain principles of laser.
2	To examine the applications of laser.
3	To outline the principles of fibre optics.
4	To examine the applications of fibre 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

1.	Define the principles of laser.	Understand
2.	Use laser in designing equipments.	Apply
3.	Explain the principles of fiber optics & the propagation of light in optical fibers.	Understand
4.	Utilize fibre optics in communication systems and sensors.	Apply
5.	Inspect materials using non-destructive testing 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	L	M	L	L	--	--	--	--	--	--	--	--	--	--	--
CO2	S	S	M	M	S	M	--	--	L	--	--	M	--	--	--
CO3	L	M	L	L	--	--	--	--	--	--	--	--	--	--	--
CO4	S	S	M	M	S	M	--	--	L	--	--	M	--	--	--
CO5	S	S	M	M	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 fibres – numerical aperture and acceptance angle – types of

optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system – fibre optic displacement sensor and pressure sensor.

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

TEXT BOOK:

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

REFERENCES:

1. Beiser, Arthur, Concepts of Modern Physics, 5th Edition, 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, Dhanpat Rai publishers, New Delhi, 2001.

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

5. Rajendran. V, Engineering Physics, Tata Mc Graw 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	senthilkumar@vmkvec.edu.in
2	Dr.R.Sethupathi	Assistant Professor	Physics	sethupathi@vmkvec.edu.in

17PCBS02	PHYSICAL SCIENCES (PART B - ENGINEERING CHEMISTRY)	Category	L	T	P	Credit
		BS	2	0	0	2

PREAMBLE

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

PREREQUISITE - Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS

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

FUELS AND CHEMISTRY OF ADVANCED MATERIALS

Classification of Fuels (Solid, Liquid, Gaseous, Nuclear and Bio fuels) – Calorific Value of a fuel –Non Petroleum Fuels – Non conventional sources of Energy – combustion.

Basics and Applications:-Organic electronic material, shape memory alloys, polymers (PVC, Teflon, Bakelite)

TEXTBOOK:

1. “Engineering Chemistry”, Department of Chemistry, Vinayaka Missions University, Salem.

REFERENCES:

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Shanthi	Professor	Chemistry	shantht@vmkvec.edu.in

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

PREAMBLE

Probability is the science of how likely events are to happen. It's concerned with the roll of a dice, or the fall of the cards in a game. But probability is also vital to science and life more generally. It's used in such diverse areas as weather forecasting and to work out the cost of your insurance premiums. Queuing 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 get exposed to the concepts of random processes and discrete time Markov chain.
5	To study queuing models to analyze real world systems.

COURSE OUTCOMES

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

CO1. Understand the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.	Understand
CO2. Classify the random variables to determine the appropriate distributions.	Understand
CO3.Apply the concepts of independence, jointly distributed random variables and conditional distributions, and use generating functions to establish the distribution of linear combinations of independent random variables	Apply
CO4. Classify and apply the concepts of probability, Random Process, Markov Process and their applications to answer quantitative questions about the outcomes of probabilistic systems.	Apply
CO5. Derive and apply main formulas for some properties (such as stationary probabilities, average waiting and system time, expected number of customers in the que, etc.) M/M/1, M/M/C – finite and infinite capacity queuing 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	L	--	L	--	--	M	--	--	--	M	--	--	--
CO2	S	M	L	--	L	--	--	M	--	--	--	M	--	--	--
CO3	S	M	L	--	L	--	--	M	--	--	--	M	--	--	--
CO4	S	S	M	M	L	--	--	M	--	--	--	M	--	--	--
CO5	S	S	M	M	L	--	--	M	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

PROBABILITY AND RANDOM VARIABLES
Probability concepts, Random variables, moments, Moment Generating function and their properties.

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 queuing 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. P.Kandasamy, K.Thilagavathy, K.Gunavathy "Probability, Random Variables and Random Processes" S.Chand &Company Ltd., New Delhi, 2008.

REFERENCES:
1.T.Veerarajan, "Probability, Statistics and Random processes" (Third Edition), Tata McGraw-Hill publishing Company Ltd., New Delhi ,2008.
2. Kapur.J.N. and Saxena.H.C. "Mathematical Statistics", S.Chand & Company Ltd. New Delhi,1997.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Ms.M.Usha	Assistant Professor	Maths	usharadha85@gmail.com
2	Dr.S.Punitha	Assistant Professor	Maths	puni.jeeju80@gmail.com

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

PREAMBLE

Engineering Physics is the application of the concepts of physics to various technological applications. Understanding the concepts of laser, types of lasers, the propagation of light through fibers, applications of optical fibers in communication and different types of non-destructive techniques will help an engineer to analyze and design various equipments.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To recall the properties of laser and to explain principles of laser.
2	To examine the applications of laser.
3	To outline the principles of fibre optics.
4	To examine the applications of fibre 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

1.	Define the principles of laser.	Understand
2.	Use laser in designing equipments.	Apply
3.	Explain the principles of fiber optics & the propagation of light in optical fibers.	Understand
4.	Utilize fibre optics in communication systems and sensors.	Apply
5.	Inspect materials using non-destructive testing 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	L	M	L	L	--	--	--	--	--	--	--	--	--	--	--
CO2	S	S	M	M	S	M	--	--	L	--	--	M	--	--	--
CO3	L	M	L	L	--	--	--	--	--	--	--	--	--	--	--
CO4	S	S	M	M	S	M	--	--	L	--	--	M	--	--	--
CO5	S	S	M	M	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 fibres – numerical aperture and acceptance angle – types of optical fibres (material, refractive index, mode) – Applications: Fibre optic communication system – fibre optic displacement sensor and pressure sensor.

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

TEXT BOOK:

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

REFERENCES:

1. Beiser, Arthur, Concepts of Modern Physics, 5th Edition, 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, Dhanpat Rai publishers, New Delhi, 2001.

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

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

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

17PCBS02	PHYSICAL SCIENCES (PART B - ENGINEERING CHEMISTRY)	Category	L	T	P	Credit
		BS	2	0	0	2

PREAMBLE

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

PREREQUISITE - Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

ELECTROCHEMISTRY, BATTERIES AND FUEL CELLS

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

FUELS AND CHEMISTRY OF ADVANCED MATERIALS

Classification of Fuels (Solid, Liquid, Gaseous, Nuclear and Bio fuels) – Calorific Value of a fuel –Non Petroleum Fuels – Non conventional sources of Energy – combustion.

Basics and Applications:-Organic electronic material, shape memory alloys, polymers (PVC, Teflon, Bakelite)

TEXTBOOK:

1. "Engineering Chemistry", Department of Chemistry, Vinayaka Missions University, Salem.

REFERENCES:

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Shanthi	Professor	Chemistry	shantht@vmkvec.edu.in

17CHBS01	Environmental Science & Engineering (Common to All Branches)	Category	L	T	P	Credit
		FC(BS)	3	0	0	3

PREAMBLE

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

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

CO1.Discuss and appreciate the unity of life in all its forms, the implications of life style on the environment.	Understand
CO2.Initiate the awareness and recognize the social responsibility in environmental issues.	Apply
CO3.Illustrate the importance of ecosystem and biodiversity	Apply
CO4. Interpret the society on the various pollutions and their impact.	Apply
CO5.Demonstrate the Solid waste and disaster management.	Apply
CO6.Recognize the issues of environment and sustainable development	Understand
CO7.Schedule the urban problems and social issues.	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	S	S	-	-	-	S			
CO2	S	M	M	-	-	S	S	S	-	-	-	S			
CO3	S	L	M	-	-	S	S	S	-	-	-	S			
CO4	S	S	S	L	-	S	S	S	-	-	-	S			
CO5	S	S	S	M	-	S	S	S	-	-	-	S			
CO6	S	S	S	M	-	S	S	S	-	-	-	S			
CO7	S	S	S	M	-	S	S	S	-	-	-	S			

S- Strong; M-Medium; L-Low

SYLLABUS

ENVIRONMENT AND NATURAL RESOURCES

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

ECOSYSTEMS AND BIO – DIVERSITY

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

ENVIRONMENTAL POLLUTION

Pollution - Definition , 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 – Disasters management : Floods, earthquake, cyclone and 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. Trivedi R.K. “Handbook of Environmental Laws", Rules, Guidelines,Compliances and Standards Vol I &II,EnviromediA.
4. Environmental Science and Engineering by Dr. J. Meenambal ,MJP Publication , Chennai Gilbert M. Masters : Introduction to Environmental Engineering and Science , Pearson EducationPvtLtd., II Edition, ISBN 81-297-0277-0,2004.
5. Miller T.G. Jr Environmental Science Wadsworth Publishing Co.
6. Townsend C. Harper J. and Michael Begon, Essentials of Ecology,Blackwell Science.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.T.Shanthi,	Professor and Head	Chemistry	shantht@vmkvec.edu.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 superconducting materials.

PRERQUISITE -

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

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

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

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

TEXT BOOK:

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

REFERENCES:

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

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1	Dr. C. SENTHIL KUMAR	senthilbdu@gmail.com
2	Dr. R. SETHUPATHI	sethupathivmkv@gmail.com

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

PREAMBLE

Real and Virtual Lab in Physics trains the students to take readings with precision. The experiments involve the calculation of physical parameters. In addition to the above, the students have the hands-on experience in performing the experiments through virtual laboratory.

PRERQUISITE – 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. Operate the equipments with precision.	Apply
CO2. Practice to handle the equipments in a systematic manner.	Apply
CO3. Demonstrate the experiments through virtual laboratory.	Apply
CO4. Recognize the importance of units while performing experiments, during calculating the physical parameters and in obtaining results.	Understand
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	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	S	--	--	--	M	--	--	M	--	--	--
CO2	S	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	S	S	M	M	S	--	--	--	--	--	--	S	--	--	--
CO4	S	S	--	--	--	--	--	--	--	--	--	--	--	--	--
CO5	S	S	--	--	--	--	--	--	--	--	--	--	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

1. Young's modulus of a bar - Non-uniform bending.
2. Rigidity modulus of a wire - Torsional Pendulum.
3. Viscosity of a liquid - Poiseuille's method.

4. Velocity of ultrasonic waves in liquids - Ultrasonic Interferometer.
5. Particle size determination using Laser.
6. Wavelength of spectral lines – grating – Spectrometer.
7. Thickness of a wire - Air wedge Method.
8. Thermal conductivity of a bad conductor - Lee's disc.
9. Band gap determination of a thermistor - Post Office Box.
10. Specific resistance of a wire – Potentiometer.

LAB MANUAL

1. Physical Sciences Lab: Part A – Real And Virtual Lab In Physics Manual, prepared by the faculty of Department of Physics, Vinayaka Mission's Kirupananda Variyar Engineering College, Salem (2017).

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.C.Senthil Kumar	Professor	Physics	senthilkumar@vmkvec.edu.in
2	Dr.R.Sethupathi	Assistant Professor	Physics	sethupathi@vmkvec.edu.in

17PCBS81	PHYSICAL SCIENCES LAB PART B - ENGINEERING CHEMISTRY LAB	Category	L	T	P	Credit
		BS	0	0	2	1

PREAMBLE

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

PRERQUISITE – NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

TEXT BOOK:

1. Engineering Chemistry Lab Manual by VMU.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.T.Shanthi	Professor	Chemistry	shantht@vmkvec.edu.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 circuit and basic laws of electrical engineering.
2	To gain knowledge about the working principle, construction, application of DC and AC machines and measuring instruments.
3	To understand the fundamentals of safety procedures, Earthing and Power system.

COURSE OUTCOMES

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

CO1: Explain the evolution of electricity, name the inventors, 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	--	--	--
CO2	S	M	S	S	--	--	--	--	M	-	--	M	--	--	--
CO3	L	S	L	--	S	--	--	--	--	L	--	L	--	--	--
CO4	S	M	S	L	L	S	S	--	--	S	--	L	--	--	--
CO5	L	M	S	M	--	S	M	M	--	S	--	L	--	--	--
CO6	S	L	S	L	M	S	S	--	--	M	--	L	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

HISTORY OF ELECTRICITY, QUANTITIES AND CIRCUITS

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

MEASURING INSTRUMENT AND ENERGY CALCULATION

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

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

ELECTRICAL SAFETY AND INTRODUCTION TO POWER SYSTEM

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, Rohit Metha, "Basic Electrical Engineering", Fifth Edition, Chand. S&Co, 2012.
2. Kothari.D.P and Nagrath.I. J, "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, 2009.
3. R.K.Rajput , "Basic Electrical and Electronics Engineering", Second Edition, Laxmi Publication, 2012.

REFERENCE BOOKS:

1. Smarajt Ghosh, "Fundamentals of Electrical & Electronics Engineering", Second Edition, PHI Learning, 2007.

COURSE DESIGNERS

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

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

PREAMBLE

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

PRERQUISITE – NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

SEMICONDUCTOR DEVICES

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

DIGITAL FUNDAMENTALS

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

COMMUNICATION AND ADVANCED GADGETS

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

TEXT BOOKS:

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

REFERENCES:

1. John 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	sheela@vmkvec.edu.in
2	Mrs.A.Malarvizhi	Assistant Professor	ECE	malarvizhi@vmkvec.edu.in

17CMES02	BASICS OF CIVIL AND MECHANICAL ENGINEERING **PART A- BASICS OF CIVIL ENGINEERING**	Category	L	T	P	Credit
		FC(ES)	2	0	0	2

PREAMBLE

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

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

SURVEYING AND CIVIL ENGINEERING MATERIALS

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

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

BUILDING COMPONENTS AND STRUCTURES :

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

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

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

17CMES02	PART B-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. Basic knowledge on hardware and software terminologies.	Remember and Understand
CO2. Demonstration about various Application Packages like MS-word, MS- Excel etc.	Apply
CO3. Understand Program Devolvement Cycle and apply various Problem Solving Techniques.	Understand, Apply.
CO4. Identifying and analyzing the efficiency of Algorithms.	Understand.
CO5. Implementation of Algorithms for various concepts.	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

Computer – Role of Information Technology – History of Internet – Internet Services.

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

1. Aho.A.V., Hopcroft.J.E and Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson Education, 2004.
2. Knuth D.E., "The Art of computer programming Vol 1: Fundamental Algorithms", 3rd Edition, Addison Wesley, 1997.

COURSE DESIGNERS

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

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

PREAMBLE

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

PRERQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT-1 INTRODUCTION

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

UNIT-2 DATA STRUCTURES

Strings-Lists-Tuples-Dictionaries-Sets

UNIT-3 CONTROL STATEMENTS

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

UNIT-4 FUNCTIONS

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

UNIT-5 EXCEPTION HANDLING

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	Computer science and engineering	karthik@avit.ac.in
2	E.Srividhya	Assistant Professor	Computer science and engineering	srividhya@avit.ac.in
3	Mrs.T.Geetha	Assistant Professor	Computer science and engineering	geetha@vmkvec.edu.in
4	Mrs. T . Narmadha	Assistant Professor	Computer science and engineering	narmadha@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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

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

REFERENCES

1. Laboratory Reference Manual.

COURSE DESIGNERS

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

17EEES82	ENGINEERING SKILLS PRACTICES LAB PART B - BASIC ELECTRONICS ENGINEERING	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. Understand the basics of various electronic components and equipments and their working principles.	Understand
CO2. Understand the fundamentals of soldering techniques for active and passive components.	Understand
CO3. Know the characteristics of Diodes, BJT and FET.	Understand
CO4. Verify the truth tables of logic gates (AND, OR, NOT, NAND, NOR, XOR).	Understand
CO5. Distinguish between amplitude and frequency modulation techniques.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

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

COURSE DESIGNERS

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

17CMES81	ENGINEERING SKILLS PRACTICE LAB PART A - BASIC CIVIL ENGINEERING LAB	Category	L	T	P	Credit
		FC(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 its execution.

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

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 household fittings.
3. Study of pipe connections requirements for pumps and turbines.
4. Preparation of plumbing line sketches for water supply and sewage works.
5. Hands-on-exercise: Mixed pipe material connection – Pipe connections with different joining components.
6. Demonstration of plumbing requirements of high-rise buildings.

CARPENTRY USING POWER TOOLS ONLY:

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

TEXT BOOKS:

1. "Laboratory Reference Manual by VMKVEC Civil Engineering Department

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	S.Supriya	Assist. Professor	Civil	jansupriyanair@gmail.com
2	A.Fizoor Rahman	Assist. Professor	Civil	Afrahman20@gmail.com

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

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

Prerequisite
NIL

Course Objective

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

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

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

Mapping with Programme Outcomes and Programme Specific Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

LIST OF EXPERIMENTS

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

Text Books

1	**BASIC MECHANICAL ENGINEERING, LAB MANUAL**

Reference Books

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

Course Designers

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

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

Preamble
Engineering Graphics is referred as language of engineers. An engineer needs to understand the 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.	Execute in the form of drawing of the orthographic projections of points, straight lines, plane surfaces and solids.	Apply
CO2.	Demonstrate in the form of drawing of the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO3.	Develop lateral surfaces of the solid section and cut section of solids.	Apply
CO4.	Draw the pictorial projections (isometric and perspective) of simple solids.	Apply
CO5.	Implement the free hand sketch of the orthographic views from the given pictorial view.	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

PLANE CURVES AND FREE HAND SKETCHING

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

PROJECTION OF POINTS, LINES

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

PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to any one reference plane by change of position method.

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Sectioning of above solids in simple vertical position by cutting planes inclined to any one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids like Prisms, pyramids, cylinders and cones.

ISOMETRIC VIEW AND PERSPECTIVE PROJECTION

Principles of isometric View – isometric scale – isometric view of simple solids- Introduction to Perspective projection

Text Books

1	Natarajan K V, “Engineering Graphics”, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
2	K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International Private Limited.

3	K.R.Gopalakrishna“Engineering Drawing” (Vol. I & II), Subhas Publications, 2014.
Reference Books	
1	N.D. Bhat and V.M. Panchal, Engineering Graphics, Charotar Publishers 2013
2	E. Finkelstein, “AutoCAD 2007 Bible”, Wiley Publishing Inc., 2007
3	R.K. Dhawan, “A text book of Engineering Drawing”, S. Chand Publishers, Delhi,2010.
4	DhananjayA.Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw Hill Publishing Company Limited, 2008.
5	G.S. Phull and H.S.Sandhu, “Engineering Graphics”, Wiley Publications, 2014.

Course Designers

S.No	Faculty Name	Designation	Dept / College	Email id
1	Dr. S.VENKATESAN	Professor	Mech / VMKVEC	venkatesan@vmkvec.edu.in
2	Prof. N.Rajan	Associate Professor	Mech / VMKVEC	rajan@vmkvec.edu.in

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

PREAMBLE

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

PRERQUISITE

NIL

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

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

REFERENCES:

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	Computer science and engineering	karthik@avit.ac.in
2	E.Srividhya	Assistant Professor	Computer science and engineering	srividhya@avit.ac.in
3	Mrs.T.Geetha	Assistant Professor	Computer science and engineering	geetha@vmkvec.edu.in
4	Mrs. T . Narmadha	Assistant Professor	Computer science and engineering	narmadha@vmkvec.edu.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. Able to remember the basic concepts in linear structures	Remember and Understand
CO2. Able to learn about tree structures and tree traversals	Understand
CO3. Able to understand about balanced trees	Understand
CO4. Able to learn about hashing and sets.	Remember and Understand
CO5. Able to 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	L	-	-	-	-	-	-	-	-	-	S	L	L
CO2	S	M	L	-	-	-	-	-	-	-	-	-	S	L	L
CO3	S	M	M	-	M	-	-	-	-	-	-	-	S	M	-
CO4	S	M	M	-	M	-	-	-	-	-	-	-	S	L	-
CO5	S	M	M	-	M	-	-	M	M	-	-	M	S	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT-I

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.

UNIT-II

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

UNIT-III

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

UNIT-IV

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.

UNIT-V

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. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.

REFERENCES:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, First Edition Reprint.

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	jaichandran@avit.ac.in
2.	Mrs. R. Latha	Assistant Professor	CSE	rlatha@avit.ac.in
3.	Dr. M. Nithya	Prof & Head	CSE	nithya@vmkvec.edu.in
4.	Dr.V.Amirthalingam	Associate Professor	CSE	amirthalingam @ vmkvec.edu.in

17CSCC02	OBJECT ORIENTED PROGRAMMING	Category	L	T	P	Credit
		FC(ES)	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, strategies and techniques; and the application of these toward the development of programming solutions.

PRERQUISITE

Nil

COURSE OBJECTIVES

1	To implement the concepts of object oriented programming.
2	To learn the syntax and semantics of C++ programming language
3	To design C++ classes for code reuse, Constructors and member functions
4	To learn how inheritance and virtual function implement dynamic binding with polymorphism
5	To learn and implement the concepts of Templates and Exception handling

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. 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 using constructors	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	S	S	L	-	-	-	-	M	M	L	L	L	S	M	-
CO2	S	S	M	-	-	-	-	M	M	L	L	L	S	S	L
CO3	S	S	M	-	-	-	-	M	M	L	L	L	S	L	L
CO4	S	S	L	-	-	-	-	M	M	L	L	L	S	S	-
CO5	S	S	M	-	-	-	-	M	M	L	L	L	S	M	-

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. 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	sasikalak@vmkvec.edu.in
2	Mr.B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@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 multi user 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.	Apply
CO2. Build and manipulate 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	S	-	-	-	-	-	-	-	-	-	-	S	S	-
CO2	S	S	-	-	-	L	-	-	-	-	-	-	S	L	L
CO3	M	S	-	-	-	-	-	-	-	-	-	-	S	L	-
CO4	S	S	-	L	-	L	L	-	-	-	-	-	S	S	-
CO5	S	S	-	-	-	-	-	-	-	-	-	-	S	M	-

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 for Concurrency.

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 - Catalog 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”, Fourth Edition, Tata McGraw Hill, 2002.

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Addision weskey, 2002.
2. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2002.
3. 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	Mail Id
1	Mr. S. SenthilKumar	Assistant Professor	CSE	senthilkumar@ vmkvec.edu.in
2	Mrs. T. Geetha	Assistant Professor	CSE	geethat@vmkvec.edu.in

17CSCC04	COMPUTER ARCHITECTURE	Category	L	T	P	Credit
		FC(ES)	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.	Apply
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	M	M	L	-	-	-	-	-	-	-	-	-	S	L	-
CO2	M	S	L	L	-	-	-	-	-	-	-	-	S	L	-
CO3	S	L	M	L	-	-	-	-	-	-	-	-	S	M	-
CO4	S	M	L	-	-	-	-	-	-	-	-	-	S	M	-
CO5	M	L	M	-	-	-	-	-	-	-	-	-	S	M	L
CO6	S	M	L	-	-	-	-	-	-	-	-	-	S	M	L

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 in PC.

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. Govindarajulu," Computer Architecture and Organization – Design principles and applications" , Tata McGrawHill publications, New Delhi.

REFERENCES:

1. William Stallings, "Computer Organization And Architecture – Designing For Performance", Sixth Edition, Pearson Education, 2003.
2. David A. Patterson And John L. Hennessy, "Computer Organization And Design: The Hardware/Software Interface", Second Edition, Morgan Kaufmann, 2002.
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", TMH, 2002 reprint.

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Mail Id
1	Mr. G. Seenivasan	Assistant. Professor	CSE	seenivasan@vmkvec.edu.in
2	Mrs. T. Geetha	Assistant. Professors	CSE	geethat@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.	Understand
CO4. Analyze the cost estimate and problem complexity using various estimation techniques.	Understand
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	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

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”, Fifth Edition, McGraw- Hill International Edition, 2005.
2. Ian sommerville ,” Software Engineering “, Seventh Edition, Pearson Education Asia, 2007.
3. Mary Shaw, David Garlan,”Software Architecture- a perspectives on an Emerging Discipline

REFERENCES:

1. WattsS.Humphrey,”A Discipline for Software Engineering”, Pearson Education, 2007.
2. James F.Peters and WitoldPedrycz,”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	sundaramuthy@vmkvec.edu.in
2	Mr. R. Bharanidharan	Associate Professor	CSE	bharanidharan@vmkvec.edu.in

17CSCC06	DESIGN AND ANALYSIS OF ALGORITHMS	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 analysis techniques.
ii) Become familiar with the different algorithm design techniques
iii) Construct efficient algorithms for solving engineering problems by using appropriate algorithm design paradigms and data structures.

PREREQUISITE:

1. Problem Solving using Computers
2. 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. Analyze the correctness of algorithms using induction and loop invariants.	Analyze
CO2. Analyze the worst-case, best-case and average-case running time of algorithms using asymptotic.	Analyze
CO3. Analyze 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.	Apply
CO5. Infer when a design scenario requires the application of the different algorithm design paradigms.	Analyze
CO6. Analyze 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	S	L	M	L	-	-	-	-	-	-	M	S	L	-
CO2	S	S	L	L	L	-	-	-	-	-	-	L	S	L	L
CO3	S	S	L	-	-	-	-	-	-	-	M	M	S	M	-
CO4	S	M	S	M	M	M	L		L	-	L	M	S	M	L
CO5	S	S	M	L			L		L	-	-	M	M	S	M
CO6	S	S	M	S	-	L	M	-	-	-	-	L	S	S	L

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 Algorithmics - 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. M. Nithya	Associate Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSCC07	OPERATING SYSTEM	Category	L	T	P	Credit
		FC	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 operating systems.

PREREQUISITE

Operating Systems Concepts

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.Apply the concepts of operating system to anevolution of operating systems and identify the features specific to operating systems.	Apply
CO2.Apply 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).	Apply
CO4.Apply the I/O Subsystem concepts for a given scenario.	Apply
CO5. Identify the role of operating system in cloud and mobile 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	M	S
CO2	S	M	L	-	-	-	-	-	-	-	-	-	L	M	S
CO3	S	M	M	-	M	-	-	-	-	-	-	-	L	M	S
CO4	S	M	M	-	M	-	-	-	-	-	-	-	L	M	S
CO5	S	M	M	-	M	-	-	-M	M	--	-	M	L	M	S

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.

STORAGE MANAGEMENT
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 in Linux.

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 in Linux.

CLOUD OS & MOBILE OS
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”, Sixth Edition, Wiley India Pvt Ltd, 2003.

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	Dr. Nitisha Aggarwal	Associate Professor	CSE	nitishaaggarwal@avit.ac.in
2	Dr.S.SenthilKumar	Assistant Professor	CSE	senthikumars@vmkvec.edu.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 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.	Remember and Understand
CO2.Learn the different Ethernet, wireless networks, switching and bridging concepts	Remember and Understand
CO3.Design solutions for complex routing methods and different multicast routing techniques.	Understand, Apply, analyse and evaluate
CO4.Learn the concepts of different protocols for transmission purpose and study the quality of service for TCP protocol.	Understand, Apply, analyse and evaluate
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	S	M	L	S	M	-	-	-	-	-	-	-			
CO2	S	M	L	M	S	-	-	-	-	-	-	-			
CO3	S	S	S	S	M	-	-	-	-	-	-	-			
CO4	S	S	S	S	S	M	-	-	-	-	-	-			
CO5	S	M	M	-	M	-	-	-	M	L	-	L			

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS & LINK LAYER

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 – Application requirements.

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, Pearson Education.
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	E.Srividhya	Assistant Professor	CSE	srividhya@avit.ac.in
2	Mr.G.Seenivasan	Assistant Professor	CSE	seenivasan@vmkvec.edu.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

Basic programming Knowledge

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	Knowledge
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	Analyse
CO5.Choose an engineering approach to solving problems, Starting from the acquired knowledge of programming and knowledge of operating systems.	Evaluation

MAPPING 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				S	S			
CO2	S		S		S			S	L	L		L			
CO3	S		M	L	S	M					L	L			
CO4	S		S	M	S		S				S	M			
CO5	S		S	M	S		M				S	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 – finalize method.

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 Java Beans.

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 (UNIT II).
3. Ed Roman, “Mastering Enterprise Java Beans”, John Wiley & Sons Inc., 1999 (UNIT III and UNIT V).

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	T.Vijila			vijila@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.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

Basics of object oriented programming concepts and good programming skills.

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 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			
CO1	S	M					S				M	M			
CO2	M	M		L								L			
CO3	M	S	L	M				M		M					
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I	INTRODUCTION TO OOAD	9 - hours
Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams		
UNIT - II	**DESIGN PATTERNS**	**9 - hours**
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller - Design Patterns – creational - factory method - structural – Bridge – Adapter - behavioral – Strategy – observer		
UNIT - III	**CASE STUDY**	**9 - hours**
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		
UNIT - IV	**APPLYING DESIGN PATTERNS**	**9 - hours**
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		
UNIT - V	**CODING AND TESTING**	**9 - hours**
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	Mail ID
1	Mrs. R. Latha		CSE	rlatha@avit.ac.in

17CSCC11	COMPILER 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 Compiler design. This syllabus helps the students to study about programming language translation and compiler design concepts, language recognition, symbol table management, semantic analysis and code generation.

PREREQUISITE

- Basic knowledge of Discrete Mathematics, Regular Expressions, Finite Automata and Context Free Grammars.
- Familiarity with working and features of high level languages.

COURSE OBJECTIVES

1.	To introduce the major concept areas of language translation and compiler design.
2.	To develop an awareness of the function and complexity of compilers.
3.	To learn the role of a parser and to study the different ways of recognizing and parsing of tokens.
4.	To study the concepts of code generation and concepts of Code Optimization and about various code improving transformations.

COURSE OUTCOMES

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

CO1: Design and implement lexical analyzer	Understand
CO2: Learn about various types of grammar and perform various parsing techniques	Apply
CO3: To understand about semantic analyzer and intermediate code generation	Apply
CO4: To learn about code optimization and storage management	Apply
CO5: To know about various error handling techniques	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I INTRODUCTION TO COMPILERS

Translators-Compilation and Interpretation-The Phases of a Compiler- Lexical Analyzer: Transition Diagram of Keywords, Identifiers, Operators – Reserved Word Strategy.

UNIT - II SYNTAX ANALYZER

Types of Grammar -- Ambiguity in Grammar – Parse Tree – Syntax Tree -- Bottom Up (Shift Reduce) Parsing – Operator Precedence Parser -- Top Down Parsing – LL(0) Parsers – FIRST and FOLLOW – Bottom Up Parser LR(k) – Construction of LR(1) Parser form a Grammar -- Shift Reduce Parsing.

UNIT - III SEMANTIC ANALYZER AND INTERMEDIATE CODE GENERATOR

Semantic Analyzer: Semantic Actions, Translation Fields, Values of Translation.Intermediate Code Generator: Virtual Machine – Three Address Code – Triple – Quadruple.

UNIT - IV CODE OPTIMIZATION AND CODE GENERATION

Code Optimization – Criterion of Optimization – Gain of Optimization – Program Flow Graph – Dead Code -- Local and Global Optimization – Safety of Local Optimization -- Optimization – Basic Block – Global Optimization Code Generation – Concept of Target Machine – Instruction Costs – Code Generation Algorithm – Run Time Store Management.

UNIT - V ERROR HANDLING

Error Handling: Lexical and Syntactic Errors – Error Handling in LL(1) and LR(0) Parsing – Table Driven and Panic Mode Error Recoveries – Overheads of Recovery -- Semantic Error Concepts, Examples and Recovery.

TEXT BOOKS

1. Alfred V.Aho, Ravi Sethi, Jeffrey D. Ullman, Compiler Principles, Techniques and Tools, Pearson education
2. Seth D. Bergmann, Compiler Design : Theory, Tools and Examples, C/C++ edition

REFERENCES

1. Yunlin Su, Song Y. Yan, Principles of Compilers: A New approach to Compilers including the Algebraic Method, Springer edition
2. Compiler Design in C – Holub, Prentice Hall.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs. R. Latha	Assistant Professor	CSE	rlatha@avit.ac.in

17CSCC12	ADVANCED JAVA PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To understand the concepts of object-oriented, networking, multi-tier and enterprise application and develop skills in using these paradigms using Advanced Java.

PREREQUISITE

Basic java programming Knowledge

COURSE OBJECTIVES

1.	This module aims to introduce the students to some concepts of advanced programming and practice on reusing components.
2.	It focuses on Graphical User Interface (GUI), multithreading, networking, and database manipulation.
3.	A selected programming language is used such as Java.
4.	By completing this module, the students should be able to write sophisticated Java applications.
5.	Understand Generic Programming

COURSE OUTCOMES

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

CO1. Understand some advanced programming concepts.Deal with complex data objects as whole entities, rather than by twiddling with their elements	Knowledge and understand
CO2. Define the problem and write large programs .Analyse a problem and determine what problem elements to represent as functions or objects	Thinking and analysis
CO3. Write the simplest possible program that solves a given problem while explaining to the reader how it solves that problem	Personal and academic
CO4. Effectively use parameterization and inheritance to promote reuse - Develop programs with networking and multithreading	Transferable Skills
CO5. Compose more complex programs from simpler parts - Write programs that implement GUIs	Transferable Skills

MAPPING 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				S	S			
CO2			M		M			S	S	M		S		S	
CO3	S		M	S	S	M					L	S	S	S	
CO4	S		S	S	S		S				S	M			S
CO5	S		M	M	S		L				S	L			S

S- Strong; M-Medium; L-Low

SYLLABUS

JAVA FUNDAMENTALS:

Java I/O streaming – filter and pipe streams – Byte Code interpretation - reflection – Dynamic Reflexive Classes – Threading – Java Native Interfaces- Swing.

NETWORK PROGRAMMING IN JAVA:

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application– Java Messaging services.

APPLICATIONS IN DISTRIBUTED ENVIRONMENT:

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI –IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models -JAR file creation.

MULTI-TIER APPLICATION DEVELOPMENT:

Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Using BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework.

ENTERPRISE APPLICATIONS:

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions.

TEXT BOOK

1. Elliotte Rusty Harold, " Java Network Programming", O"Reilly publishers, 2000 (UNIT II).
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999. (UNIT III and UNIT V).
3. ortsmann& Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002. (UNIT I and UNIT IV).

REFERENCE BOOKS

1. Web reference: http://java.sun.com.
2. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	T.Vijila	Assistant Professor	CSE	vijila@avit.ac.in
2.	Dr.K.Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in

17CSCC13	DATA WAREHOUSING AND DATA MINING	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:. To understand the basics of data warehousing and mining	Understand
CO2: To learn the data preprocessing, language, architectures, concept description.	Apply
CO3: To learn the association rules and its algorithms.	Apply
CO4: To learn the classification and clustering rules and the respective algorithms	Apply
CO5: *To 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			
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I INTRODUCTION AND DATA WAREHOUSING

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

UNIT II 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.

UNIT III ASSOCIATION RULES

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

UNIT IV 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.

UNIT V 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	S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in

17CSCC14	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	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 Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. Which 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

Data Base Management System

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: to know about extension of condition probability and how to apply in the real time environment.	Apply
CO5: *to lean 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			
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

UNIT - I	INTRODUCTION
Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation	
UNIT - II	**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	
UNIT - III	**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.	
UNIT - IV	**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.	
UNIT - V	**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
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			rajaprakash@avit.ac.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. To learn the basics of .net Frame work and C# language	Knowledge
CO2. To learn C# elements and OOPS concepts	Understand
CO3. To learn interface and inheritance concepts in C# language	Analyze
CO4. To learn fundamentals of window application programming and create a window application	Apply
CO5. To develop web applications and learn advanced	Evaluation

MAPPING 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		S		S		M	
CO2.	S		S				M	S	S		S	S		M	S
CO3.			M	L	S	S		S	M		M	S	M	S	M
CO4.			S	M	M		S					S			S
CO5.	S		M	M	S						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 NETWORK PROGRAMMING:

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

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	Computer science and engineering	narmadha@vmkvec.edu.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

NIL

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 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: Able to Understand basics in Cloud Computing	Understand
CO2: Able to apply cloud computing concepts in real time	Apply
CO3: Able to develop cloud computing projects	Apply
CO4: Able to 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			
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I	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.	
UNIT - II	**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.	
UNIT - III	**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.	
UNIT - IV	**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.	
UNIT - V	**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 Paradigms",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	rjaichandran@avit.ac.in
2				

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.	Understand and Apply
CO5: Able to apply defense and analysis techniques in real time	Apply
CO1: Able to Understand basics in cyber security	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

UNIT - I	INTRODUCTION
Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.	
UNIT - II	**ATTACKER TECHNIQUES**
Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.	
UNIT - III	**EXPLOITATION**
Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.	
UNIT - IV	**MALICIOUS CODE**
Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.	
UNIT - V	**DEFENSE AND ANALYSIS TECHNIQUES**
Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.	
TEXT BOOKS	
1. James Graham, Richard Howard and Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor & Francis Group, 2011. 2. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, "Cyber security: The Essential Body of Knowledge", Cengage Learning, 2012.	
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	PROFESSOR	CSE	rjaichandran@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, Web Applications.

PREREQUISITE

Basis of HTML

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: To understand the basic concept of HTML and Scripting Language	Understand & Apply
CO2: To learn the HTML, Common Gateway Interface.	Understand & Apply
CO3: To learn the Java Script and AJAX	Understand & Apply
CO4: To learn the Server side programming	Understand & Apply
CO5: *To learn the database connectivity.*	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I -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
UNIT II-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
UNIT III -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 web application vs AJAX application –creating full scale AJAX application - Forms – Scripting Object
UNIT IV -SERVER SIDE PROGRAMMING
Dynamic Web content – cascading style sheets – DHTML – XML – Server side includes – communication – Active and Java Server Pages - Ruby enabled applications
UNIT V -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, 1999. **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

Name of the Faculty	Designation	Department	Mail ID
Dr. K. Somasunadaram	PROFESSOR	CSE	ksomasundaram@avit.ac.in

17CSCC19	INTERNET OF THINGS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To study and understand the technologies involved in Internet of Things (IoT) and apply them practically.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand the basic concepts of IOT
2.	To study the methodology of IOT
3.	To Develop IOT applications using Raspberry PI
4.	To Develop IOT applications using Arduino and Intel Edison
5.	To apply cloud concepts in IOT

COURSE OUTCOMES

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

CO1: Able to understand basics in IOT	Understand
CO2: Able to understand Methodology in IOT	Understand
CO3: Able to design IOT applications using Raspberry	Design
CO4: Able to design IOT applications using Aurdino and Intel Edison	Design
CO5: *Able to apply Cloud computing in IOT*	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I	**INTRODUCTION**
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.	
UNIT - II	**IOT METHODOLOGY**
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.	
UNIT - III	**IOT WITH RASPBERRY**
Bascis of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services	
UNIT - IV	**IOT WITH AURDINO AND INTEL EDISON**
Basics of Aurdino, Intel Edison with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks	
UNIT - V	**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	Professor	CSE	rjaichandran@avit.ac.in
2.				

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	Evaluate
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	L	-	-	-	-	-	-	-	-	-	-	-	S	L	
CO2	-	-	-	-	-	-	-	-	-	-	-	-	S	M	
CO3	S	S		S	-	M	S	-	-	M	-	-	S	L	L
CO4													S	M	
CO5	S	S		S		M	S						S	M	L

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	Computer science and engineering	jaichandran@avit.ac.in
2	Mrs. R. Latha	Assistant Professor	Computer science and engineering	rlatha@avit.ac.in
3	Dr. M. Nithya	Prof & Head	Computer science and engineering	nithya@vmkvec.edu.in
4	Dr.V.Amirthalingam	Associate Professor	Computer science and engineering	amirthalingam @ vmkvec.edu.in

17CSEC01	ADHOC AND WIRELESS SENSOR NETWORKS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to learn about adhoc and wireless sensor networks. This syllabus helps the students to study and identify different issues in wireless ad hoc and sensor networks , to analyze protocols developed for ad hoc and sensor networks , to Identify different issues in wireless ad hoc and sensor networks and to Identify and critique security issues in ad hoc and sensor networks.

PREREQUISITE

Basic knowledge of Discrete Mathematics, Regular Expressions, Finite Automata and Context Free Grammars
Familiarity with working and features of high level languages

COURSE OBJECTIVES

1	To learn about the issues in the design of wireless ad hoc networks
2	To understand the working of protocols in different layers of mobile ad hoc and sensor networks
3	Identify different issues in wireless ad hoc and sensor networks
4	To expose the students to different aspects in sensor networks
5	To understand various security issues in ad hoc and sensor networks and solutions to the issues

COURSE OUTCOMES

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

CO1: Learn about the design of wireless ad hoc networks	Understand
CO2: Learn and analyze the working of protocols developed for ad hoc and sensor networks	Apply
CO3: To understand about and Identify different issues in wireless ad hoc and sensor networks	Apply
CO4: To Identify different issues in wireless ad hoc	Apply
CO5: To Identify and critique security issues in ad hoc and sensor networks	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

MAC & ROUTING IN AD HOC NETWORKS **9 - hours**

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – MultipleChannel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols.

TRANSPORT & QOS IN AD HOC NETWORKS **9 – hours**

TCP's challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

MAC & ROUTING IN WIRELESS SENSOR NETWORKS **9 - hours**

Introduction – Applications – Challenges – Sensor network architecture - MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Sechedule Based Protocols – Zigbee – Topology Control – Routing Protocols.

TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS **9 - hours**

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control – In-network processing – Operating systems for wireless sensor networks – Examples.

SECURITY IN AD HOC NETWORKS **9 - hours**

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.

TEXT BOOKS

1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007

2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.

2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. Nitishagarwal	Asso. Prof	CSE	nitishaaggarwal@avit.ac.in
2	Dr.K.Sasikala	Asso. Prof	CSE	Sasikala@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

Awareness of basics of software engineering concepts and waterfall methodology
Exposure to any object oriented programming language such as Java, C#.

COURSE OBJECTIVES

1	Understand the background and driving forces for taking an Agile approach to software development
2	Understand the business value of adopting Agile approaches
3	Understand the Agile development practices
4	Drive development with unit tests using Test Driven Development
5	Apply design principles and refactoring to achieve Agility
6	Deploy automated build tools, version control and continuous integration

COURSE OUTCOMES

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

CO1: To understand the fundamentals of agile.	Understand
CO2: To learn the basics of agile scrum framework.	Apply
CO3: To learn the agile testing.	Apply
CO4: To learn the agile software design and development.	Apply
CO5: To learn the industry trends	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF AGILE **9 - hours**

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 **9 – hours**

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 **9 - hours**

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 **9 - hours**

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 **9 - hours**

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 Mar 2008.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 25 Oct 2002.
3. Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 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 Oct 2006.
2. Mike Cohn Publisher, "User Stories Applied: For Agile Software", Addison Wesley, 1 Mar 2004

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2	Dr.S.Senthilkumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

17CSEC03	BIG DATA AND ANALYTICS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Big data provides unprecedented opportunities to drive information-based innovation in economies, healthcare, public safety, education, transportation and almost every human endeavour. Big data also creates risk to both individuals and society unless effective governance is in place.

PREREQUISITE

DBMS & 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

COURSE OUTCOMES

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

CO1: To understand the basics of digital data and introduction to big data	Understand
CO2: To learn the basic big data challenges, important and technologies.	Apply
CO3: To learn the Hadoop architecture and technologies.	Apply
CO4: To learn the big data applications like MongoDB, Cassandra and Hive.	Apply
CO5: To learn the Pig and Jasper Reports..	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

DIGITAL DATA AND INTRODUCTION TO BIG DATA **9 - hours**

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 **9 – hours**

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 **9 - hours**

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 **9 - hours**

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 **9 - hours**

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	S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2	Dr.S.Senthil kumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

17CSEC04	BIO METRICS	Category	L	T	P	Credit
		EC	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

Basis of Sensor Network

COURSE OBJECTIVES

1	To understand the basics of Biometrics and its functionalities
2	To get the exposure the context of Biometric Applications
3	To learn to develop applications with biometric security

COURSE OUTCOMES

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

CO1: To understand the basics of biometric systems	Understand
CO2: To understand and learn the fingerprint, facial and iris recognition.	Understand & Apply
CO3: To understand the multi-biometrics systems.	Understand & Apply
CO4: To understand & learn the biometric cryptography	Understand
CO5: To understand the ethical usage.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

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 **9 - hours**

Ear detection and - gait feature extraction and matching - hand geometry- soft biometrics - sources of multi-biometrics- Acquisition and processing - Fusion levels.

BIOMETRIC CRYPTOGRAPHY **9 - hours**

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 **9 - hours**

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	Dr. K. Somasunadaram	Associate Professor	CSE	ksomasundaram@avit.ac.in
2	R.Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

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

PREAMBLE

To study and understand security concepts and apply them cloud computing.

PREREQUISITE

NIL

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: Able to Understand security basics in Cloud Computing	Understand
CO2: Able to understand and apply security issues in cloud computing	Understand and Apply
CO3: Able to understand virtualization techniques	Understand
CO4: Able to apply attacks in virtualization	Apply
CO5: Able to understand and apply legal issues in cloud applications	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

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).

VERTUALIZATION TECHNOLOGY **9 - hours**

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

VERTUALIZATIONATTACKS **9 - hours**

Guest hopping, attacks on VM (attack on control of VM, code injection into virtualized file structure), VM migration attack, hyperjacking.

LEGAL ISSUES **9 - hours**

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. Tim Mather, SubraKumaraswamy, ShahedLatif, “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.

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COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor	CSE	rjaichandran@avit.ac.in
2	S.Senthil kumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

17CSEC06	CLOUD COMPUTING SECURITY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To understand the concepts in cryptography and network security and their applications in real time

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the basic concepts in understanding cryptography and network security
2	To study various algorithms used in cryptography
3	To understand key exchange methods used
4	To study the applications of cryptography in authentication
5	To understand various security threats

COURSE OUTCOMES

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

CO1: Able to understand basic concepts in cryptography and network security	Understand
CO2: Able to understand and apply cryptography methods	Apply
CO3: Able to apply techniques in information security	Apply
CO4: Able to understand and apply authentication concepts	Understand and Apply
CO5: Able to apply security and firewall concepts	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

Simple DES – Differential cryptanalysis – DES – Modes of operation – Triple DES –AES – RC4 – RSA – Attacks – Primality test – factoring

TECHNIQUES **9 - hours**

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 **9 - hours**

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP,S/MIME – IP security – Web Security – SSL, TLS, SET.

SECURITY AND FIREWALLS **9 - hours**

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.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition –Prentice Hall of India, 2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor	CSE	rjaichandran@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE	sasikala@vmkvec.edu.in
3				
4				

17CSEC07	DATA CENTER VIRTUALIZATION	Category	L	T	P	Credit
		EC-PS	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: To learn the concepts of Web design patterns and page design	Understand
CO2: To understand and learn the scripting languages with design of web applications	Apply
CO3: To learn the maintenance and evaluation of web design	Apply
CO4: To learn about Resource monitoring and virtual machine data Protection	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

DATA CENTER CHALLENGES **9 - hours**

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 **9 – hours**

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 **9 - hours**

Virtual machine deployment, modification, management; monitoring and migration methodologies.

RESOURCE MONITORING **9 - hours**

Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor

VIRTUAL MACHINE DATA PROTECTION **9 - hours**

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 Administration Instant

REFERENCES

1. Brian Perry, Chris Huss, Jeantet Fields, “VCP VMware Certified Professional on vSphere 4 Study Guide” 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	karthik@avit.ac.in
2	R.Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

17CSEC08	DISTRIBUTED COMPUTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The student will be able to understand the concepts of distributed computing and communicating in distributed systems. This course also includes the network internet protocol, remote method invocation, peer to peer systems & distributed file system, synchronize, transaction and distributed deadlocks

PREREQUISITE

Basis of Networking

COURSE OBJECTIVES

1	To layout foundations of distributed systems
2	To introduce the idea of network related issues
3	To understand in detail the remote method and objects and support required for distributed system
4	To introduce the idea of middleware and computing of distributed systems
5	To understand the synchronization and cloud computing in distributed systems

COURSE OUTCOMES

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

CO1: To understand the basics of distributed computing	Understand
CO2: To learn the internet protocol & network	Understand and Apply
CO3: To learn the remote method invocation	Understand and Apply
CO4: To learn the peer to peer systems and distributed file system	Understand
CO5: To know the synchronization, transaction and distributed deadlocks	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

Introduction – Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges, DCS design goals: Transparencies, Fundamental issues, Case study: World Wide Web.

COMMUNICATION IN DISTRIBUTED SYSTEM **9 – hours**

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI

REMOTE METHOD INVOCATION AND OBJECTS **9 - hours**

Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: CORBA -from objects to components.

PEER TO PEER SERVICES AND FILE SYSTEM **9 - hours**

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems : Data-Intensive Computing , Distributed Hash Tables , Consistency Models , Fault Tolerance , Many-Core Computing

SYNCHRONIZATION AND REPLICATION **9 - hours**

Introduction - Clocks, events and process states - Synchronizing physical clocks - Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering -Distributed deadlocks – Replication – Workflow Systems: Grid Computing, Cloud Computing , Virtualization , IaaS Clouds , File systems, Networked File systems, Parallel File systems.

TEXT BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design” Fifth edition – 2011- Addison Wesley.

REFERENCES

1. 1. Tanenbaum A.S., Van Steen M., “ Distributed Systems: Principles and Paradigms” , Pearson Education ,2007.

2. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson and education, 2004.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. K. Somasunadaram	Associate Professor	CSE	ksomasundaram@avit.ac.in
2	Sundaramurthy	Associate Professor	CSE	sundaramurthy@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 the basic concepts in ethical hacking
2	To identify vulnerabilities using ethical hacking techniques
3	To understand security in web applications
4	To understand various types of vulnerabilities in wireless networks
5	To discuss about security tools and its applications

COURSE OUTCOMES

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

CO1: To Understand basics in ethical hacking	Understand
CO2: To apply hacking techniques in real time problems	Apply
CO3: To apply Security Features in web applications	Apply
CO4: To understand and apply security features in wireless networks	Understand and Apply
CO5: To 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			
CO1	M	M									L	L			
CO2	M	M		L								L			
CO3	M	M	L	L		M									
CO4	M	S	L			L				L		M			
CO5	M	L				M					M	L			

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

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 **9 - hours**

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 **9 - hours**

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 **9 - hours**

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	CSE	rjaichandran@avit.ac.in
2	M. Annamalai	Assistant Professor	CSE	annamalaim@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

Prior knowledge of basics of the game theory

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: To learn about the basic notion of a game, its solutions concepts, and other basic notions	Understand
CO2: To study tools of game theory, and the main applications	Apply
CO3: To formalize the notion of strategic thinking and rational choice by using tools of game theory	Apply
CO4: To provide insights into using game theory in modeling applications	Apply
CO5: To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

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 **9 - hours**

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 **9 - hours**

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 equilibriaof two-player, zero-sum games -Computing Nash equilibria of twoplayer, general-sum games - Identifying dominated strategies.

MECHANISM DESIGN **9 - hours**

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	nitishaaggarwal@avit.ac.in
2	R.Bharanidharan	Assistant Professor	CSE	bharanidharan@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 and To understand the impact of e-waste and carbon waste
4	To learn about green compliance. And implementation using IT

COURSE OUTCOMES

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

CO1: To acquire knowledge to adopt green computing practices	Understand
CO2: To minimize negative impacts on the environment	Apply
CO3: To learn about energy saving practices and To understand the impact of e-waste and carbon waste	Understand
CO4: To learn about green compliance. And implementation using IT	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS **9 - hours**

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 **9 – hours**

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 **9 - hours**

Virtualizing of IT Systems – Role of Electric Utilities, Telecommuting, Teleconferencing and Teleporting – Materials Recycling – Best Ways for Green PC – Green Data Center – Green Grid Framework. Optimizing Computer Power Management, Seamless Sharing Across Systems. Collaborating and Cloud Computing, Virtual Presence.

GREEN COMPLIANCE **9 - hours**

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 **9 - hours**

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	karthik@avit.ac.in
2	B. Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in

17CSEC12	GRID COMPUTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The student will be able to understand the concepts of grid computing and over the technologies. This course also includes the grid computing systems & architectures, security of gird computing, distributed systems and grid service architecture.

PREREQUISITE

Basis of Networking

COURSE OBJECTIVES

1	To understand the concept of Grid computing and the benefits of Grid computing over other technologies
2	To understand the components of grid computing systems and architectures
3	To understand the security of Grid Computing
4	To introduce the idea of middleware and computing of distributed systems
5	To understand the issues and approaches in Grid Deployment

COURSE OUTCOMES

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

CO1: To understand the basics of grid, parallel and distributed computing	Understand
CO2: To learn the basic grid architecture and grid monitoring systems	Understand
CO3: To understand the grid security and scheduling	Understand
CO4: To understand the data management and grid portal	Understand
CO5: To learn and understand grid service architecture	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

Introduction: Grid Computing –Key Issues –Potential Applications and Benefits – Grid Types, Topologies – Comparison with other Approaches- Motivations for Grid Computing – Brief History (communication, computation, grid technology) -Parallel and Distributed Computing- Cluster Computing- Grid Computing - Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

GRID MONITORING **9 – hours**

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems – Grid ICE – JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and Grid Mon.

GRID SECURITY AND RESOURCE MANAGEMENT **9 - hours**

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

DATA MANAGEMENT AND GRID PORTALS **9 - hours**

Data Management - Categories and Origins of Structured Data - Data Management Challenges - Architectural Approaches - Collective Data Management Services - Federation Services - Grid Portals – First - Generation Grid Portals - Second-Generation Grid Portals.

OPEN GRID SERVICES INFRASTRUCTURE **9 - hours**

Introduction- Architectural Constructs-OGSI/OGSA Service Elements and Layered Model (Key Aspects, Ancillary Aspects, Implementations of OGSI)-Grid Service-WSDL Extensions and Conventions- Service Data-Core Grid Service Properties - Open Grid Services Architecture – Introduction - Functionality Requirements-OGSA Service Taxonomy-Service Relationships-OGSA Services-Security Considerations.

TEXT BOOKS

1. Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005.

2. Daniel Minoli, “A Networking Approach to Grid Computing” , A John Wiley & Sons Inc., Publication , Singapore, 2005.

REFERENCES

1. Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure , Morgan Kaufman – 2004.

2. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson Education 2004.

3. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a reality”, John Wiley and sons.

4. Ahmar Abbas, " Grid Computing , A Practical Guide to Technology and Applications", Firewall Media, 2004

5. D.Janakiraman, “Grid Computing- A Research Monograph”, Tata McGraw Hill , New Delhi, 2005.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. K. Somasunadaram	Associate Professor	CSE	ksomasundaram@avit.ac.in
2	S.Senthil kumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

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

Artificial Intelligence or soft computing

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	Learn the guidelines for user interface

COURSE OUTCOMES

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

CO1: To understand the foundations of human computer interaction	Understand
CO2: To learn the basics of design & software process of human computer interaction	Apply
CO3: To learn the models and theories of HCI	Apply
CO4: To learn the mobile human computer interaction	Apply
CO5: To learn the web interface design	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FOUNDATIONS OF HCI **9 - hours**

he 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 **9 – hours**

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 **9 - hours**

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

MOBILE HCI **9 - hours**

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 **9 - hours**

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	muthuselvan@avit.ac.in
2	M.Annamalai	Assistant Professor	CSE	annamalaim@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

Prior knowledge of elementary linear algebra would be helpful

COURSE OBJECTIVES

1	To get an understanding of machine learning techniques for text classification and clustering
2	To understand the various applications of Information Retrieval giving emphasis to Multimedia IR
3	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: To learn about the basic concepts, practical issues and impact of the web on Information Retrieval	Understand
CO2: To understand about the various IR models	Apply
CO3: To know about the static and dynamic indices and query operations	Apply
CO4: To learn about classification and clustering	Apply
CO5: To learn about searching and 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			
CO1	M			M			S								
CO2		M		L						M					
CO3			L			S		M				M			
CO4	M			M		S				L					
CO5		M						S			L				

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 Search engine.

MODELING **9 – hours**

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 **9 - hours**

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 **9 - hours**

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 **9 - hours**

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), Second Edition

2.Textbook Retrieval Systems In Information Management by GG Chowdhury

REFERENCES

1. Christopher D. Manning, PrabhakarRaghavan, HinrichSchutze, Introduction to Information Retrieval, Cambridge University Press, First South Asian Edition

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	rlatha@avit.ac.in
2	S.Senthil Kumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

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: To study the Importance of Firewalls and their types	Understand
CO2: To analyze and validate computer forensics data	Apply
CO3: To study various threats associated with security and information warfare	Understand
CO4: To study about evidence collection and forensics tools	Understand
CO5: To study about various forensics and analysis and validation	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

NETWORK LAYER SECURITY &TRANSPORT LAYER SECURITY **9 - hours**

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 **9 – hours**

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 **9 - hours**

Computer Forensics Fundamentals – Types of Computer Forensics – Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

EVIDENCE COLLECTION AND FORENSICS TOOLS **9 - hours**

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensic Tools: Software/Hardware Tools.

ANALYSIS AND VALIDATION **9 - hours**

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	karthik@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE	

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

Introduction to Information Technology

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: Understand the different security management and storage management in IT infrastructure	Understand
CO5: Understand the service delivery concept in IT field	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

IT system Management **9 - hours**

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 **9 – hours**

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 **9 - hours**

Information system costs and benefits, Capital budgeting for information system, Real Options pricing models, Limitation of financial models.

Service Delivery and Service Support Management **9 - hours**

Service-level management, financial management and advantages of financial management -Service support process, Configuration Management-Incident management.

Storage Management and Security Management **9 - hours**

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	srividhya@avit.ac.in
2	Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmvkec.edu.in
3				
4				

17CSEC17	KNOWLEDGE BASED DECISION SUPPORT SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

The purpose of this course is to impart knowledge on decision support systems and implementation.

PREREQUISITE

Software Engineering

COURSE OBJECTIVES

1	To familiarize decision support systems and their characteristics
2	To study about Intelligent DSS and applications of DSS
3	To learn the technologies related to decision support systems

COURSE OUTCOMES

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

CO1: To familiarize decision support systems and their characteristics	Understand
CO2: To study about Intelligent DSS and applications of DSS	Apply
CO3: To learn the technologies related to decision support systems	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	S	M	S			M			L						
CO2	M	S			M			S							
CO3				M			M		L		M				

S- Strong; M-Medium; L-Low

SYLLABUS

DECISION MAKING AND COMPUTERIZED SUPPORT **9 - hours**

Management Support Systems: An Overview - Decision Making, Systems, Modeling, and Support.

DECISION SUPPORT SYSTEMS **9 – hours**

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 **9 - hours**

Collaborative Computing Technologies: Group Support Systems -Enterprise Information Systems - knowledge Management.

EVIDENCE COLLECTION AND FORENSICS TOOLS **9 - hours**

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 **9 - hours**

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.

COURSE DESIGNERS				
S. No.	**Name of the Faculty**	**Designation**	**Department**	**Mail ID**
1	K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in
2	R.Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkve.edu.in

17CSEC18	MOBILE ADHOC NETWORKS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to learn the basic concepts of Mobile Adhoc Networks, various types of Mobile Adhoc Networks protocols, their design issues, goals and classification.

PREREQUISITE

Prior knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards, Knowledge of sensor networks and their characteristics

COURSE OBJECTIVES

1	This course covers major aspects of adhoc networks from design through performance issues to application requirements
2	It starts with the design issues and challenges associated with implementations of ad hoc and sensor network applications
3	This includes mobility, disconnections, and battery power consumption
4	Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards. Their designing, operations, plus approaches to interoperability
5	Knowledge of sensor networks and their characteristics. Designing of MAC layer protocols, understanding of power management, query processing, and sensor databases

COURSE OUTCOMES

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

CO1: To learn about the basic concepts, practical issues and impact of the MANets	Understand
CO2: To understand major aspects of adhoc networks from design through performance issues to application requirements	Apply
CO3: To know about the static and dynamic indices and query operations	Apply
CO4: To learn about classification and clustering	Apply
CO5: To learn about searching and 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			
CO1	M			M			S								
CO2		M		L						M					
CO3			L			S		M				M			
CO4	M			M		S				L					
CO5		M						S			L				

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

Introduction to adhoc networks – definition, characteristics features, applications. Charectristics of Wireless channel, Adhoc Mobility Models.

MEDIUM ACCESS PROTOCOLS **9 – hours**

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15.

NETWORK PROTOCOLS **9 - hours**

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

END-END DELIVERY AND SECURITY **9 - hours**

Transport layer : Issues in desiging- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G **9 - hours**

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques.

TEXT BOOKS

1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007

2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.

2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. Nitisha	Associate Professor	CSE	nitishaaggarwal@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE	sasikala@vmkvec.edu.in

17CSEC19	MOBILE COMPUTING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

To learn the standards and issues in Mobile Computing.

PREREQUISITE

Basis of Network

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: To understand the basics of wireless transmission and signal processing	Understand
CO2: To understand the concept of cellular network	Understand & Apply
CO3: To understand the concept of wireless lan network	Understand & Apply
CO4: To understand the concept of mobile network and transport layer	Understand & Apply
CO5: To understand and learn the adhoc wireless network	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9 - hours**

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 **9 – hours**

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 **9 - hours**

Wireless LAN – IEEE 802.11 standards – HIPERLAN – Blue tooth technology and protocols. Wireless Local Loop technologies.

MOBILE NETWORK LAYER AND TRANSPORT LAYER **9 - hours**

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 **9 - hours**

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. K. Somasunadaram	Associate Professor	CSE	ksomasundaram@avit.ac.in
2	Dr.M.Nithya	Professor	CSE	nithya@vmkvec.edu.in

17CSEC20	MULTIMEDIA DATABASE MANAGEMENT SYSTEMS	Category	L	T	P	Credit
		PC	3	0	0	3

PREAMBLE

The main purpose of this course is to provide the student about the database storage, retrieval of Multimedia elements.

PREREQUISITE

Basic knowledge in Database is preferred

COURSE OBJECTIVES

1	To understand basic of database
2	To understand different types data structure
3	To understand Design and Architecture of a Multimedia Database
4	To understand Audio Storage
5	To understand Video Storage

COURSE OUTCOMES

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

CO1: Basic concepts of image/video coding technology and compression standards	Knowledge &Understand
CO2: Fundamentals of multimedia content description and presentation	Knowledge &Understand
CO3: Fundamentals of content based image and video retrieval techniques	Analyze
CO4: Basic knowledge of multimedia database system -- indexing, browsing and retrieval	Understand & Apply
CO5: Interpret and analyze measurement results obtained on the multimedia system and components	Analyze & Evaluation

MAPPING 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			S		L					
CO2	S		S	S	S		S		S	S	S				
CO3	S		M	L	L		L	S	S	L	M	S	S	S	
CO4			M	S	S	S	M		S	S	M	S	M	M	S
CO5	S		S	L			S		S		S		M		

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO DATABASE **9 - hours**

Basics of Database Management Systems - Relational Model – SQL, Functional Dependencies - Normal Forms – Multivalued Dependencies, Join Dependencies – Examples - An introduction to Object-oriented Databases.

MULTIDIMENSIONAL DATA STRUCTURES **9 – hours**

k-d Trees - Point Quadtrees - The MX-Quadtree - R-Trees - comparison of Different Data Structures

IMAGE RETRIEVAL MECHANISMS **9 - hours**

Text/Document Databases - Precision and Recall - Stop Lists - Word Stems and Frequency Tables - Latent Semantic Indexing - TV-Trees - Other Retrieval Techniques -Image Databases - Raw Images - Compressed Image Representations - Similarity-Based Retrieval - Alternative Image DB Paradigms - Representing Image DBs with Relations - Representing Image DBs with R-Trees - Retrieving Images By Spatial Layout - Implementations.

AUDIO/VIDEO DATABASES **9 - hours**

Audio Databases - A General Model of Audio Data - Capturing Audio Content through Discrete Transformation - Indexing Audio Data. Video Databases - Organizing Content of a Single Video - Querying Content of Video Libraries - Video Segmentation.

MULTIMEDIA DATABASE DESIGN **9 - hours**

Design and Architecture of a Multimedia Database - Organizing Multimedia Data Based on The Principle of Uniformity - Media Abstractions - Query Languages for Retrieving Multimedia Data.

TEXT BOOKS

1. Multimedia Database Management Systems Authors: **Prabhakaran**, B. Publisher Name Springer, Boston, MA.

2. Multimedia Database Retrieval Technology and Applications Authors: **Muneesawang**, Paisarn, **Zhang**, Ning, **Guan**, Ling , Publisher Name Springer, Cham.

REFERENCES

1.Subramanian V. S., “Principles of Multimedia Database Systems”, Elsevier Publishers, 2013.

2. Elmasri and Navathe, “Fundamentals of Database Systems, 6th Edition, Addison.

3. Wesley, 2003. Subramanian S., “Principles of Multimedia Database Systems”, Elsevier, 1998.

4. Date C. J., “An Introduction to Database Systems”, 8th Edition.

5. Khoshafian S. and Bakor A. B., “Multimedia and Imaging Databases”, Elsevier, 1996.

6. Kingsley Nwosu C., “Multimedia Database Systems: Design and Implementation Strategies”, Kluwer Academic Publishers, 1996.

7. Lynne Dunckley, “Multimedia Databases: An Object-Relational Approach”, Pearson Education, 2003

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. K. Somasunadaram	Associate Professor	CSE	ksomasundaram@avit.ac.in
2	Dr.S.Senthil kumar	Associate Professor	CSE	vmkvec.itsenthilkumar@gmail.com

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

PREAMBLE:

Total Quality Management (**TQM**) is a management approach describes to long–term success through customer satisfaction and, is an integrative philosophy of management for continuously improving the quality of products and processes.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

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

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: Explain the required tools to implement TQM.	Apply
CO3: Analyse various TQM parameters with help of statistical tools.	Analysing
CO4: Evaluating various TQM Techniques	Evaluate
CO5: Propose the Quality Management Systems in a different organization environment	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

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 Management tools.

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 reprint 2002).
2. Feigenbaum.A.V. "Total Quality Management- McGraw-Hill- 1991.

REFERENCES:

1. James R.Evans & William M.Lidsay - The Management and Control of Quality- (5th Edition) - South-Western (Thomson Learning) - 2002 (ISBN 0-324-06680-5).
2. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd - Oxford. 1989.
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	Management Studies	asmanimba@gmail.com
2	B. Rajnarayanan	Assistant Professor	Management Studies	Rajsachin.narayanan@gmail.com

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

PREAMBLE: Engineering management is to deliver a better understanding over the basic management functions and its importance to build the organization. Also, they were insisted to learn the importance of rights and duties of the employees through basic ethics. It allows them to understand various occupational crimes happening throughout the world, which educates them to learn the moral leadership.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To Understand the importance of Planning at various levels of the organisation.
2. To understand the fundamentals of organizing, staffing and its factors to higher productivity.
3. To Understand and inculcate ethics for individual as well as society. And Practice moral responsibility and code of ethics of an Engineer.
4. To Explore and Experiment various social related cases and Realise the importance of ethics
5. . To analyse the Rights and duties that can shape the individual for long term
6. To apply the Experiences learnt through the case studies at global context and apply the ethical issues of global market at local environment to compete in the Globalization.

COURSE OUTCOMES:

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

CO1: Understand the importance of planning in organization at all levels of employees.	Understand
CO2: Explain the importance of fitting right man for the right job.	Apply
CO3: Analyse various leadership skills and its importance on shaping the organization.	Analysing
CO4: Evaluating various ethical practices. Propose the Rights and duties of engineers in a different organization environment	Evaluate
CO5: Impart ethical practices, collective bargaining techniques and essentials of leadership 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
CO1	S	L	L	L	L	L	L	L	L	M	L	L		
CO2	S	S	M	L	M	L	L	M	M	L	L	L		
CO3	M	S	S	M	S	M	L	L	M	L	L	M		
CO4	M	S	S	L	M	L	L	M	M	L	L	M		

S- Strong; M-Medium; L-Low

SYLLABUS:

PLANNING **9**

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

ORGANIZING & STAFFING **9**

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

DIRECTING & CONTROLLING **9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Communication - Barriers to effective Communication – Controlling – Controlling Techniques - Organization Culture - Elements and types of culture – Managing cultural diversity.

INTRODUCTION TO ETHICS **9**

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

ETHICS IN ENGINEERING **9**

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

TEXT BOOKS:

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

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999).
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, 'Essentials of Management', Thomson 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	B.Rajnarayanan	Assistant Professor	Management Studies	rajsachin.narayanan@gmail.com
2	Dr. G. Murugesan	Professor	Management Studies	Selvasahana.m@gmail.com

17MBHS05	MARKETING TECHNIQUES FOR ENGINEERS	Category	L	T	P	Credit
		EC-OE	3	0	0	3

PREAMBLE:

According to world-renowned management consultant, Peter Drucker, "Marketing is the only distinguishing and unique function of business…There is only one valid definition of business purpose and that is to create a customer."While the significance of marketing in today's business world can never be overstated, it is the precise understanding and appreciation of marketing management that needs to be accentuated. Marketing management allows an organization to track, review and analyze their marketing resources and activities.

In this marketing course, you will learn the fundamentals of marketing management, as you gradually learn advanced theories and applications through real world business examples, illustrations, cases and exercises. You will learn how marketing management tools can be used to increase your customer base, improve customer satisfaction and increase your company's overall perceived value.You will learn how marketing serves as a key element within an organization's strategy.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the students to learn the fundamental concept of Marketing for managers.
2. To analyse various indicators of marketing management through thoughts and practices
3. To explore and apply the Pricing Concepts and Strategies
4. To apply market channel driven strategies.
5. To motivate students to learn and practice ethical responsibilities of a promotional activities.

COURSE OUTCOMES:

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

CO1: Understanding the moral values that ought to guide management practice	Understand
CO2: Making the consciousness of marketing management process	Understand
CO3: Gaining the knowledge of analytical skills in solving marketing related problems.	Apply
CO4: Assessing and evaluating the marketing related problems	Analyse
CO5: Gaining and applying the skills and knowledge to solve the current problems and challenges in marketing management.	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

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 – Buyer Behaviour.

Product Mix

Product – Meaning and Definition – Product Policy – Classification of Products – Product mix – product line strategies – Branding– Product life cycle – New Product Development case studies.

Pricing

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.

Distribution Channels

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.

Promotion Mix

Promotional mix- Factors determining promotional mix – Sales promotion – Objectives – Types- Advertising Budget – Personal Selling – Kinds of Advertising – Benefits – Advertisement copy, Advertising Budget – Personal selling – kinds of salesmen – Function – Qualities of a good salesmen- process of selling.

TEXT BOOK:

1. Philip Kotler, Marketing Management,Millennium Edition, Prentice Hall Publication.
2. KS Chandrasekar, “Marketing management Text and Cases”, Tata McGrawHill - Vijaynicole, First edition,2010

REFERENCES:

1. Ramasamy &Namakumari, Marketing Management, Macmillan Pub.
2. Arunkumar, Meenakshi, Marketing Management, Vikas Pub.
3. Sherlaker.S.A, Marketing Management, HPH
4. Rajan Saxena, Marketing Management, TMH
5. Beri. C. G, Marketing Research, Sultan Chand Pub.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	mail id
1	Dr. P. Marishkumar	Associate Professor	Management Studies	marishkumarp@vmkvec.edu.in

17CVEC07	DISASTER MITIGATION AND MANAGEMENT	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course deals with the various disasters and to expose the students about the measures, its effect against built structures, and Hazard Assessment procedure in India. This course also deals with the methods of mitigating various hazards such that their impact on communities is reduced.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Understand basic concepts in Disaster Management
2	To Understand Definitions and Terminologies used in Disaster Management
3	To Understand the Challenges posed by Disasters
4	To understand Impacts of Disasters

COURSE OUTCOMES

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

CO1. Understand the various types of disaster viz Hydrological, Coastal and Marine Disasters, Atmospheric Disasters, Geological, Mass Movement and Land Disasters, Wind and Water Driven Disasters.	Understand
CO2. Identify the potential deficiencies of existing buildings for Earthquake disaster and suggest suitable remedial measures.	Understand
CO3.Derive the guide lines for the precautionary measures and rehabilitation measures for Earthquake disaster.	Apply
CO4. Derive the protection measures against floods, cyclone, land slides	Apply
CO5. Understand the effects of disasters on built structures in India	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: Concept of disaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events (Global, national and regional); Natural and man-made hazards

RISK ASSESSMENT AND VULNERABILITY ANALYSIS: Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment ;Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

DISASTER MANAGEMENT MECHANISM: Concepts of risk management and crisis management ; Disaster management cycle ;Response and Recovery ; Development, Prevention, Mitigation and Preparedness; Planning for relief

DISASTER RESPONSE: Mass media and disaster management; Disaster Response Plan; Communication, Participation, and Activation of Emergency Preparedness Plan; Logistics Management; Psychological Response; Trauma and Stress Management; Rumour and Panic Management ;Minimum Standards of Relief; Managing Relief; Funding.

DISASTER MANAGEMENT IN INDIA: Strategies for disaster management planning; Steps for formulating a disaster risk reduction plan; Disaster management Act and Policy in India; Organisational structure for disaster management in India; Preparation of state and district disaster management plans.

TEXT BOOKS:

Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.

Carter, W. N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.

Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

REFERENCES:

Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.

Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.

Goswami, S. C. Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.

National Policy on Disaster Management, NDMA, New Delhi, 2009.

Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Fizoor Rahman	Asst. Professor	CIVIL	fizoorr@gmail.com
2	J.Karthick Rajan	Asst. Professor	CIVIL	Karthickrajan078@gmail.com

17ECCC14	DIGITAL IMAGE PROCESSING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Digital Image Processing has applications in all walks of present day digital life. The student stands to gain knowledge of the basics of images, acquisition of images, enhancement of images, restoration of images, compression of images for efficient storage and transmission, color image processing, image segmentation and morphological image processing.

PREREQUISITE: Signal Processing

COURSE OBJECTIVES

1	To understand the mathematics behind image sampling, quantization and image transforms
2	To understand different filtering techniques both in the frequency domain as well as the time domain and analyze them
3	To understand noise removal and other restoration techniques and apply them.
4	To understand and apply multi resolution techniques for image compression
5	To understand morphological representation, image segmentation and representation

COURSE OUTCOMES

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

CO1. Understand the mathematics behind image acquisition, sampling and transforms	Understand
CO2. Understand the concepts of filtering in time domain and frequency domain	Understand
CO3. Analyze the effect of different filters on removing different noises	Analyze
CO4. Understand the basics behind image restoration	Understand
CO5. Design an application for removing different types of noises in a set of given images	Apply
CO4. Understand the different multiresolution techniques	Understand
CO5. Apply multi resolution for image compression	Apply
CO6. Understand morphological representation, image segmentation and representation	Understand
CO7. Apply image segmentation techniques for segmenting objects in given images	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L								M			
CO2	S											M			
CO3		S										M			
CO4	S	M										M			
CO5	S	S	M	L								M			
C06	S	M	L									M			
CO7	S	S	M	L								M			

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction and Image transforms

Origin of digital image processing – Fundamental steps in digital image processing – Components of an image processing system – Elements of visual perception – Image sensing and acquisition – Image sampling and quantization – Basic relationships between pixels – Introduction to mathematical tools used in digital image processing – Fields that use digital image processing

Transforms for Image processing - Discrete Fourier transform – Discrete Cosine transform – Haar transform – Hadamard transform – Walsh transform

Intensity transformations & Filtering

Basic intensity transformation functions – Histogram processing – Fundamentals of spatial filtering – Smoothing spatial filtering – Sharpening spatial filters – Fuzzy techniques for intensity transformations and spatial filtering

Basics of filtering in frequency transforms – Image smoothing using frequency domain filters - Image sharpening using frequency domain filters.

Image Restoration & Color Image Processing

Image restoration model – Noise parameters – Restoration in the presence of noise only –spatial filtering – Periodic noise reduction by frequency domain filtering – Degrading functions- Estimating the degradation function – Inverse filtering – Wiener filtering – Constrained least square filtering – Geometric mean filtering – Image reconstruction from projections

Color fundamentals – Color models – Pseudo color image processing – Color transformations – Color image Smoothing and sharpening – Color image segmentation – Noise in color images – Color image compression

Wavelets and Multiresolution processing & Image Compression

Background – Multiresolution expansion – Wavelet transform in one dimension – Fast wavelet transform – Wavelet transform in two dimensions- Wavelet packets

Image compression models – Huffman coding – Arithmetic coding – LZW coding – Run length coding – Bit plane coding – Block transform coding – Predictive coding – Wavelet coding

Morphological Processing, Segmentation & Representation

Morphological Processing - Erosion and dilation - Opening and closing – Basic morphological operations – Grey scale morphology. Image Segmentation - Point, Line and Edge detection – Thresholding – Region based segmentation – segmentation using morphological watersheds – use of motion in segmentation. Image Representation – Boundary descriptors – Regional descriptors

TEXT BOOKS:

1) "Digital Image Processing", Rafael C Gonzalez & Richard E Woods, Pearson Education International, Third Edition, 2008, ISBN 0-13-168728-x, 978-0-13-168728-8
2) "Fundamentals of Digital Image Processing",A.K. Jain, PHI, 1995.

REFERENCE BOOKS:

1) Digital Image Processing, Bernd Jahne, Springer -Verlag, Fifth Edition, 2002, ISBN 3-540 - 67754 - 2
2) The Essential Guide to Image Processing", Al Bowik,2009, Elsevier Inc, ISBN 978-0-12-374457-9
3) S. Jayarman, S. Esakkirajan and T. Veerakumar, "Digital Image Processing", Tata McGraw Hill, 2010.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Mr. P. Subramanian	subramanian@avit.ac.in
2.	Mrs.S.Valarmathy	valarmathy@vmkvec.edu.in
3.	Mr.R.Ramani	ramani@vmkvec.edu.in

17ECCC05	DIGITAL LOGIC CIRCUITS & DESIGN	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

One of the most important reasons for the unprecedented growth of Digital Electronics and systems is the advent of integrated circuits(ICs).Developments in the IC technology have made it possible to fabricate complex digital circuits such as microprocessors, memories and FPGAs etc. This course provides various methods and techniques suitable for a variety of digital system design applications.

PREREQUISITE

Basic Electrical and Electronics Engineering

COURSE OBJECTIVES

1	To understand the various number systems and their conversions.
2	To learn the Boolean expressions, Boolean postulates and Karnaugh map method to reduce the variables.
3	To impart the design knowledge of various combinational logic circuits and sequential circuits.
4	To understand the basics of hardware descriptive language.
5	To design the RTL for various logic circuits.

COURSE OUTCOMES

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

CO1. Explain the various number systems and their conversions.	Understand
CO2. Apply the principles of Boolean algebra to manipulate and minimize logic expressions	Apply
CO3. Design various combinational logic circuits (adder, subtractor, multiplexer and coders, etc.,)	Apply
CO4. Design various sequential circuits using flip flops (counters, shift registers, etc.,)	Apply

CO5. Write the HDL programming for combinational and sequential circuits.	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	L	-	-	-	M	-	-	-	S	M	-
CO2	S	M	M	M	M	-	-	-	M	-	-	-	S	M	-
CO3	S	S	M	M	M	-	-	-	M	-	-	-	S	M	-
CO4	S	S	M	M	M	-	-	-	M	-	-	-	S	M	-
CO5	S	S	M	M	M	-	-	-	M	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

Basics of digital system:

About Digital system, Analog versus Digital, Advantages of processing information in digital form, Number System-Binary,Octal,Decimal & Hexadecimal Number Systems & its Conversion, Complement Arithmetic, Signed Binary Numbers, Binary Codes, Binary Storage And Registers.

Boolean Algebra, Logic Gates & Gate –Level Minimization:

Introduction, Boolean Algebra, basic theorem & properties of Boolean Algebra, Boolean functions, canonical & standard forms, logical operations, logic gates, Integrated circuits, Map method-upto four variable K-maps, Product of Sums (POS) & Sum of Products (SOP) simplification, don't care conditions, NAND & NOR implementations, Exclusive-OR Function, Hardware Description Language(HDL).

Combinational logic:

Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Code Converters, Encoders, Decoders, Multiplexers.

Synchronous Sequential Logic, Register & Counters:

Sequential circuits, storage elements: latches, flip flops, Analysis of clocked sequential circuits, Moore and Mealy circuits ,state diagram, state reduction & Assignment, design procedure, shift registers, ripple counters, synchronous counters.

Design At The Register Transfer Level:

Register Transfer Level Notation, Register Transfer Level In HDL, ASM, Sequential Binary Multiplier, Control Logic, HDL Description Of Binary Multiplier, Design With Multiplexers, Race Free Design, Latch Free Design.

Text Books

1. Morris Mano, “Digital Design (with an introduction to the verilog HDL)", Prentice-Hall of India.
2. John F. Wakerly, “Digital Design Principles & Practices”, 4th edition, Prentice-Hall, 2005.

REFERENCES:

1. Stephen D. Brown, and Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design, 2nd Edition," McGraw Hill, June, 2007.
2. William Kleitz, “Digital Electronics: A Practical Approach with VHDL”, Ninth Edition, Pearson, 2002.
3. Floyd T.L., “Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.
4. Tokheim R.L., “Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.
5. Jain R.P., “Modern Digital Electronics ", Tata McGraw Hill, 1999

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr.B.Rajasekaran	Associate Professor	ECE	rajasekaran@vmkvec.edu.in
2	Mrs.S.Valarmathy	Associate Professor	ECE	valarmathy@vmkvec.edu.in

17EEEC21	**NON CONVENTIONAL ENERGY SOURCES**	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Non Conventional resources include solar energy, wind, falling water, the heat of the earth (geothermal), plant materials (biomass), waves, ocean currents, temperature differences in the oceans and the energy of the tides. Non Conventional energy technologies produce power, heat or mechanical energy by converting those resources either to electricity or to motive power. It concerned with development of the national grid system will focus on those resources that have established themselves commercially and are cost effective for on grid applications. Such commercial technologies include hydroelectric power, solar energy, fuels derived from biomass, wind energy and geothermal energy. Wave, ocean current, ocean thermal and other technologies that are in the research or early commercial stage, as well as non-electric Non Conventional energy technologies, such as solar water heaters and geothermal heat pumps, are also based on Non Conventional resources, but outside the scope of this Manual.

PREREQUISITE-NIL

COURSE OBJECTIVES

1	To learn about PV technology principles.
2	To learn economical and environmental merits of solar energy for variety applications.
3	To learn modern wind turbine control & monitoring.
4	To learn various power converters in the field of renewable energy technologies.
5	To study and analyse different types of Power converters for Renewable energy conversion

COURSE OUTCOMES

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

CO1	Understand to Renewable Energy Sources, Principles of Solar Radiation, Different Methods of Solar Energy Storage and its Applications, Concepts of Solar Ponds, Solar Distillation and Photo Voltaic Energy Conversion	Understand and Analyse
CO2	Learn the Flat Plate and Concentrating Collectors, Classification of Concentrating Collectors	Analyse
CO3	Learn the Wind Energy, Horizontal and Vertical Access Wind Mills, Bio Conversion	Analyse
CO4	Types of Bio-Gas Digesters and Utilization for Cooking Geothermal Energy Resources	Understand and Apply

CO5	Types of Wells and Methods of Harnessing the Energy, Ocean Energy and Setting of OTEC Plants	Understand
CO6	Tidal and Wave Energy and Mini Hydel Power Plant, Need and Principles of Direct Energy Conversion, Concepts of Thermo-Electric Generators and MHD Generators	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Statistics on conventional energy sources, Classification of Energy Resources, Definition Concepts of NCES, Limitations of RES, Criteria for assessing the potential of NCES. - Solar, Wind, Geothermal, Bio-mass, Ocean Energy Sources, comparison of these energy sources

SOLAR ENERGY CONCEPT

Solar Energy-Energy available form Sun, Solar radiation data, Solar energy conversion into heat, Flat plate and Concentrating collectors, Mathematical analysis of Flat plate collectors and collector efficiency, Principle of Natural and Forced convection, Solar engines-Stirling, Brayton engines, Photovoltaic, p-n junction, solar cells, PV systems, Stand-alone, Grid connected solar power satellite.

WIND ENERGY CONCEPT

Wind energy conversion, General formula -Lift and Drag- Basis of wind energy conversion – Effect of density, frequency variances, angle of attack, and wind speed. Windmill rotors Horizontal axis and vertical axis rotors. Determination of torque coefficient, Induction type generators- working principle.

GEOTHERMAL AND BIOMASS ENERGY

Nature of Geothermal sources, Definition and classification of resources, Utilization for electric generation and direct heating, Well Head power generating units, Basic features Atmospheric exhaust and condensing, exhaust types of conventional steam turbines. Pyrolysis of Biomass to produce solid, liquid and gaseous fuels, Biomass gasification, Constructional details of gasifier, usage of biogas for chulhas, various types of chulhas for rural energy needs.

TODAL AND WAVE ENERGY

Wave, Tidal and OTEC energy- Difference between tidal and wave power generation, Principles of tidal and wave power generation, OTEC power plants, Operational of small cycle experimental facility, Design of 5 Mw OTEC pro-commercial plant, Economics of OTEC, Environmental impacts of OTEC. Status of multiple product OTEC systems.

TEXT BOOK

1. Ashok V Desai, Non-Conventional Energy, Wiley Eastern Ltd, New Delhi, 2003
2. K M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, New Delhi, 2003.

REFERENCES

1. Ramesh R & Kumar K U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 2004
2. Wakil MM, Power Plant Technology, Mc Graw Hill Book Co, New Delhi, 2004.
3. Non – Conventional Energy Sources. Rai.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	e-Mail ID
1	P. LOGANATHAN	Assistant Professor	EEE	loganathan@vmkvec.edu.in
2	R. SATHISH	Assistant Professor	EEE	sathish@vmkvec.edu.in

17MEP104	NON-DESTRUCTIVE TESTING	Category	L	T	P	Credit
		CC	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.	Classify the concept of overview of NDT	Apply
CO2.	To familiarize with the applications of differential equations, surface NDE Methods	Understand
CO3.	Explain the concept of thermography and Eddy current testing	Understand
CO4.	Explain the concept of ultrasonic testing and acoustic emission	Understand
CO5.	Explain the concept of Radiography (RT)	Understand

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	L	S	S	M	S	M	M	L	M	M	L	M	S
CO2	S	M	L	S	S	M	S	M	M	M	S	M	L	M	M
CO3	S	S	L	M	S	M	S	M	S	M	S	M	L	M	M
CO4	S	M	L	M	S	M	S	M	S	M	L	M	M	S	S
CO5	S	M	M	M	S	M	S	M	S	M	L	L	M	S	S

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, Types of 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 Publishing House.
2.Ravi Prakash, “Non-Destructive Testing Techniques”, 1st revised edition, New Age International 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, New York.

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

17MESE19	MODERN MANUFACTURING METHODS	Category	L	T	P	Credit
		EC	3	0	0	3

Preamble

This course aims to teach the physics, modelling, and mathematical inferences of various advanced manufacturing processes used in industries for making products. The students will get complete knowledge of the unconventional processes in terms of aspects stated above.

Prerequisite

1. Basic Manufacturing Process
2. Manufacturing Technology
3. Computer Integrated Manufacturing

Course Objective

1	To discuss the basic concepts 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 various unconventional machining processes	Understand
CO2.	Demonstrate the Mechanical energy based unconventional machining processes.	Apply
CO3.	Demonstrate the Electrical energy based unconventional machining processes.	Apply
CO4.	Demonstrate the Chemical & Electro-Chemical energy based unconventional machining processes.	Apply
CO5.	Demonstrate 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	M	L	-	-	-	M	S	-	-	-	-	M	M	-	M
CO2	M	L	-	-	-	M	S	-	-	-	-	M	M	-	M
CO3	M	L	-	-	-	M	S	-	-	-	-	M	M	-	M
CO4	M	L	-	-	-	M	S	-	-	-	-	M	M	-	M
CO5	M	L	-	-	-	M	S	-	-	-	-	M	M	-	M

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., New York
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” Prentice Hall of India Pvt. Ltd., New Delhi, 8th Edition.

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

17ECCC07	MICROCONTROLLERS & ITS APPLICATIONS	Category	L	T	P	Credit
		CC	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 programming of Microcontrollers. This course also introduces the architecture and hardware features of PIC 16F877 and ARM7 (LPC2148) microcontrollers.

PREREQUISITE -

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. Explain the advanced Microcontrollers used in different applications.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	-	L	-	-	-	-	-	-	M	-	-	-
CO2	L	S	S	-	M	-	-	-	-	-	-	M	-	-	-
CO3	S	M	M	-	L	M	-	-	-	-	-	M	-	-	-
CO4	S	L	L	-	L	S	-	-	-	-	-	M	-	-	-
CO5	M	M	S	-	M	L	-	-	-	-	-	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 Controller 8279.

INTEL 8051 MICROCONTROLLER

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- Serial Communication.

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 Motor Interfacing.

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

1	Mr.S.Selvam	selvam@avit.ac.in
2	Mr.R.Ramani	ramani@vmkvec.edu.in
3	Mr.G.Sureshkumar	sureshkumar@vmkvec.edu.in

17MBHS02	FINANCE AND ACCOUNTING FOR ENGINEERS	Category	L	T	P	Credit
		HSS	3	0	0	3

PREAMBLE:

Finance and accounting for engineers relating to money or the way money is managed financial stability, security, strength. Independent agencies perform rigorous analysis in order to assign financial strength. The present age is the age of trade business and commerce. After Globalisation, liberalization, and privatization, business is increasing day by day and becoming complex also. An organization cannot remember all its dealing for long.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To enable students to understand **various** assumptions underlying for the preparation of Income Statement, and Balance Sheet.
2. To understand the importance of accounting to apply while claiming depreciation and capital budgeting.
3. To understand the Cost analysis during decision making and explore the purpose of discounted cash flow analysis.
4. To apply Financial strategy including marginal costing and working capital management.
5. To Create model inventory management as techniques.

COURSE OUTCOMES:

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

CO1: Understand the role of accounting information in the collection, decision making and analysis of business performance.	Understand
CO2: Explain the business performance related to financial accounting.	Apply
CO3: Analyse various concept of depreciation, capital budgeting decision, cost accounting and working capital Management.	Analysing
CO4: Evaluate the roles of cost accounting and working capital requirements for the business cycle.	Evaluate
CO5 Create a Model financial strategy within the business model of a firm.	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

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 - Profitability Index.
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.
1. 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	Management Studies	manickamannu@rocketmail.com

17ECCC21	DIGITAL SIGNAL PROCESSING	Category	L	T	P	Credit
		CC	**3**	**0**	**0**	**3**

PREAMBLE

Digital Signal Processing (DSP) is being used very widely in applications that include telecommunication equipment, multimedia systems, electronic and biomedical instrumentation, automotive systems and many military and weapon systems. DSP chips, general processors or dedicated ASIC chips, are now able to process wide bandwidth signal of all sorts in real-time. The application of DSP is only limited by our imagination instead of DSP technology itself.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the basics of discrete time signals, systems and their classifications.
2	To analyze the discrete time signals in both time and frequency domain.
3	To design lowpass digital IIR filters according to predefined specifications based on analog filter theory and analog-to-digital filter transformation.
4	To design Linear phase digital FIR filters using fourier method, window technique
5	To realize the concept and usage of DSP in various engineering fields.

COURSE OUTCOMES

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

CO1. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them	Understand
CO2. Compute various transform analysis of Linear Time Invariant System	Apply
CO3. Design and test signal processing algorithms for various applications.	Apply
CO4. Design and simulate digital filters.	Apply
CO5. understand various applications of DSP such as multi rate signal processing, telecommunication	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	-	-	-	-	-	-	-	-	S	M	-
CO2	S	S	M	M	M	-	-	-	M	-	-	M	S	M	-
CO3	S	S	M	M	M	-	-	-	M	-	-	M	S	S	-
CO4	S	S	M	M	M	-	-	-	M	-	-	M	S	M	-
CO5	S	S	M	M	M	-	-	-	M	-	-	M	S	M	-
CO6	S	M	M	M	M	-	-	-	M	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I DISCRETE TIME SIGNALS AND SYSTEMS **9**

Introduction to DSP – Basic elements of DSP– Sampling of Continuous time signals–Representation, Operation and Classification of Discrete Time Signal–Classification of Discrete Time Systems–Discrete Convolution: Linear and Circular–Correlation.

UNIT II ANALYSIS OF LTI DISCRETE TIME SIGNALS AND SYSTEMS **9**

Analysis of LTI Discrete Time Systems using DFT–Properties of DFT–Inverse DFT– Analysis of LTI Discrete Time Systems using FFT Algorithms– Inverse DFT using FFT Algorithm.

UNIT III DESIGN AND IMPLEMENTATION OF IIR FILTERS **9**

Design of analog filters using Butterworth and Chebyshev approximations – IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs for IIR filters.

UNIT IV DESIGN AND IMPLEMENTATION OF FIR FILTERS **9**

Linear phase response – Design techniques for FIR filters – Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows – Matlab programs for FIR filters.

UNIT V APPLICATIONS OF DSP 9

Multirate Signal Processing: Decimation, Interpolation, Spectrum of the sampled signal –Processing of Audio and Radar signal.

Text Books

1. John .G. Proakis and Dimitris C. Manolakis, “Digital Signal Processing Principles, Algorithms and Applications”, Pearson Education, Fourth edition, 2007.
2. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Third Edition, Tata Mc Graw Hill, 2007.

Reference Books

1. M.H.Hayes, “Digital Signal Processing”, Tata McGraw Hill, New Delhi, Edition, 2009.
2. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1	Mrs.A.Malarvizhi	malar.ece06@gmail.com
2		

17ATEC14	COMPUTER CONTROLLED VEHICLE SYSTEMS	Category	L	T	P	C
		EC(PS)	3	0	0	3

Preamble

This course introduces the role of sensors and actuators for controlling the engine, drive line. It also provide knowledge about the transportation and safety devices controlled by computer

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.	Understand the role of sensors and actuators used in vehicle control system	Understand
CO2.	Control fuel, Ignition , speed and knock in IC engine	Apply
CO3.	Control Drive line system, Steering and suspension systems	Apply
CO4.	Understand intelligent transportation system	Understand
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	L	M	L	M	L	--	--	--	--	--	--	L	--	--
CO2	S	L	--	--	M	L	--	--	--	--	--	--	L	--	--
CO3	S	L	--	--		L	--	--	--	--	--	--	L	--	--
CO4	S	L	M	M	M	M	M	--	L	L		L	L	--	--
CO5	S	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, New Delhi.
2. Artamonov, M.D., Harionov, V.A. & Morin, M.M. Motor Vehicle, Mir Publishers, Moscow 1978.,
3. Heitner, J., Automotive Mechanics, CBS Publishers, New Delhi 1987.
4. Stockel Martin W and Stocker Martin T., Auto Mechanics Fundamentals, Goodheart Wilcox,

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	A.Imithyas	Asst. Prof. Gr - I	Mechanical, AVIT	imthicyr @avit.ac.in
4				

17CVSE55	REMOTE SENSING AND GIS FOR ENVIRONMENTAL APPLICATION	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This Course helps in gaining knowledge about remote sensing and GIS for environment application.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1.	Be acquainted with the concepts of Remote sensing, EMR interaction with Environmental issues.
2.	Be familiar with remote sensing platform systems, its satellites and sensors.
3.	Gain knowledge on data processing using image processing software.
4.	Gain knowledge on GIS and GIS software.
5.	Be familiar with monitoring environment using remote sensing and GIS.

COURSE OUTCOMES

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

CO1. Develop knowledge on concept of remote sensing.	Understand
CO2. Be aware of remote sensing platforms and sensors.	Understand
CO3. Identify the steps in Image processing software.	Apply
CO4. Relate the problems in GIS software.	Apply
CO5. Describe the environmental application using remote sensing and GIS.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF ELECTRO MAGNETIC RADIATION:

Concepts of Remote Sensing - Energy sources and radiation principles, Energy interactions in the atmosphere - Spectral reflectance of earth surface features.

REMOTE SENSING PLATFORMS:

Aerial Photographs, Photographic Systems - Visible, Infra Red and Microwave sensing - Active and passive sensors - Satellites and their sensors, Indian Space Program - Satellite data products.

DATA PROCESSING:

Photogrammetry - Satellite data analysis - Visual Interpretation, Interpretation equipments - Digital Image Processing - Image rectification, enhancement, classification, data merging and biophysical modeling - Image Processing software.

GEOGRAPHIC INFORMATION SYSTEM :

Introduction to GIS concepts - Data base structure - Data analysis - GIS software

REMOTE SENSING AND GIS APPLICATIONS:

Management and monitoring of environment, conservation of resources, coastal zone management - Limitations.

TEXT BOOKS:

1.Lillesand, T.M. and Kiefer, R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York, 2004.

REFERENCES:

1. Burrough, P.A. and McDonnell, R.A., Principles of Geographic Information Systems, Oxford University Press, New York, 2001.

2. Lintz, J. and Simonet, Remote Sensing of Environment, Addison Wesley Publishing Company, New Jersey, 1998.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	C. Nivetha	Assistant Professor	AVIT	nivethachandru92@gmail.com
2.	Dr.S.P.Sangeetha	HoD -Civil	AVIT	sangeetha@avit.ac.in

17CVEC03	GEOGRAPHICAL INFORMATION SYSTEM	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

Geographical Information System is the application of the geologic sciences to engineering practice for the purpose of assuring that the geologic factors affecting the engineering works are recognized and adequately provided for. Engineering geologic studies may be performed during the planning and design. A civil engineer should be able to understand an engineering geologic report, and incorporate adequate measures into the design of engineering works.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To provide exposure to applications of GIS in various application domains through case studies
2.	Students will learn about the use of zone mapping for water bodies .
3.	Students will learn about the use of mapping techniques for Agriculture and Earth sciences
4.	Students will also learn about the recent techniques used for GPS system
5.	The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides and literate the rural people

COURSE OUTCOMES

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

CO1. Acquire the knowledge of the topographical formation, interior earth, gradational activities and GIS Technique and data INPUT	Understand
CO2. Understand the importance of advanced techniques involved in data Analysis and modelling	Understand
CO3. Study the importance of Data Output And Error Analysis.	Analyse
CO4. Understand the importance of Natural Resources And Wasteland Management using GIS	Understand
CO5. Analysis of RS and GIS data and interpreting the data for modeling applications	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

GIS TECHNIQUE AND DATA INPUT:

MAP – Types of Maps – Development of GIS – Components of GIS – Hardware, software, organisation – Types of data – Spatial and non-spatial data – Print, Line and Polygon – Vector and Raster data – Database structures – Files – Vector and Raster data structures.

DATA ANALYSIS AND MODELLING:

Data Retrieval – Query – Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Modelling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS.

DATA OUTPUT AND ERROR ANALYSIS:

Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photo write Devices – Sources of Errors – Types of Errors – Elimination – Accuracies.

GIS APPLICATIONS IN RESOURCE MANAGEMENT:

Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Wasteland Management - Social Resources - Cadastral Records – LIS.

ADVANCED GIS APPLICATION:

AM/FM – Utility Network Management – Integration with Remote Sensing – Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Model.

TEXT BOOKS:

1. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000
2. Michael N Demers, Fundamentals of Geographical Information Systems, Second Edition, John Wiley Publications, 2002.

REFERENCES:

1.Paul A Longley, Michael F Goodchild etal, Geographical Information Systems Volume I and II, Second Edition, John Wiley Publications, 1999.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	R.SATHIYARAJ	Asst. Professor	CIVIL	sathiyaraj.r.25@gmail.com
2.	S.Prakash	Asst. Professor	CIVIL	tsprakashcivil@gmail.com

17CVSE02	ENTERPRISE WIDE INFORMATION SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course is designed to provide the student with a thorough understanding of both the role that Enterprise Resource Planning Systems (ERPs) play in an organization and the challenging task of managing the Information Systems (IS) function.

PREREQUISITE

Nil

COURSE OBJECTIVES

1.	To introduce Enterprise resource planning
2.	To make students understand the financial accounting
3.	Explain how 'best business practices' are incorporated in an ERP
4.	Execute an entire business process chain in the areas of sales, Procurement, Production and Accounting
5.	To study about the Materials requirement planning, billing & work centers.

COURSE OUTCOMES

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

CO1. The introduce Enterprise resource planning	Apply
CO2. Definition 'best business practices' are incorporated in an ERP	Understand
CO3. The 'best business practices' are incorporated in an ERP	Apply
CO4. An entire business process chain in the areas of sales, Procurement, Production and Accounting	Understand
CO5. Apply appropriate methods to collect the Materials requirement planning, billing & work centers.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION:

Overview - database applications -Business function vs business process-Introduction to Enterprise Resource Planning (ERP).

FINANCIAL ACCOUNTING:

Financial Accounting basics – Balance sheet, Profit and Loss Statement- General Ledger, Chart of Accounts –Posting financial transaction-Controlling – Cost centers and cost elements-Allocating Costs – Assessments and distributions.

BUSINESS PROCESSES:

Sales and fulfillment cycle -Master Data and its role in ERP systems -Creating customer master data, material master data and pricing conditions -Implementing a Sales Cycle.

PROCUREMENT PROCESSES:

Forecasting raw material requirements using sales information, production requirements, sales forecast-Raw Material procurement-Vendors and pricing conditions-Payment.

PLANNING AND CONTROL:

MRP – Materials requirement planning-Independent and dependent materials requirements-Creating Production orders and schedules-Bill of Materials-Executing a Production process-Inventory and Goods movement-Routing and work centers.

TEXT BOOKS:

1. Enterprise Resource Planning, 3rd Edition, by *Bret Wagner and Ellen Monk*, ISBN: 9781423901792,2009
2. SAP R/3, Business Blueprint, 2nd Edition, by *Thomas A. Curran & Andrew Ladd*, Prentice Hall PTR, 2000, ISBN: 0-13-085340-2.

REFERENCES:

1. Essentials of Business Processes and Information Systems, by *Simha R. Magal and Jeffrey Word* , ©2010, ISBN: 978-0-470-23059-6
2. Integrated Business Processes with ERP Systems, Preliminary Edition, by *Simha R. Magal and Jeffrey Word*, ISBN: 978-0-470-88424-9.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mr. Sudip Das	Asst. Prof	AVIT	sudipdas@avit.ac.in

17CVSE47	ICT BASED CITY AND INFRASTRUCTURE PLANNING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

This course offers the various methods of changing scenario in the spatial order of cities and regions as well as the emergence of virtual societies in the world social networks among communities across the city, country and globe demand for paradigm shift in the spatial planning outlook and governance edge.

PREREQUISITE

Nil.

COURSE OBJECTIVES

1	To make students aware and exposed to changing scenario of virtual societies in the world
2	The spatial order of cities like drinking water provision, transportation, sanitation facility etc.,
3	The students will be in a position to understand the use and power of emerging new technologies
4	Social networks among communities across the city, country and globe
5	Paradigm shift in the spatial planning outlook and governance edge.

COURSE OUTCOMES

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

CO1. Students are able to cope up with the application technology	Apply
CO2. Students understand its impact on the infrastructure Planning and development at the house, neighborhood and city levels.	Analyze
CO3. Appraise the spatial order of cities like drinking water provision, transportation, sanitation facility etc.,	Analyze
CO4. Building smart cities and smart communities with the help of Social networks among communities across the city, country and globe	Apply
CO5. Ability to Understand the Paradigm shift in the spatial planning outlook and governance edge.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	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	-	L	-	-	M	M	M	-	-	L	-	-			
CO3	-	-	L	L	L	-	L	M	M	M	M	M			
CO4	M	M	-	L	-	L	-	L	L	L	-	M			
CO5	-	L	-	M	M	-	-	L	-	L	-	-			

S- Strong; M-Medium; L-Low

SYLLABUS

PLANNING VS TECHNOLOGY:

Tradition to modernity – Spatial planning and technology interface - Socio-economic planning and technology interface – Planning cities and local technologies - Technological innovations and responsive city planning - Planning responsive technology Vs technology responsive planning.

CITIES-TECHNOLOGY-INFRASTRUCTURE:

Transportation and technology, water, sanitation and technology, energy efficient technology for home, street, neighborhoods and city - Telecommunication, health and education – Security and safety for buildings and people in cities.

TECHNO CITIES:

Digital cities, virtual cities, technology parks - Smart planning and infill development – Planning, design and communication system - Socio-economic and environmental Impact of techno cities..

GOVERNANCE:

Role of law and technology, administration and organization, industry and corporate, communities and people in building smart cities and smart communities.

CASE STUDIES:

Best practices in India and around the world.

TEXT BOOKS:

1. Brkovic, M. B., 'Planning in the Information Age: Opportunities and Challenges of e-Planning, CORP, 2004.
2. City Government of Naga, 'The Naga City Citizen Chartes- A Guide Book of City Government Services. 2004.

REFERENCES:

1. Elizabeth, S. Frans, V. 'IDENSITY: Planning Paradigms for the Information Communication Age', Isocarp Congress, 2001.
2. Intelligent Community forum, 'Innovation and Employment in the Intelligent Community", Intelligent Community forum, 2012.
3. Komakech, D., 'Achieving More Intelligent Cities", Municipal Engineer, 2005.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Mrs.Subathra	AP Gr II	AVIT	subathra@avit.ac.in
2	Mr.Johnson Daniel	AP	AVIT	johnsondaniel@avit.ac.in

17BMCC01	BIOMEDICAL CIRCUITS & NETWORKS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The field of engineering, such as electrical, electronics, communications, biomedical and instrumentation, are based on electric circuits and networks. An electrical network is an interconnection of electrical elements (Active and Passive) such as resistors, inductors, capacitors, transformers, diodes, sources, controlled sources and switches. One of the main objectives of a biomedical engineer is to acquire the knowledge about electric circuits, analyse and synthesize electric networks that improve the realization of electric networks and devices for a given biomedical application.

PREREQUISITE

17EEES03 - Basics of Electrical & Electronics Engineering

COURSE OBJECTIVES

1	To Express the basic methods of circuit analysis using Mesh & Nodal Analysis.
2	To describe the various Network theorem and apply them in biomedical circuits.
3	To get an insight into solution of RLC circuits, resonance as well as Analysis of coupled circuits.
4	To explain the concept of complex frequency and Total responses of RL, RC & RLC circuits two Port network parameters.
5	To Analyse the stability & Synthesis of Network and understand about the filter design.

COURSE OUTCOMES

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

CO1.	Discuss the circuit‘s behavior using Ohm‘s law and Kirchhoff‘s laws.	Understand
CO2.	Express the source transformations, mesh analysis, nodal analysis and network theorems to understand the circuit behavior.	Understand
CO3.	Illustrate the series, parallel resonance and magnetically coupled circuits behavior hence apply the concepts in biomedical field.	Apply
CO4.	Relate the AC circuits using phasor techniques under steady state and transient condition for dc and sinusoidal excitation and dramatize the two-port parameters of networks.	Apply
CO5.	Use the synthesis of network and able to initiate the concept of filters and design a filter for various range of frequencies.	Apply
CO6.	Perform circuit analysis to prove circuit laws and theorems independently.	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	M	--	--	--	--	--	--	M	L	L	L
CO2	S	M	L	L	M	--	--	--	M	--	--	M	M	L	L
CO3	M	M	L	L	L	M	--	M	--	--	--	--	S	L	L
CO4	S	M	L	L	L	--	--	--	--	--	--	--	S	M	L
CO5	M	M	L	L	L	M	--	M	--	--	--	--	S	M	L
CO6	M	M	M	S	S	--	--	--	M	--	--	--	S	S	L

S- Strong; M-Medium; L-Low

SYLLABUS

BASICS OF CIRCUIT ANALYSIS

Circuit Laws, DC and AC excitation, series and parallel circuits, voltage division and current division Mesh current and Node Voltage method of Analysis, Matrix method of Analysis. Source Transformation Technique, Wheatstone bridge. Analyzing simple biomedical circuits by simulation. **Applications:** Resistive Sensors, Resistive Temperature Detector (RTD).

NETWORK THEOREMS

Star-Delta Transformation, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Superposition Theorem, Compensation Theorem, Reciprocity theorem, Duals and Duality, Analyzing theorems by simulation**. Applications:** Electro Surgery Unit (ESU).

AC CIRCUITS & COUPLED CIRCUITS

Power & Power factor, Series resonance-Q factor, Bandwidth, Parallel resonance-Q factor, Bandwidth, Mutual Inductance – Coefficient of coupling, dot rule, Analysis: Single-tuned, and Double-tuned circuits. **Applications:** Human Vocal cord and speech generation.

TRANSIENT ANALYSIS

Source free and forced responses of RL, RC, and RLC circuits with DC and Sinusoidal excitation. **Applications:** Prosthetic Limb device, Strain relaxation of a muscle fiber. **TWO PORT NETWORKS** – Impedance, admittance, Hybrid and Transmission parameter, Inter relation and interconnection of networks.

NETWORK SYNTHESIS & FILTER DESIGN

Causality and Stability analysis of network functions, Hurwitz polynomial, Positive Real Functions and Cauer Foster forms. **Applications:** Impedance Spectroscopy.

Filter Design: Filter networks – Constant K filters, m derived filters, composite filters. Butterworth and Chebyshev approximation.

TEXT BOOKS:

1. Hayt, Kemmerley & Durbin, **"Engineering circuit Analysis"**, Tata McGraw Hill, 8th Edition 2012.
2. Sudhakar.A and Shyammohan.S P, **"Circuits and Networks - Analysis and Synthesis"**, Tata McGraw Hill, 4th Edition 2014.
3. Ali Ümit Keskin, **"Electrical Circuits in Biomedical Engineering, Problems with Solutions"**, © Springer International Publishing AG 2017.

REFERENCES:

1. Franklin F. Kuo, **"Network Analysis and Synthesis"**, John Wiley & Sons, 2nd Edition Reprint 2009.
2. Mahmood Nahvi & Joseph Edminister, **"Schaum's Outline of Electric circuits"**, McGraw-Hill Education, 5th Edition 2011.
3. Umesh Sinha, **"Network Analysis and Synthesis"**, Satyaprakashan Publishers, 2013.
4. Aatre V.K, **"Network Theory and Filter Design"**, New Age International Publishers, 2nd Edition Reprint 2003.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr.S.Mathankumar	Associate Professor	BME	mathankumar@vmkvec.edu.in
2	Mrs.S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in
3	Mr.R.Pathamuth	Assistant Professor (Gr-II)	BME	pathamuthu@avit.ac.in

17BMCC03	BIOSENSORS AND TRANSDUCERS	Category	L	T	P	Credit
		CC	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 determine the recording of biological components.
3	To employ the knowledge in electrochemical and optical biosensors.
4	To outline the various biological components using biosensors.

COURSE OUTCOMES

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

CO1. Respond 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	S	L	L	L	--	--	--	--	--	--	--	L	--	--	L
CO2	S	M	M	M	--	--	--	--	--	--	--	L	L	--	L
CO3	S	M	M	M	--	L	L	L	L	L	--	L	M	--	L
CO4	S	S	S	M	--	L	L	L	L	L	--	L	S	L	L
CO5	S	S	S	S	--	L	L	L	L	L	--	L	S	M	L

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 Indian reprint).
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	Mail ID
1	Mrs.S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in
2	Mrs. R.Indumathi	Assistant Professor (Gr-II)	BME	indhumr@avit.ac.in
3	Dr.N.Babu	Professor	BME	babu@vmkvec.edu.in

17BMEC06	APPLIED NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS IN MEDICINE	Category	L	T	P	Credit
		EC-PS	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. To get the basic concepts of artificial neural networks	Understand
CO2. To Introduce about the Basics To study the various ANN Models	Understand
CO3.To get familiarize about the Self organizing maps and competitive networks	Understand
CO4. To get familiarize about the basic concepts of fuzzy Logic systems	Analyze
CO5. To apply the concepts of ANN and Fuzzy Logic in Biomedical 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	--	S	M	M	--	--	--	--	M	--	--	--
CO2	S	--	M	L	S	M	M	--	--	--	--	S	--	L	--
CO3	S	--	M	--	M	S	S	M	--	--	--	M	--	--	L
CO4	M	--	M	L	L	S	S	S	--	--	--	M	M	M	L
CO5	S	--	M	--	M	S	S	S	--	--	--	M	M	--	M

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 in medicine.

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 Edition 2006.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. R. Ezhilan	Assistant Professor	BME	ezhilan@vmkvec.edu.in
2	Dr.D.Vinodkumar	Professor	BME	vinodkumar@vmkvec.edu.in
3	Mr.R.Sureshkumar	Associate Professor	BME	sureshkumar@avit.ac.in

17BTCC02	CELL BIOLOGY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Cell biology deals with the structures, organization and functions of the cells and organelles, their physiological properties, life cycle, metabolic processes, signaling pathways and their interactions with their environment at microscopic and molecular level. The subject helps to gain knowledge in fundamentals of cells to all biological sciences, for research in bio-medical fields such as cancer, and other diseases and also in research related to genetics, biochemistry, molecular biology, immunology, and developmental biology.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
2	Students will understand how these cellular components are used to generate and utilize energy in cells and the concepts behind cell division.
3	To give an overview of cell signaling molecules and their receptors.
4	To understand the pathways and intracellular signal transduction
5	To make students to apply their knowledge of cell biology to selected examples of changes or losses in cell function

COURSE OUTCOMES

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

CO1. List the fundamental features of prokaryotic and eukaryotic cells, their structure, composition and role of cell membranes and the major stages of the cell cycle	Understand
CO2. To understand the specific processes and proteins involved in membrane transport	Understand
CO3. To understand about intercellular chemical messengers, receptor subclasses and their possible uses in cell signaling.	Understand
CO4. To analyze the mechanisms by which different messenger-receptor interactions bring about long or short-term changes in cell state.	Apply
CO5. To Integrate the different levels of biological organization, from molecules to cells to organisms.	Apply
CO6. To apply critical thinking and logical analysis in the assessment and evaluation of issues in cell biology and genetics.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

CELL AND FUNCTIONS OF THE ORGANELLES

General structure – Prokaryotic and eukaryotic cell, Molecular organization of the cell membrane, Cell membrane – Proteins, Lipids and Carbohydrates, Cell organelles, Cytoskeletal proteins, Types of cell functions, Cell cycle - Mitosis and meiosis, apoptosis.

CELL MEMBRANE AND PERMEABILITY

Passive and active transport, Permeases, Sodium potassium pump, Ca2+, AT Pase pumps, Lysosomal and vacuolar membrane, Co-transport, Uniport, Symport, Antiport, Protein localization & Membrane trafficking, Endocytosis and exocytosis, Entry of viruses and toxins into cells.

CELL SIGNALING MOLECULES AND THEIR RECEPTORS

Cytosolic, Nuclear and membrane bound receptors, Examples of receptors, Modes of cell – cell signaling: Autocrine, Paracrine and Endocrine models of action, Secondary messenger's molecules, Quantitation and characterization of receptors.

PATHWAYS AND INTRACELLULAR SIGNAL TRANSDUCTION

Signal amplification – Different models of signal amplifications, Cyclic AMP, Role of inositol phosphates as messengers, Biosynthesis of inositol triphosphates, Cyclic GMP and G proteins role in signal transduction, Calcium ion flux and its role in cell Signaling, Current models of signal amplification, Phosphorylation of protein kinases.

CELL CULTURE

Techniques for the propagation of prokaryotic and eukaryotic cells, Cell line, Generation of cell lines, Maintenance of stock cells, Characterization of cell, Morphological analysis techniques in cell culture, Explant cultures, Primary cultures, Contamination, Differentiation

.

TEXT BOOKS:

1. De Robertis E.D.P and De Robertis E.M.F, "Cell and Molecular Biology", 8th Edition, Lippincott Williams & Wilkins, New York, USA, 2001.
2. Harvey Lodish, Arnold Berk, Chirs A. Kaiser, Monty Krieger, Matthew P. Scott, Anthony Bretscher, Hidde Ploegh and Paul Matsudaira, "Molecular Cell Biology", 6th Edition, W. H. Freeman and Company, New York, 2008.

REFERENCES:

1. B Alberts, A Johnson, J Lewis, M Raff, K Roberts and P Walter, "Molecular Biology of the Cell", (4th Edition) New York: Garland Science, 2002.
2. Kimball, T.W., "Cell Biology', Addision Wesley Publishers, 1989.
3. Geoffrey M. Cooper and Robert E. Hansman, "The Cell: A Molecular Approach", ASM Press and Sinauer Associates Inc., USA, 4th Edition, 2007.
4. Ian Freshney, R, "Culture of Animal Cells", Alan R. Liss Inc., New York, 4th Edition, 2005

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.C.Nirmala	Assistant Professor	Biotechnology	nirmala@vmkvec.edu.in
2	Dr.M.Sridevi	Professor & Head	Biotechnology	sridevi@vmkvec.edu.in

17BTCC01	ESSENTIALS OF BIOCHEMISTRY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

Essentials of biochemistry deals with the study of biomolecules found in living organism. The course exposes the students to classification, properties, basic structure and functions of biomolecules like carbohydrate, amino acid, lipids, nucleic acid and vitamins. Knowledge of this course will enable students to understand the importance of biomolecules and give awareness to the various diseases associated with the deficiency of biomolecules

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To understand the basic structure, properties and functions of Biomolecules
2	To emphasize the role of biomolecules by providing basic information on specific metabolic diseases.

COURSE OUTCOMES

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

CO1. Explain the classification properties and biological importance of carbohydrates	Understand
CO2. Discuss the classification, nomenclature, structure and properties of fatty acids	Understand
CO3. Knowledge about amino acids and proteins	Understand
CO4. Know about the importance of nucleic acid	Apply
CO5. Distinguish the vitamins and its deficiency	Understand
CO6. Know about the importance of minerals	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12	PSO 1	PSO 2	PSO3
CO1	S	-	L	-	-	-	-	-	-	-	-	-	L	L	-
CO2	S	-	L	-	-	-	-	-	-	-	-	-	L	L	-
CO3	S	-	L	-	-	-	-	-	-	-	-	-	L	L	-
CO4	S	-	L	-	-	-	-	-	-	-	-	-	L	L	-
CO5	S	-	L	-	-	M	-	-	-	-	-	-	L	L	-
CO6	S	-	L	-	-	M	-	-	-	-	-	-	L	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

CARBOHYDRATE

Biological importance, Classification and Properties of Monosaccharides, Disaccharides and Polysaccharides (Starch, Glycogen, Cellulose and their derivatives, Chitin, Peptidoglycans, Glycoaminoglycans, Glycoconjugates).

LIPIDS

Biological importance, Classification. Fattyacids: classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids, Triacylglycerols: nomenclature, physical properties,

chemical properties. Glycerophospholipids (lecithins, cephalins, phosphatidyl serine, phosphatidyl inositol, sphingomyelins).

AMINO ACIDS AND PROTEINS

Amino acids – Classification, Structure, Properties and Biological importance. Proteins – Classification, Structural organization of Proteins – Primary, Secondary (α-helix, β-pleated structure, triple helix), Tertiary and Quaternary (Myoglobin and Hemoglobin), Factors stabilizing, Properties and Biological importance, Denaturation and Renaturation.

NUCLEIC ACIDS

Nucleosides and nucleotides, configuration and conformation, Composition of RNA and DNA, Physico-chemical properties of nucleic acids – effect of alkali, acid and heat (denaturation and renaturation), features of phosphodiester bond, endonucleases. Complementary base pairing, secondary structure of RNA, features of DNA double helix (Watson-Crick model), Nucleoproteins – histone and nonhistone

VITAMINS

Nutritional importance of vitamin, classification, source, daily requirements and functions, Deficiency symptoms – hypervitaminosis of fat-soluble vitamins. Nutritional importance of Minerals – classification, source, daily requirement and deficiency symptoms.

TEXT BOOKS

1. "Fundamentals of Biochemistry", Jain J.L., Sunjay Jain and Nitin Jain., S.Chand & Company Ltd., 6th Edition, 2005.

REFERENCES:

1. "Text Book of Biochemistry for Medical Students", Ambika Shanmugham, Lippin cott Williams & Wilkins, 7th Edition, 2012.
2. "Biochemistry", Rastogi S.C. Mc. Graw-Hill Publishing Company Ltd, 6th Edition, 2007.
3. "Principles of Biochemistry", David L. Nelson and Michael M. Cox, W. H. Freeman and Company, 4th Edition, 2005.
4. "Text book of Biochemistry", Sathyanarayana U and Chakrapani U., Uppala Author Publishers Interlinks, 3rd Edition, 2006.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.M.Sridevi	Professor & Head	Biotechnology	sridevi@vmkvec.edu.in
2	Mrs.C.Nirmala	Assistant Professor	Biotechnology	nirmala@vmkvec.edu.in

17BTEC03	PRINCIPLES OF BIOINFORMATICS	Category	L	T	P	Credit
		EC (PS)	3	0	0	3

PREAMBLE

Principles of Bioinformatics is an interdisciplinary field that combines Computer Science, Molecular Biology, Genetics ,Mathematics, Statistics and Engineering etc. to analyze and interpret biological data. Bioinformatics has been used for *in silico* analyses of biological queries using mathematical and statistical techniques. This course includes the use computer programming as part of their methodology, in the field of genomics, the identification of candidate genes, genetic basis of disease etc. leading to specific drug discovery by molecular modelling.

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	Define the basis of Bioinformatics in the biological field
2.	Explains the *in-silico* analysis of biological queries using mathematical and statistical techniques.
3.	Implement the Bioinformatics software and tools based on its applications
4.	Construct the phylogenetic tree based on the biological information and queries using bioinformatics tools.
5.	Develop bioinformatics tools in various field like medicine, agriculture etc.,

COURSE OUTCOMES

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

CO1. Relate the basics of computer science and interdisciplinary subjects related to	Remember
CO2. Demonstrate the importance of biological databases and their significance in	Understand
CO3. Operate the various tools and software which can be adopted in different fields of Biotechnology	Apply
CO4. Measure the significance of evolutionary traits using Bioinformatics tools and software	Evaluate
CO5. Validate the various bioinformatics tools in different fields	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	-	L	L	-	-	-	L	-	-	L	-	-	-
CO2	S	-	-	S	L	-	-	-	-	-	-	L	L	-	-
CO3	M	L	-	M	L	S	-	-	-	-	-	L	M	-	-
CO4	S	M	L	L	M	-	-	-	-	-	-	S	-	-	-
CO5	-	L	L	L	M	-	-	-	-	-	L	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BIOINFORMATICS

Introduction, Scope of bioinformatics – Introduction to UNIX- Files and processes, Basic UNIX commands for listing files and directories, Making directories, Changing to a different directory, Copying and moving files, Removing files in directories, Clear, CAT and Less commands, Word count, Help, Redirection, Access rights, Running background process and killing processes, ftp, telnet, Internet, http, Search engines.

DATABASES

Introduction to databases – Flat files, Relational databases, Object oriented databases and hypertext databases, Biological databases and their uses, Introduction to EMB net and NCBI, Classification of biological databases; Primary nucleic acid sequence databases – Gen Bank, EMBL, DDBJ; Primary protein sequence databases – PIR, SWISS-PROT; Composite databases – NRDB, OWL, SWISS-PROT+TrEMBL; Secondary databases – PROSITE, PRINTS; Structural databases – PDB, MMDB.

SEQUENCE ALIGNMENT

Introduction to sequence alignment and its significance, Types – Global, Local, Pairwise and Multiple alignment. DOT PLOTS, Scoring matrices – PAM, BLOSSUM. Dynamic programming algorithms, BLAST, FASTA. Multiple sequence alignment by PSI- BLAST.

PHYLOGENETIC ANALYSIS

Terminology and basics of Phylogenetics – Clades, Taxons, Baranches, Nodes; Orthologs and Paralogs. Steps to construct a Phylogenetic tree – Constructing a Multiple Sequence Alignment, Determining the substitution model, Tree building and tree evaluation.

APPLICATION OF BIOINFORMATICS

Application of bioinformatics in various fields – Medicine, Agriculture and Industries.

TEXT BOOKS:

1. Rastogi, S.C., Namita Mendiratta, Parag Rastogi. 2006. Bioinformatics – Concepts, Skills, Application. CBS Publications.
2. Westhead, D.R., Parish, J.H., Twyman, R.M., 2000. Instant Notes in Bioinformatics. *BIOS Scientific Publishers*.
3. Teresa, K., Attwood and David J. Parry-Smith, 2007. Introduction to Bioinformatics. *Pearson Education Ltd.*

REFERENCES:

1. Bergeran, B., 2002. Bioinformatics Computing. *PHI.*
2. Richard Durbin, Sean Eddy, Anders Krogh and Graeme Mitchison, 1998. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. *Cambridge University Press.*
3. Bishop, M.J., Rawlings, C.J., 1997. DNA and Protein Sequence Analysis. A Practical Approach. *IRL Press*, Oxford.
4. Gibas, C. and Jambeck, P., 1999. Developing Bioinformatics Skills. *O'Reilly*.
5. Dan Gusfield, 2007. Algorithms on Strings Tree and Sequence. *Cambridge University Press.*
6. Baldi, P. and Brunak, S., 1998. Bioinformatics: A Machine Learning Approach. *MIT Press*
7. Essential Bioinformatics. Jin Xiong. Cambridge University Press. 2006.
8. An Introduction ti Bioinformatics Algorithms. Neil C Jones, Pavel A Pevzner. MIT Press.2004.
9. The New Avenue in Bioinformatics. Joseph Seckbeck Eitan Rubin. Springer.2010.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Devika	Professor	Biotechnology	devika@avit.com
2	Mr.N.Jawahar	Assistant Professor	Biotechnology	jawahar@vmkvec.edu.in

17BTEC32	BIOLOGICAL DATABASE	Category	L	T	P	Credit
		EC (PS)	3	0	0	3

PREAMBLE

This course is designed to impart the knowledge on Biological database and they deals with libraries of life sciences information, collected from scientific experiments, published literature, high-throughput experiment technology, and computational analysis.

PREREQUISITE – NIL

COURSE OBJECTIVES

1.	To state the knowledge on Bioinformatics and Database management
2.	To explain the basics of Genome databases
3.	To demonstrate the different methods of sequence databases
4.	To outline the basics of homology modelling
5.	To assess the regulatory of structural similarities

COURSE OUTCOMES

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

CO1: Recall the design and Database management	Remember
CO2: Discuss the genome browsers and databases	Understand
CO3: Classify different methods of sequence databases	Apply
CO4: Infer the Molecular modelling and enzyme databases	Analyse
CO5: Assess the sequence and motif -based search engines	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	M	M	-		L	-	-	-	-	-	-	L	L	-	-
CO4	M	M	-	-	S	-	L	-	-	-	-	-	-	M	-
CO5	M	M	L	L	S	S	-	L	-	-	-	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BIOINFORMATICS DATA AND DATABASES

Types of Biological data:- Genomic DNA, Complementary DNA (cDNA), Recombinant DNA (rDNA), Expressed sequence tags (ESTs), Genomic survey sequences (GSSs). Primary Databases: - GenBank, EMBL, DDBJ, Composite Databases:-NRDB, UniProt, Literature Databases:- Open access and open sources, PubMed, PLoS, Biomed Central

GENOME DATABASES

Viral genome database (ICTVdb, VirGen), Bacterial Genomes database (Genomes OnLine Database –GOLD, Microbial Genome Database-MBGD), Organism specific Genome database (OMIM / OMIA, SGD, WormBase, PlasmoDB, FlyBase, TAIR), and Genome Browsers (Ensembl, VEGA genome browser, NCBI-NCBI map viewer, KEGG, MIPS, UCSC Genome Browser).

SEQUENCE DATABASES

Nucleotide sequence Databases (GenBank, EMBL, DDBJ).). Protein sequences Databases (Swiss-Prot, TrEMBL, UniProt Knowledgebase – UniProtKB, UniProt Archive –UniParc, UniProt Reference Clusters –UniRef, UniProt Metagenomic and Environmental Sequences –UniMES. Sequence motifs Databases:-Prosite, ProDom, Pfam, InterPro. Sequence file formats:- GenBank, FASTA, PIR, ALN/ClustalW2, GCG/MSF.

STRUCTURE AND DERIVED DATABASES

The primary structure databases (Protein Data Bank –PDB, Cambridge Structural Database –CSD, Molecular Modeling Database -MMDB). The secondary structure databases (Structural Classification of Proteins –SCOP, Class Architecture Topology Homology –CATH, Families of Structurally Similar Proteins –FSSP, Catalytic Site Atlas –CSA. Molecular functions/Enzymatic catalysis databases (KEGG ENZYME database, BRENDA).

BIOINFORMATICS DATABASE SEARCH ENGINES

Text-based search engines (Entrez, SRS, DBGET / LinkDB). Sequence similarity based search engines (BLAST and FASTA). Motif-based search engines (ScanProsite and eMOTIF). Structure similarity based search engines (VAST and DALI). Proteomics tools at the ExPASy server, GCG utilities and EMBOSS

TEXT BOOKS

1. Bioinformatics: Sequence and Genome Analysis by Mount D., Cold Spring Harbor Laboratory Press, New York. 2004
2. Bioinformatics- a Practical Guide to the Analysis of Genes and Proteins by Baxevanis, A.D. and Francis Ouellellette, B.F., Wiley India Pvt Ltd. 2009.

REFERENCES BOOK

1. Introduction to bioinformatics by Teresa K. Attwood, David J. Parry-Smith. Pearson Education. 1999.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Subbaiya	Associate Professor	Biotechnology	rsubbaiya80@gmail.com
2	Dr. R. Balachandar	Assistant Professor (Gr-II)	Biotechnology	balaclone1@gmail.com
3	Ms.R.Subashini	Assistant Professor	Biotechnology	subashini@vmkvec.edu.in

17CSSE01	COMPUTATIONAL BIOLOGY & DATA MINING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course focuses on the fundamental techniques in data mining, including data warehousing, frequent pattern mining, clustering, classification, anomaly detection and feature selection methods.

PREREQUISITE –

COURSE OBJECTIVES

1	Explain bioinformatics data mining concepts, principles and methods,
2	Learn data structures, algorithms and tools for sequence mining and alignment, clustering and bio-clustering, bio-molecular structure prediction, evolutionary tree reconstruction, as well as graph and network inference,
3	Use a wide range of publicly available software packages for bioinformatics data mining,
4	Evaluate the effectiveness and efficiency of these software packages based on different performance measures.

COURSE OUTCOMES

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

CO1. Understand bioinformatics data mining concepts, principles and methods	Understand
CO2. Understand data structures, algorithms and tools for sequence mining and alignment, clustering and bioclustering, biomolecular structure prediction, evolutionary tree reconstruction.	Understand, Apply.
CO3. Have a clear understanding and appreciation for software packages for bioinformatics data mining	Apply
CO4. Develop bioinformatics tools with programming skills.	Apply
CO5. Apply computational based solutions for biological perspectives.	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	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	S	L	-	-	L	L
CO3	S	L	L	L	S	L	L	L	-	M	L	L	L	L	L
CO4	S	S	L	L	M	L	L	L	-	S	S	L	L	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

Data warehousing – model design, Frequent pattern mining – association rules mining

Clustering – partition-based, hierarchical-based, density-based approaches, spectral clustering, Feature selection – dimensionality reduction

Classification – decision-tree, Bayesian, rule-based, SVM, ensemble methods, Anomaly detection – statistics-based, density-based, clustering-based

Evaluation and validation of data mining result, Correlation analysis – metrics and analysis

Graph and network mining, Visualization of patterns – mapping between high-dimensional data and low-dimensional data, Multi-source information integration

TOTAL HOURS: 45

Text Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Addison Wesley.
2. Data Warehousing, Paulraj Ponniah, John Wiley & Sons, Inc.

References:

1. Bioinformatics: Managing Scientific Data, Zoe Lacroix and Terence Critchlow, 2003, Morgan Kaufmann Publishers.
2. Advanced Analysis of Gene Expression Microarray Data, Aidong Zhang, ISBN 981-256- 645-7, World Scientific Publishing Co.

Course Designers

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. K. Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in
2	Mr.B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in

17CSSE02	CGI & WEB PROGRAMMING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course has a practical emphasis on the design and techniques for developing internet-based applications, mainly focusing on web programming. Topics include HTML, client-side scripting language (JavaScript), server-side programming (Servlets, JSP, and J2EE), and web services. This course will also cover some important topics needed for internet-based application developments, such as Internet architectures and web security.

PREREQUISITE – JAVA PROGRAMMING

COURSE OBJECTIVES

1	To provide basic knowledge of development of web applications
2	To study CGI Techniques and Web development.
3	Design and test simple programs in Servlet and JSP.
4	To understand the J2EE framework
5	To have an exposure to the role of CGI in web programming.

COURSE OUTCOMES

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

CO1. Understand the architecture of the Internet and the organization and standards that make it the World Wide Web at both the underlying structure and the browser/server levels.	Understand
CO2. Understand many of the legal and ethical aspects of sharing with the public and referencing information made available to the public over the web.	Understand, Apply.
CO3. Have a clear understanding and appreciation for clear, accurate, and relevant content for web-based publications.	Apply
CO4. Have hands-on experience designing and writing web-based applications.	Apply
CO5. Build and manipulate enterprise web application using J2EE technologies	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	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L
CO3	S	S	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	S	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

Server-side Programming: Common Gateway Interface (CGI)—Internet Programming paradigm, Languages for CGI, Applications, Server Environment, Environment Variables, CGI Building Blocks, CGI Scripting Using java , Shell Script, Writing CGI Programs, CGI Security, Alternatives and Enhancements to CGI

Servlets: Server-side Java, Advantages Over Applets, Alternatives, Strengths, Architecture, Life Cycle, GenericServlet and HttpServlet, Passing and Retrieving Parameters, Server-Side Include, Cookies, Filters, Problems with Servlet, Security Issues

Java Server Pages: JSP and HTTP, JSP Engines, How JSP Works, JSP and Servlet, Anatomy of a JSP Page, JSP Syntax, JSP Components, Beans, Session Tracking, Database Connectivity, JDBC Drivers, Basic Steps, Loading a Driver, Making a Connection, Execute an SQL Statement, SQL Statements, Retrieving Result, Getting Database Information

Overview of J2EE—Introduction to JavaBeans, Bean Builder, Advantages of JavaBeans. BDK Introspection, Properties, BeanInfo Interface, Persistence, Customizer, JavaBeans API, EJB, Introduction to Struts Framework, MVC Framework

Web Services: SOA, SOAP, Cloud Computing

TOTAL HOURS: 45

TEXT BOOKS

1. J2EE - The Complete Reference – Jim Keogh, Tata McGraw Hill, 2007.
2. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How to Program, 5th Edition.

REFERENCES

1. The J2EE Tutorial – Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.
2. McGovern, et al., "Java Web Services Architecture", Morgan Kaufmann Publishers, 2005.

Course Designers

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. M. Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSSE03	BIO INFORMATICS ALGORITHM	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course will introduce students to bioinformatics in the area concerning the development and application of computational methods to address key problems in biology. It will introduce the students to a variety of methods and skills required to conduct research in this highly rising field.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	It will focus on DNA and protein sequence databases and analysis, secondary structures and 3D structural analysis.
2	To study applications such as prediction of protein structure, folding rates, stability upon mutation, and intermolecular interactions.
3	Designed to nurture skills and knowledge required for aspiring students, young biologists and research scholars to develop algorithms and tools in bioinformatics.
4	To analyzing and interpreting vast biological data using computational techniques

COURSE OUTCOMES

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

CO1. Understand the DNA and protein sequence databases	Understand
CO2. Understand BLAST and FASTA algorithms	Understand, Apply.
CO3. Analyze protein structure for visualization and classification	Apply
CO4. Have hands-on experience designing Robotics applications in bioinformatics.	Apply
CO5. Build and manipulate enterprise web application in bioinformatics.	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	S	L	-	L	-	-	-	L	L	-	-
CO2	S	S	M	S	S	S	S	L	-	-	-	-	-	-	-
CO3	S	M	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	M	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to molecular biology: basic concepts in biochemistry and bioinformatics, what are proteins and why they are important.

Database search and sequence alignment: BLAST and FASTA algorithms, the BLAST web server, Multiple sequence alignment. Introduction to protein structure: Protein structure, the protein folding problem, protein structure visualization and classification.

Protein folding: Folding methods homology modelling, threading, ab-initio folding. Folding models, folding vs. protein structure determination. Bio molecular simulations: Molecular dynamics Applications of MD, force fields and energy models. Geometry based methods: Transformations, distance measurement.

Introduction to geometric hashing. Geometry based methods: Geometric hashing in docking, Geometric hashing and its applications in protein structural alignment. Introduction to Robotics applications in bioinformatics.

Geometry based methods: Robotics-based methods and their applications in folding, flexible docking and conformational search. Other topics in bioinformatics: Systems biology, networks. Evolutionary biology, data mining.

TOTAL HOURS: 45

REFERENCES

1. Structural Bioinformatics, 2nd edition, Jenny Gu and Philip E. Bourne. Wiley - Blackwell, 2009.
2. Introduction to Bioinformatics by A. Lesk, 3rd edition, Oxford University Press, 2008.

Course Designers

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.R.Kamatchi Priya	Assistant Professor	CSE	kamatchipriya@avit.ac.in
2	Mr.P.K.Kumaresan	Professor	CSE	pkkumaresan@vmkvec.edu.in

17CSSE04	JAVA & CGI PROGRAMMING LAB	Category	L	T	P	Credit
		SE	0	0	4	2

PREAMBLE

This course will cover some important topics needed for internet-based application developments, such as Web development and design.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To provide basic knowledge of development of web applications
2	To study CGI Techniques and Web development.
3	Design and test simple programs in Servlet and JSP.
4	To understand the J2EE framework
5	To have an exposure to the role of CGI in web programming.

COURSE OUTCOMES

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

CO1. Define Web and Implement the concept of web page development to design real world applications.	Understand
CO2. Compare the development of the web application performance using different set of web development tools.	Understand, Apply.
CO3. Apply the usage of web development tools to serve the purpose of different end users of Internet.	Apply
CO4. Interpret an existing static web application to make it a robust one and integrate dynamic features of web development.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Develop and demonstrate, using Java script, a

- Common Gateway Interface
- Shell Script,
- Writing CGI Programs
- GenericServlet and HttpServlet,
- Passing and Retrieving Parameters,
- Cookies
- JDBC Drivers
- Getting Database Information
- JavaBeans

Reference Book:

1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson Education, 2008.
2. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004

Course Designers

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. M. Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSSE05	DATA MINING LAB	Category	L	T	P	Credit
		SE	0	0	4	2

PREAMBLE

This course will cover some important topics needed for internet-based application developments, such as Web development and design.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To provide mining process and important issues around data cleaning, pre-processing and integration
2	To learning performance evaluation of data mining algorithms

COURSE OUTCOMES

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

CO1. Learning performance evaluation of data mining algorithms	Understand
CO2. Handling a small data mining project for a given practical domain	Understand, Apply.
CO3. Exposure to real life data sets for analysis and prediction	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Develop and demonstrate,

Databases/Data Warehouse Design

Modelling: Conceptual and logical modelling of biomedical data

System design of biomedical data warehouses

Online Analytical Processing (OLAP) tools for biomedical data

Cluster Analysis

Implement several clustering algorithms that partition data points into groups based on their similarity

Build classifiers that learn from training data and apply to test data to predict their class labels

Select informative features that lead to a good classifier

Evaluate the performance of the classification results

Reference Book:

1. Introduction to Data Mining. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley.
2. Data Warehousing. Paulraj Ponniah. John Wiley & Sons, Inc.

Course Designers

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. K. Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in
2	Mr.B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in

17BTCC82	CELL BIOLOGY LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To offer hands on training in the areas of cell culture, cell identification and to demonstrate various techniques to learn the morphology, identification and propagation of cells.

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	Demonstrate working principles of microscopy
2.	Perform the basic techniques to work with cells.
3.	Differentiate the cells by staining techniques.
4.	Categorize the various stages of mitosis.
5.	Differentiate the types of blood cells.

COURSE OUTCOMES

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

CO1. Demonstrate the basic concepts of sterilization techniques	Understand
CO2. Interpret the behaviour of cells in their microenvironment	Understand
CO3. Analyze scientific work and experimental results in of cell biology	Analyse
CO4. Categorize the cell organelles	Analyse
CO5. Examine physiological processes of cell e.g. cell divisions	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	L	-	-	-	-	-	-	-	-	-	-		-	-
CO2	S	M	-	-	-	-	-	-	-	-	-	-	-	M	-
CO3	M	S	-	L	-	-	-	-	-	-	-	-	L	L	-
CO4	S	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	M	L	-	-	-	-	-	-	-	-	-	-	-		-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Introduction to principles of sterilization techniques and cell propagation.
2. Principles of Microscopy.
3. Isolation of Cell organelle – Mitochondria, Microtubules, Actin and Myosin filaments.
4. Cell Fractionation – Separation of peripheral blood mononuclear cells from blood.
5. Cell staining - Gram’s staining, Leishman staining
6. Cell counting - Tryphan blue assay, Alamar blue assay.
7. Osmosis and Tonicity.
8. Staining for different stages of mitosis in *Allium cepa* (Onion).

REFERENCES

1. Rickwood, D. and J.R. Harris “Cell Biology: Essential Techniques”, Johnwiley, 1996.
2. Davis, J.M. “Basic Cell Culture: A Practical Approach”, IRL, 1994

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.C.Nirmala	Assistant Professor	Biotechnology	nirmala@vmkvec.edu.in
2	Dr.M.Sridevi	Professor & Head	Biotechnology	sridevi@vmkvec.edu.in

17BTCC81	BIOCHEMISTRY LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The course is a laboratory course that focuses on developing the skills of the students by providing hands on training in various techniques in Biochemistry

PREREQUISITE - NIL

COURSE OBJECTIVES

1.	To Understand laboratory safety and standard operating procedures of common laboratory equipment's.
2.	To impart skills in preparation of solutions and biological buffers.
3.	To extend knowledge in analysis & estimation of biomolecules

COURSE OUTCOMES

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

CO1. Demonstrate safe laboratory practices and handle the equipment safely	Apply
CO2. Prepare solutions and biological buffers	Apply
CO3. Isolate biomolecules from various source	Analyze
CO4. Determine the quality and quantity of biomolecules	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO1 0	PO1 1	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	M	S	M	-	-	-	-	-	-	M	-
CO2	S	S	M	-	-	-	-	-	-	-	-	-	-	S	-
CO3	S	S	S	M	S	-	-	-	-	-	-	-	M	S	-
CO4	S	S	S	-	S	-	-	-	-	-	-	-	-	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. pH measurements and Buffer preparations.

TITRIMETRIC EXPERIMENTS

2. Estimation of Ascorbic acid by Titrimetric method using 2, 6 Dichloro phenol indophenols.
3. Determination of Saponification value of Edible oil
4. Determination of Acid number of Edible oils.
5. Determination of Iodine value of Oil.

BIOCHEMICAL PREPARATIONS

6. Isolation of Chloroplast from Spinach leaves.
7. Cheese Production from Milk.
8. Casein from Milk.
9. Starch from Potato.

REFERENCES:

1. Laboratory Manual.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.M.Sridevi	Professor & Head	Biotechnology	sridevi@vmkvec.edu.in
2.	Mrs.C.Nirmala	Assistant Professor	Biotechnology	nirmala@vmkvec.edu.in

17BTCC93	BIOINFORMATICS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

Bioinformatics is the field emerging from biology which is the combination of biology and computer science. There are number of computer programs developed to maintain, analyse biological data to support research and development. This field of science is used to simulate various biological process in virtual environment to investigate the already available along with newly produced data to predict new structures and functions of biomolecules.

PRERQUISITE- NIL

COURSE OBJECTIVES

1.	To Summarize the significance of biological databases.
2.	To Perform sequence alignment using various sequence alignment tools.
3.	To Distinguish the structure and functions of protein molecule using 3D structure of the protein.
4.	To Construct phylogenetic tree to analysis the evolution.
5.	To Generate, compare and analyse 3D structure of ligand and receptor complex.

COURSE OUTCOMES

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

CO1. Discuss in detail about impotence of biological databases.	Understand
CO2. Demonstrate sequence alignment by different opensource software programs	Apply
CO3. Compare the structure of protein molecule to predict its functions.	Analyse
CO4. Evaluate the phylogenetic tree Construction.	Evaluate
CO5. Assemble ligand and receptor complex using Docking programs.	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	-	-	-	-	-	-	L	L	-	-
CO2	M	L	M	M	L	-	-	-	-	-	-	L	M	-	-
CO3	L	L	L	L	S	-	-	-	-	-	-	M	L	-	-
CO4	S	M	L	L	M	-	-	-	-	-	-	S	S	-	-
CO5	S	S	L	M	L	-	-	-	-	-	-	M	M	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Biological Database (DNA) - NCBI-Genbank, EMBL
2. Biological Database (Protein) – Uniprot, Protein Data Bank
3. Sequence Alignment Programs – BLAST, FASTA, Clustal W
4. Protein 3D Structure Prediction Programs – Swissmodel, Rasmol
5. Phylogenetic Analysis Program – Phylip
6. Docking Studies – PatchDock

TEXT BOOKS

1. Algorithms on Strings, Trees and Sequences by Dan Gusfield, Cambridge University Press.
2. Biological Sequence Analysis Probabilistic Models of proteins and nucleic acids by R.Durbin, S.Eddy, A.Krogh, G.Mitchison.
3. Bioinformatics Sequence and Genome Analysis by David W. Mount, Cold Spring Harbor Laboratory Press.

REFERENCES

1. Introduction to Bioinformatics by Arthur K. Lesk , Oxford University Press.

COURSE DESIGNERS				
S.No.	**Name of the Faculty**	**Designation**	**Department**	**Mail ID**
1.	Mr.N.Jawahar	Assistant Professor	Biotechnology	jawahar@vmkvec.edu.in
2.	Dr. R. Deepapriya	Assistant professor	Biotechnology	deepapriya.biotech@avit.ac.in

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

DETAILS OF ELECTIVE COURSES FOR DEGREE WITH SPECIALISATION

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

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

(i) SPECIALIZATION – BIO-INFORMATICS

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTCC02	CELL BIOLOGY	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
2.	17BTCC01	ESSENTIALS OF BIO CHEMISTRY	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
3.	17BTEC03	PRINCIPLES OF BIO-INFORMATICS	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
4.	17BTEC32	BIOLOGICAL DATABASE	BIO-TECHNOLOGY	SE	3	0	0	3	NIL
5.	17CSSE01	COMPUTATIONAL BIOLOGY & DATA MINING	CSE	SE	3	0	0	3	NIL
6.	17CSSE02	CGI & WEB PROGRAMMING	CSE	SE	3	0	0	3	NIL
7.	17CSSE03	BIO INFORMATICS ALGORITHM	CSE	SE	3	0	0	3	NIL
LAB									
8.	17CSSE04	JAVA & CGI PROGRAMMING LAB	CSE	SE	0	0	4	2	NIL
9.	17CSSE05	DATA MINING LAB	CSE	SE	0	0	4	2	NIL
10.	17BTCC82	CELL BIOLOGY LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL
11.	17BTCC81	BIO CHEMISTRY LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL
12.	17BTCC93	BIO INFORMATICS LAB	BIO-TECHNOLOGY	SE	0	0	4	2	NIL

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 this course.

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).	Understand
2. Complete a problem definition and its evaluations.	Apply
3. Perform coding for the project.	Understand
4. Documentation requirements and prepare and evaluate systems 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	-	-	L	S	L	S	--	M	M	M
CO2	S	S	M	M	S	M	M	L	S	M	M	--	S	S	S
CO3	L	M	L	L	M	M	L	L	M	L	L	--	M	M	-
CO4	S	S	M	L	S	-	L	L	S	L	S	--	l	M	M

S- Strong; M-Medium; L-Low

- Not more than one student is permitted to work on a project.
- 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 the project.

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 project report.

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 per Annexure-II.)
b. Certificate –As per Annexure-III.
c. Index.
d. Preface/Acknowledgement.
e. Course outcomes.
f. Project title.
g. Assembly and detail production drawings.
h. List of activities (suggested as per Annexure – IV) and work allocation matrix.
i. Plant layout with dimensions.
j. List and specifications of machineries, equipments and tools.
k. Bill of material with make or buy decision.
l. Specifications of bought out parts.
m. Process sheets-As per format given in course Industrial engineering.
n. Flow process charts.
o. Specification and consumption of consumables.
p. Details of inspection / testing carried out.
q. Details of rework / rectifications carried out.
r. Cost estimation.
s. Monitoring and control report/sheet.
t. Notes on troubleshooting.
u. Notes on individual achievement of skills / experience /problems / solutions.
v. References.
w. Day to day logbook as per Annexure-V.
x. Presentation including moments at work-video/photographs in action

Notes:

Prepare project report with MS Office with following guidelines.

PAGE:	A4 (ON ONE SIDE).
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 THE INSTITUTE

SUGGESTED LEARNING RESOURCES.

i. Use of Library.
ii. Reference books.
iii. Hand books.
iv. Encyclopedia.
v. Magazines.
vi. Periodicals.
vii. Journals.
viii. Visits of industry, organizations related as per the requirement.
ix. Internet.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.M.Nithya	Associate Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI02	MINI PROJECT	Category	L	T	P	Credit
		PI	**0**	**0**	**6**	**3**

PREAMBLE

The primary emphasis of the project work is to understand and gain the knowledge of the principles of software Engineering practices, so as to participate and manage a large software engineering projects in future.

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).	Understand
2. Complete a problem definition and its evaluations.	Apply
3. Perform coding for the project.	Understand
4. Documentation requirements and prepare and evaluate systems 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	-	-	L	S	L	S	--	M	M	M
CO2	S	S	M	M	S	M	M	L	S	M	M	--	S	S	S
CO3	L	M	L	L	M	M	L	L	M	L	L	--	M	M	-
CO4	S	S	M	L	S	-	L	L	S	L	S	--	l	M	M

S- Strong; M-Medium; L-Low

- Individual / not more than one student is permitted to work on a project.
- 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 the project.

Guidelines for preparing the Project Dissertation

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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 project report.

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 per Annexure-II.)
b. Certificate –As per Annexure-III.
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d. Preface/Acknowledgement.
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g. Assembly and detail production drawings.
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i. Plant layout with dimensions.
j. List and specifications of machineries, equipments and tools.
k. Bill of material with make or buy decision.
l. Specifications of bought out parts.
m. Process sheets-As per format given in course Industrial engineering.
n. Flow process charts.
o. Specification and consumption of consumables.
p. Details of inspection / testing carried out.
q. Details of rework / rectifications carried out.
r. Cost estimation.
s. Monitoring and control report/sheet.
t. Notes on troubleshooting.
u. Notes on individual achievement of skills / experience /problems / solutions.
v. References.
w. Day to day logbook as per Annexure-V.
x. Presentation including moments at work-video/photographs in action

Notes:

Prepare project report with MS Office with following guidelines.

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	SPACING 18 POINTS,
HEADER:	TITLE OF THE PROJECT,
	PAGE NUMBER ON TOP
	RIGHT.
FOOTER:	ACADEMIC YEAR, SHORT
	NAME OF THE INSTITUTE

SUGGESTED LEARNING RESOURCES.

i. Use of Library.
ii. Reference books.
iii. Hand books.
iv. Encyclopedia.
v. Magazines.
vi. Periodicals.
vii. Journals.
viii. Visits of industry, organizations related as per the requirement.
ix. Internet.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.M.Nithya	Associate Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI03	INTERNSHIP	Category	L	T	P	Credit
		PI				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 Information Section

Explain your role and how your work contributed to the company

II. Technical Skills

Document the technical experiences you had during your work experience and discuss technical problems that you assisted in solving

III. Development of Professional Skills

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 for yourself
- 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 career goals
- Provide two "lessons learned" to share with any student that is considering an internship

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.M.Nithya	Associate Professor	CSE	hodcse@vmkvec.edu.in
2.	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI04	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 – DATA MINING AND DATA WAREHOUSING

COURSE OBJECTIVES

1	Introduce students to various business intelligence concepts
2	To learn the concepts of data integration
3	To introduce enterprise reporting

COURSE OUTCOMES

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

CO1 .Examine The Concepts Of Data Warehousing And OLAP	Understand
CO2. Apply The Concepts Of Bi And Dm Techniques For Clustering, Association, And Classification.	Apply
CO3. Understand existing data collection and operational systems	Understand
CO4. Understand key requirements and vision for information management	Understand
CO5. Develop proposal for road-map / timescale for implementation	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	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L
CO3	S	S	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	S	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

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.M.Nithya	Professor	CSE	nithyam@vmkvec.edu.in
2.	Mr.M.Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI05	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	Understand
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	S	S	S	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L
CO3	S	S	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	S	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to 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

Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

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 and design

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 code coverage

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, Veerakumar Esakimuthu
2. Building Java Enterprise Applications – Published by O'Reilly Media, authored by Brett McLaughlin

REFERENCE BOOK

1. Software Requirements: Styles & Techniques – published by Addison-Wesley Professional
2. Software Systems Requirements Engineering: In Practice – published by McGraw-Hill/Osborne Media
3. Managing Software Requirements: A Use Case Approach, 2/e – published by Pearson
4. Software Architecture: A Case Based Approach – published by Pearson

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.M.Nithya	Associate Professor	CSE	hodcse@vmkvec.edu.in
2.	Mr.M.Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI06	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 – RICH INTERNET APPLICATION

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.	Understand
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	S	S	S	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L
CO3	S	S	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	S	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

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 form elements

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	sasikalak@vmkvec.edu.in
2.	Mr.B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in

17CSPI07	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 fundamentals of web applications and its modeling	Understand
CO2. To understand and learn the scripting languages with design of web applications.	Understand
CO3. To understand n the networking concept internet protocols, network routing	Understand
CO4. Analyze the process of mobile communication and network technologies	Analyze
CO5. Build simple interactive applications ,database applications and multimedia applications.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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.

TOTAL HOURS: 45

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 language PHI,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	sasikalak@vmkvec.edu.in
2	Mr. R. Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

17CSPI08	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	Understand, Apply.
CO3. Understand Program Devolvement Cycle and apply various Problem Solving Techniques	Apply
CO4. Develop the function programs with all the concepts in c	Apply
CO5. Build and manipulate relational database using Structured Query Language and relational languages	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	S	L	-	L	L	-	-	L	L	M	S
CO2	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L
CO3	S	S	S	S	S	S	S	L	-	L	L	-	-	L	L
CO4	S	S	S	S	M	S	S	L	-	L	L	-	-	L	L
CO5	S	S	S	M	S	S	S	L	-	L	L	-	-	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

Unit I: Introduction to Computer Systems - 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 - Interprocess Communication – Deadlocks - File management - Device management

Unit II: 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

Unit III: 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

Unit IV: Project - 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.

Unit V: 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

REFERENCES

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. S. SenthilKumar	Assistant Professor	CSE	senthilkumar@vmkvec.edu.in
2	Mrs. T. Geetha	Assistant Professor	CSE	geethat@vmkvec.edu.in

17CSPI09	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 –
Computer Architecture

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 To learn the Concept of Computer Architecture ,Mainframes OS and Terminology	Understand
CO2. To learn the Concept of virtual storage and its use in z/OS..	Apply
CO3 Understand Job Control language- Various statements in JCL- JCL procedures	Understand
CO4. Understand various forms of data representation and structures supported by the COBOL language	Understand
CO5. Build and manipulate relational database using Structured Query Language and relational languages	Apply
CO6. ob Control Language (JCL) is the command language of Multiple Virtual Storage (MVS), which is the commonly used Operating System in the IBM Mainframecomputers.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT –I 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 in mainframes.

UNIT-II 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.

UNIT-III 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 utility programs.

UNIT-IV 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.

UNIT-V 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 scrollable cursors.

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 and Associates.

2. AS/400 Architecture and Application – The Database Machine by Jill T. Lawrence (SPD Publications)

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 online at

http://www-.ibm.com/support/docview.wss?uid=pub1sa22759706

5.z/OS V1R1.0 MVS JCL Reference found online at
http://publibz.boulder.ibm.com/cgibin/bookmgr_OS390/BOOKS/iea2b600/CCONTENTS
6. COBOL - Language Reference, Ver 3, Release 2, IBM Redbook.
7. COBOL - Programming Guide, Ver 3, Release 2, IBM Redbook.
8. Complete CL The Definitive Control Language Programming Guide by Ted Holt and Ernie Malaga (SPD Publication).
9. Nancy Stern & Robert A Stern, "Structured Cobol Programming", John Wiley & Sons, New York, 1973.
10. M.K. Roy and D. Ghosh Dastidar, "Cobol Programming", Tata McGraw Hill, New York, 1973.
11. Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, New York, 1973.
12. Craig S Mullins, DB2 Developer's Guide, Sams Publishing, 1992.
13. Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley, 1992.
14. C J Date & Colin J White, A Guide to DB2, Addison Wesley.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mr.M.Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

17CSPI10	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.

PREREQUISITE – 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. Be exposed to technology and business trends impacting mobile applications	Understand
CO2.Understanding enterprise scale requirements of mobile applications	Understand
CO3. Be competent with the characterization and architecture of mobile applications	Apply
CO4. Familiarize in the Graphics used for Android application development	Apply
CO5. Be competent with designing and developing mobile applications using one application development framework.	Apply
CO6. Test the developed app and publish in	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	S	S	M	S	S	S	S	M	M	M	S
CO2	S	S	M	L	S	S	S	M	M	S	M	M	M	M	S
CO3	S	M	M	L	S	M	M	M	S	S	M	M	M	M	S
CO4	S	S	M	M	S	M	M	M	S	S	S	M	M	M	S
CO5	S	S	M	M	S	M	M	M	S	S	S	M	M	M	S
CO6	S	S	M	L	S	M	M	L	S	S	S	M	M	M	S

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 and modifiability.

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 media applications.

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.	Mr. M. Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in
2.	Mr. R. Bharanidharan	Assistant Professor	CSE	