VINAYAKA MISSION'S RESEARCH FOUNDATION

(DEEMED TO BE UNIVERSITY)

SALEM, TAMILNADU, INDIA

VINAYAKA MISSION'S RESEARCH FOUNDATION

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Programme:

ME –COMPUTER SCIENCE AND ENGINEERING

FULL TIME (2 Years)

UNDER FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM

(CBCS)

CURRICLUM AND SYLLABUS

(Semester I to IV)

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY
(An Constituent College of Vinayaka Mission's Research Foundation)

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE

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

Post Graduates will be able to:

PO1	Engineering knowledge: Ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integration of the same for enhancement of knowledge in Computer Science and Engineering.
PO2	Problem analysis: Identify, formulate and analyze complex problems and apply independent judgment for fusing information to conduct research in a wider theoretical, practical and policy context in Computer Science and Engineering.
PO3	Design/development of solutions: think laterally and originally to identify, formulate and solve an engineering problem in Computer Science and Engineering and effectively utilize appropriate scientific and engineering techniques and methodologies in the problem solving process.
PO4	Conduct investigations of complex problems: apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and contribute individually or in groups to the development of technological knowledge in Computer Science and Engineering.
PO5	Modern tool usage: Ability to Create, select, and apply usage of tools from optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in IT industry involving uncertainty and scarce or expensive resources.
PO6	The engineer and society: Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Ability to develop diverse technical knowledge and skills to formulate problems and projects and to plan a process for solution including engineering economic analysis for project which involving uncertainty and scarce or expensive resources.
PO8	Ethics: Ability to comprehend the complex engineering problems and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

Graduating Students of Computer Science and Engineering programme will be able to:

PSO1	Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
PSO2	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.
PSO3	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.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1	Graduates will be able to successfully pursue doctoral research in Computer Science, Engineering and allied disciplines.
PEO2	Graduates will have an ability to contribute significantly to contemporary research domains in Computer Science and Engineering through publications, innovative products or patents.
PEO3	Graduates will have successful teaching/research careers in industry or academia.
PEO4	Graduates will be able to establish companies or lead teams/organizations to solve society relevant problems.

Mapping of PEOs with POs for M.E. (CSE) Programme

PEO\PO	1	2	3	4	5	6	7	8	9	10	11
1	S	M	M	M	S	S	S	L	M	M	S
2	S	M	S	S	S	S	S	S	M	M	S
3	M	M	M	M	M	M	L	S	M	S	S
4	M	S	S	M	M	M	L	M	S	L	L

S- Strong Correlation, M – Medium Correlation, L – Low Correlation

VINAYAKA MISSIONS RESEARCH FOUNDATIONS
(Deemed to be University)
FACULTY OF ENGINEERING AND TECHNOLOGY
Credit Structure for Post Graduate Engineering Program
(M.E / M.Tech –Regular) -2021

S.No	Category of courses	Type of courses	Suggested break up of credits
1.	A. Foundation courses	Applied Operations Research	03
		Research Methodology and IPR	02
2.	B. Program core courses	Core courses	32
3.	C. Elective courses	Program electives	15
		Open electives (Courses on emerging areas.)	03
4.	D. Employability Enhancement Courses and courses for presentation of Technical skills related to the specialization	Project work phase I	06
		Project work phase II	12
		Internship/Industrial training	01
		Research paper writing technical Seminar	01
1.	E. Mandatory Courses/Audit courses	Any two courses on: 1. English for Research Paper Writing 2. Disaster Management 3. Value Education 4. Constitution of India 5. Pedagogy Studies 6. Personality Development Through Life Enlighten Skills	Zero credit
Total credits to be earned for the award of M.E /M.Tech degree			**75**

M.E/ M.TECH.
COMPUTER SCIENCE AND ENGINEERING
SEMESTER I TO IV

A. FOUNDATION COURSES RELEVANT TO THE PROGRAMME - CREDITS (5)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
A. 1. Humanities and Social Sciences including Management Courses									
1.		RESEARCH METHODOLOGY AND IPR	PHYSICS / CHEMISTRY	FC	2	0	0	2	Nil
A. 2. Basic Science Courses									
2.		MATHEMATICS / APPLIED MATHEMATICS	MATHS	FC	3	0	0	3	Nil

CATEGORY B – CORE COURSES - CREDITS (32)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1		OBJECT ORIENTED SOFTWARE ENGINEERING	CSE	CC	3	0	0	3	
2		COMPUTER NETWORKS AND MANAGEMENT	CSE	CC	3	0	0	3	
3		DATA STRUCTURES AND ALGORITHMS	CSE	CC	3	0	0	3	
4		COMPUTER ARCHITECTURE	CSE	CC	3	0	0	3	
5		DATA BASE TECHNOLOGY	CSE	CC	3	0	0	3	
6		ADVANCED OPERATING SYSTEM	CSE	CC	3	0	0	3	
7		ADVANCED SYSTEM SOFTWARE	CSE	CC	3	0	0	3	
8		WEB TECHNOLOGY	CSE	CC	3	0	0	3	
9		DATA STRUCTURES LAB	CSE	CC	0	0	3	2	
10		NETWORKING LAB	CSE	CC	0	0	3	2	
11		OPERATING SYSTEM LAB	CSE	CC	0	0	3	2	
12		WEB TECHNOLOGY LAB	CSE	CC	0	0	3	2	

CATEGORY C – ELECTIVE COURSES - CREDITS (15)

C. 1. Program electives courses relevant to chosen specialization/branch

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1		AD-HOC NETWORKS	CSE	PE	3	0	0	3	

2		ADVANCED ARTIFICIAL INTELLIGENCE	CSE	PE	3	0	0	3	
3		ADVANCED DATABASES	CSE	PE	3	0	0	3	
4		AGENT BASED INTELLIGENT SYSTEMS	CSE	PE	3	0	0	3	
5		BIO INFORMATICS	CSE	PE	3	0	0	3	
6		CLOUD COMPUTING	CSE	PE	3	0	0	3	
7		COMPONENT BASED TECHNOLOGY	CSE	PE	3	0	0	3	
8		DATA WAREHOUSING AND DATA MINING	CSE	PE	3	0	0	3	
9		DIGITAL IMAGING	CSE	PE	3	0	0	3	
10		DISTRIBUTED COMPUTING	CSE	PE	3	0	0	3	
11		EMBEDDED SYSTEMS	CSE	PE	3	0	0	3	
12		GRID COMPUTING	CSE	PE	3	0	0	3	
13		INFORMATION SECURITY	CSE	PE	3	0	0	3	
14		MANAGING BIG DATA	CSE	PE	3	0	0	3	
15		MOBILE APPLICATION DEVELOPMENT	CSE	PE	3	0	0	3	
16		MOBILE COMPUTING	CSE	PE	3	0	0	3	
17		MULTIMEDIA SYSTEMS	CSE	PE	3	0	0	3	
18		NETWORK SECURITY	CSE	PE	3	0	0	3	
19		PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS	CSE	PE	3	0	0	3	
20		SOFT COMPUTING	CSE	PE	3	0	0	3	
21		SOFTWARE ARCHITECTURE	CSE	PE	3	0	0	3	
22		SOFTWARE PROJECT MANAGEMENT	CSE	PE	3	0	0	3	
23		SOFTWARE QUALITY ASSURANCE	CSE	PE	3	0	0	3	
24		THEORY OF COMPUTATION	CSE	PE	3	0	0	3	
25		VISUALIZATION TECHNIQUES	CSE	PE	3	0	0	3	
26		XML AND WEB SERVICES	CSE	PE	3	0	0	3	
C. 2. Open electives (Courses on emerging areas..)- CREDITS (3)									

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1		BIO MEMS	ECE	OE	3	0	0	3	
2		ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	MBA	OE	3	0	0	3	
3		INNOVATION PRODUCT DEVELOPMENT AND COMMERCIALIZATION	MBA	OE	3	0	0	3	
4		INTELLECTUAL PROPERTY RIGHTS AND ALTERNATE DISPUTE RESOLUTION	MBA	OE	3	0	0	3	
5		NEW VENTURE PLANNING AND MANAGEMENT	MBA	OE	3	0	0	3	
6		SMART GRID TECHNOLOGIES	EEE	OE	3	0	0	3	
7		SOLAR AND ENERGY STORAGE SYSTEMS	EEE	OE	3	0	0	3	
8		SOCIAL ENTREPRENEURSHIP	MBA	OE	3	0	0	3	

CATEGORY D – EMPLOYABILITY ENHANCEMENT COURSES AND COURSES FOR PRESENTATION OF TECHNICAL SKILLS RELATED TO THE SPECIALIZATION - CREDITS (20)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1		PROJECT WORK PHASE I	CSE	OE	0	0	12	6	
2		PROJECT WORK PHASE II	CSE	OE	0	0	24	12	
3		INTERNSHIP/INDUSTRIAL TRAINING	CSE	OE	0	0	2	1	
4		RESEARCH PAPER WRITING TECHNICAL SEMINAR	CSE	OE	0	0	2	1	

CATEGORY E – MANDATORY COURSES/AUDIT COURSES (Any two courses on)- CREDITS (0)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1		ENGLISH FOR RESEARCH PAPER WRITING	ENGLISH	MC	1	0	0	0	
2		DISASTER MANAGEMENT	CIVIL	MC	1	0	0	0	
3		VALUE EDUCATION	MBA	MC	1	0	0	0	
4		CONSTITUTION OF INDIA	MBA	MC	1	0	0	0	
5		PEDAGOGY STUDIES	MBA	MC	1	0	0	0	
6		PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTEN SKILLS	MBA	MC	1	0	0	0	

Total credits to be earned for the award of M.E /M.Tech degree	**75**	

Course Code	Course Title	category	L	T	P	C
	RESEARCH METHODOLOGY AND IPR	**FC**	**2**	**0**	**0**	**2**

Course Outcomes:

At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information.
3. Follow research ethics.
4. Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis, the need of information about Intellectual Property Right to be promoted among students in general & Engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT I- RESEARCH PROBLEM AND SCOPE FOR SOLUTION

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT II- FORMAT

Effective literature studies approaches, analysis, Plagiarism, Research ethics. Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT III- PROCESS AND DEVELOPMENT

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, patenting under PCT.

UNIT IV- PATENT RIGHTS

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT V- NEW DEVELOPMENTS IN IPR

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students”Juta Publishers,1996.

2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction” , Juta Publishers,2004.

3. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”

REFERENCES

1. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
2. Mayall, “Industrial Design”, McGraw Hill, 1992.
3. Niebel, “Product Design”, McGraw Hill, 1974.
4. Asimov, “Introduction to Design”, Prentice Hall, 1962.
5. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
6. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

	APPLIED OPERATIONS RESEARCH	Category	L	T	P	Credit
		BS	2	2	0	3

PREAMBLE

APPLIED OPERATIONS RESEARCH provides an in-depth insight into the concepts, theories, and techniques of Operations Research &Quantitative Techniques and their applications to planning, control, performance which could be successfully used for improving the quality of managerial decisions. This paper has adopted a logical mathematical problems and solution approach to explain various aspects of Operations Research. The students will study this course with a generalist approach and avoid the minor details of the topics prescribed hereunder

PREREQUISITE - Nil

COURSE OBJECTIVES

1	Ability to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively
2	Knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry.
3	Skills in the use of Operations Research approaches and computer tools in solving real problems in industry
4	Mathematical models for analysis of real problems in Operations Research.

COURSE OUTCOMES

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

CO1;BeabletounderstandtheapplicationofORandframeaLPProblemwith solution	Apply
CO2: Beable to build andsolve TransportationandAssignmentproblemsUsingappropriate method	Apply
CO3: BeabletodesignandsolvesimplemodelsofCPMandqueuingToimprovedecisionmakinganddevelopcriticalthinkingandobjective analysisof decision problems	Apply
CO4: Beabletosolvesimpleproblemsofreplacementandimplementpracticalcasesofdecisionmakingunderdifferentbusinessenvironments	Apply
CO5: Enablestotakebestcourseofactionoutofseveralalternativecoursesforthepurposeofachievingobjectivesbyapplyinggametheoryandsequencingmodels	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

LINEAR PROGRAMMING: Mathematical Formulation of Linear programming problems- applications & limitations – Graphical method - Simplex method – Big M method – Two phase method-Duality principle

TRANSPORTATION & ASSIGNMENT MODELS: Transportation Models -Balanced / Unbalanced, Minimization / Maximization -The Northwest Method, The Lowest Cost Method –Vogel's Approximation Method - The Stepping Stone Method –Modified Distribution (MODI) Method -Cases of degeneracy. Transportation problem with TORA . The Assignment Model (Hungarian Method) -Basic Assumptions

NETWORK MODEL&QUEUING THEORY: Project Network – CPM and PERT Networks – Critical path scheduling. Queuing Theory -Single and Multi -Channel Models

DECISION THEORY AND REPLACEMENT MODELS : Decision making under risk –Decision trees Decision making under uncertainty. Application of simulation techniques for decision making

Replacement Models -Replacement of Items that Deteriorate whose maintenance costs increase with time without change in themoney value -Replacement of items that fail suddenly -Individual replacement policy & group replacement policy.

GAME THEORY AND SEQUENCING

Game Theory –Definition –Saddle Point -Two Person Zero Sum Game -Pure and Mixed Strategies -Algebraic Solution Procedure -Graphical Solution –Principle of Dominance .

Sequencing Problem:Processing of n Jobs through Two Machines and m Machines -Graphical Method of Two Jobs m Machines Problem.

Text Book:

1. H.A.Taha, "Operations Research:An Introduction", 7th Edition, Prentice Hall of India, (2002).
2. KantiSwarup, P K Gupta, Man Mohan, "Operations Research", Sultan Chand &Sons (2014).

Reference:

1. Sharma J K, "Operations Research", Pearson
2. Gupta P.K, Hira D.S, Problem in Operations Research, S.Chand and Co (2007)
3. Paneerselvam R., "Operations Research", Prentice Hall of India, Fourth Print (2008)

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Mrs.V.T.Lakshmi	Asso.Prof	Mathematics	lakshmivt@vmkvec.edu.in
2.	Mr.D.Balaji	Assistant Professor-Grade-I	Mathematics	balaji@avit.ac.in

	OBJECT ORIENTED SOFTWARE ENGINEERING	Category	L	T	P	Credit
		C	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.

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To learn about the basic software engineering concepts, UML language.
2	To learn about the basic requirement, analyzing the different types of models.
3	To determine how to define the elements of a system such as creating the modules, architecture, components and their interfaces and data for a system based on the specified requirements.
4	To learn about the improving the modularity and performance of the object model, refactoring process through forward and reverse engineering.
5	To Analyse how to make a plan and develop the project, decision in time at critical situation.

COURSE OUTCOMES

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

CO1 Gains knowledge of software engineering concepts, UML language.	Remember
CO2 2 Interprets minimum requirements, types of requirements for the development of application for various models.	Understand
CO3. Develops the system design and improves the efficiency of the system design.	Apply
CO4. Constructs a design model with improved readability, modifiability and consistency of the code.	Apply
CO5. Improves in planning projects, to make better decision and documentation support system, maintains system in consistent state.	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication

ANALYSIS

Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model – Analysis Dynamic Models

SYSTEM DESIGN

Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design

OBJECT DESIGN AND IMPLEMENTATION ISSUES

Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing

MANAGING CHANGE

Rationale Management – Configuration Management – Project Management – Software Life Cycle

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

COURSE DESIGNERS

Name of the faculty	Designation	Department	Mail Id
Dr. K. Sasikala	Associate Professor	CSE, VMKVEC	sasikalak@vmkvec.edu.in
Mrs. S.Leelavathy	Assistant. Professors (GII)	CSE, AVIT	leelavathy@avit.ac.in

	COMPUTER NETWORKS AND MANAGEMENT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The purpose of this course is to understand the concepts of data management, data communication and computer networks. Identify the mechanism required to build Asynchronous transfer mode based networks for High speed data transfer. Choose the required functionality and solution at each layer for given application. Trace the flow of information from one node to another node in the network by using protocols.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge in high speed networking concepts.
2	To introduce various congestion control and traffic management.
3	To introduce different methodologies TCP and ATM congestion control.
4	To learn about integrated and differentiated services in Queuing Discipline
5	To provide knowledge about different protocols for QoS Support

COURSE OUTCOMES

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

CO1.Learn the fundamentals of Frame Relay Networks ATM Protocol Architecture, logical Connection, and Cell.	Remember and Understand
CO2.Learn the different Queuing Analysis and Congestion Control concepts	Remember and Understand
CO3. Learn the TCP Congestion Control, Performance of TCP over ATM, ABR rate control and GFR traffic management.	Understand, Apply, analyse and evaluate
CO4.Learn the concepts of different Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ	Understand, Apply, analyse and evaluate
CO5.Learn different types of protocols for QoS Support 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

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 10

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QoS SUPPORT 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

References:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 2003.

COURSE DESIGNERS

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

	DATA STRUCTURES AND ALGORITHMS	CATEGORY	L	T	P	CREDIT
		CC	3	0	0	3

PREAMBLE

Learn the algorithm analysis techniques. Become familiar with the different algorithm design techniques Construct efficient algorithms for solving engineering problems by using appropriate algorithm design paradigms and data structures.

PRERQUISITE

NIL

COURSE OBJECTIVES

1.	To remember and understand the basic concepts in linear structures
2.	To learn about heaps 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. Complexity Analysis & Elementary Data Structures	Understand
CO2. Learn about Leftist heaps Binomial heaps Fibonacci heaps	Analyze
CO3. Understand about various tree types	Analyze
CO4. Learn about the concepts of greedy & divide and conquer.	Apply
CO5. Learn and understand about Multistage graphs, knapsack using dynamic programming, 8-queens problem, coloring graphs	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES 9

Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NP-hard – recurrence equations – solving recurrence equations – arrays – linked lists – trees.

HEAP STRUCTURES 9

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

SEARCH STRUCTURES 9

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

GREEDY & DIVIDE AND CONQUER 9

Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

DYNAMIC PROGRAMMING AND BACKTRACKING 9

Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8-queens problem – graph coloring – knapsack using backtracking

REFERENCES:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

COURSE DESIGNERS

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

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

PREAMBLE:

This course provides the basics of organizational and architectural issues of a digital computer, analyze performance issues in processor and memory design of a digital computer. It also analyses various data transfer techniques in digital and performance improvement using instruction level parallelism.

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To provide knowledge on overview of fundamentals of computer design and Pipelining.
2	Hardware and software implementation of arithmetic unit to solve addition, subtraction multiplication and division.
3	Comprehend the various instruction level parallelism with dynamic and software approaches.
4	To provide knowledge of memory technologies, interfacing techniques and subsystem devices.

COURSE OUTCOMES

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

CO1 Provide fundamentals on machine instructions and addressing modes	Understand
CO2. Comprehend the various instruction level parallelisms with dynamic approaches.	Apply
CO3. Comprehend the various instruction level parallelism with software approaches	Apply
CO4 Describe the multiprocessor and multi core architectures in CA	Analyze
CO5.Explain the memory and IO in Architectures.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING 9

Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES 9

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP – Case studies.

INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES 9

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronisation issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

MEMORY AND I/O 9

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

TOTAL :45

REFERENCES:

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A hardware/ software approach" , Morgan Kaufmann / Elsevier, 1997.
3. William Stallings, " Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

COURSE DESIGNERS

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Mr. B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in
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	DATABASE TECHNOLOGY	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 Distributed Database Systems, object oriented database model, the method and model to store data and how to manipulate them through query languages, the designing issues in database system in the database environment.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To understand the basics of distributed databases.
2	To understand the client/server database design model.
3	To build and manipulate the object oriented databases using SQL.
4	To discuss the database design issues and recovery mechanism for database design problems

COURSE OUTCOMES

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

CO1. Illustrate the design distributed databases.	Understand
CO2. Build and manipulate the object oriented databases using Structured Query Languages.	Understand & Apply
CO3. Develop a Client/Server database model and discuss on data warehouse techniques.	Apply
CO4. Discussion on design issues & recovery mechanism for database design problems.	Understand & Apply
CO5. Illustrate the current issues in database design technologies.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

DISTRIBUTED DATABASES **5**

Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

OBJECT ORIENTED DATABASES **10**

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks - Recovery.

EMERGING SYSTEMS **10**

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

DATABASE DESIGN ISSUES **10**

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

CURRENT ISSUES **10**

Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases – Multimedia Databases – Image Databases – Text Database

REFERENCES:

1. Elisa Bertino, Barbara Catania, Gian Piero Zarri, “Intelligent Database Systems”, Addison-Wesley, 2001.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, “Advanced Database Systems”, Morgan Kaufman, 1997.
3. N.Tamer Ozsu, Patrick Valduriez, “Principles Of Distributed Database Systems”, Prentice Hal International Inc., 1999.
4. C.S.R Prabhu, “Object-Oriented Database Systems”, Prentice Hall Of India, 1998.
5. Abdullah Uz Tansel Et Al, “Temporal Databases: Theory, Design And Principles”, Benjamin Cummings Publishers, 1993.
6. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, Mcgraw Hill, Third Edition 2004.
7. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fourth Ediion, Mcgraw Hill, 2002.
8. R. Elmasri, S.B. Navathe, “Fundamentals Of Database Systems”, Pearson Education, 2004.

COURSE DESIGNERS

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1	Dr. M. Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Dr. R. Jaichandran	Associate Professor	CSE	jaichandran@avit.ac.in

	ADVANCED OPERATING SYSTEM	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

The student will be able to understand the concepts of operating system, scheduling algorithms, Inter process communication, threads, disk management and file systems.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To be aware of the types of operating systems, Critical Section Problem, Models of Deadlocks, Resources, System State
2.	To learn what are the distributed operating systems algorithms.
3.	To have an understanding of the distributed resource management techniques.
4.	To learn and understand the failure recovery and fault tolerance
5.	To learn and understand the multiprocessor and database operating systems

COURSE OUTCOMES

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

CO1. Understand the types of operating systems, Critical Section Problem, Models of Deadlocks, Resources, System State	Understand
CO2. Apply the various Distributed Algorithms and Agreement Protocols Classification, Solutions and Applications in operating systems environment.	Apply
CO3. Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.	Apply
CO4. Apply the I/O Subsystem concepts for a given scenario.	Apply
CO5. Design and implement file management system.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9**

Overview - Functions of an Operating System – Design Approaches – Types of Advanced Operating System - Synchronization Mechanisms – Concept of a Process, Concurrent Processes – The Critical Section Problem,

Other Synchronization Problems – Language Mechanisms for Synchronization – Axiomatic Verification of Parallel Programs - Process Deadlocks - Preliminaries – Models of Deadlocks, Resources, System State – Necessary and Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable Resources, Reusable Resources**.**

DISTRIBUTED OPERATING SYSTEMS 9

Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms.

Agreement Protocols – Classification - Solutions –Applications.

DISTRIBUTED RESOURCE MANAGEMENT 9

Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues – Components – Algorithms.

FAILURE RECOVERY AND FAULT TOLERANCE 9

Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS 9

Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability / Fault Tolerance; Database Operating Systems – Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control Algorithms.

TEXT BOOKS:

1. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill, 2000

REFERENCES: .

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.

COURSE DESIGNERS

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1.	Dr.R.Jaichandran	Professor	CSE	jaichandran@avit.ac.in
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	ADVANCED SYSTEM SOFTWARE	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to learn about compiler design. Its helps the students to study about the language processing systems, phases of compiler, , symbol table management, Java VM Architecture, Process Virtual Machines

PREREQUISITE :

- Familiarity with working and features of high level languages.
- Background knowledge of computer architecture, data structures, Virtual Machines and system software

COURSE OBJECTIVES

1.	To introduce the major concept areas of language translation and compiler design.
2.	To Understand the concept of Symbol table management
3.	To Understand the concept of various optimization technique
4.	To study the concepts Virtual Machines and Java Virtual Machines Architecture
5.	To understand the concepts of Process of Virtual Machines

COURSE OUTCOMES

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

CO1: Understand the concept of phases of compiler, Lexical and Syntactic Analysis	Understand
CO2: : Understand the concept of Symbol table management	Understand
CO3: Understand and apply the concept of various optimization technique	Understand &Apply
CO4: Understand the concept of Virtual Machines and Java Virtual Machines Architecture	Understand
CO5: Describe the Process of Virtual Machines	Understand& Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Basic Compiler Functions – Grammars – Lexical Analysis – Syntactic Analysis – Code Generation – Heap Management – Parameter Passing Methods – Semantics of Calls and Returns – Implementing Subprograms – Stack Dynamic Local Variables – Dynamic binding of method calls to methods – Overview of Memory Management, Virtual Memory, Process Creation – Overview of I/O Systems, Device Drivers, System Boot

Introduction and Overview – Symbol table structure – Local and Global Symbol table management Intermediate representation – Issues – High level, medium level, low level intermediate languages – MIR, HIR, LIR – ICAN for Intermediate code – Optimization – Early optimization – loop optimization

Procedure optimization – in-line expansion – leaf routine optimization and shrink wrapping – register allocation and assignment – graph coloring – data flow analysis – constant propagation – alias analysis – register allocation – global references – Optimization for memory hierarchy -Code Scheduling – Instruction scheduling – Speculative scheduling – Software pipelining – trace scheduling – Run-time support – Register usage – local stack frame – run-time stack – Code sharing – position–independent code

Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading – Security – Garbage Collection – Optimization

Emulation – Interpretation and Binary Translation – Instruction Set Issues – Process Virtual Machines – Profiling – Migration – Grids – Examples of real world implementations of system software

TEXT BOOKS:

1. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman – Elsevier Science, India, First Edition 2004
2. James E Smith and Ravi Nair, "Virtual Machines", Elsevier, 2005. (Units 4, 5) (Sections 1.0-1.6, 2.0-2.5, 2.8, 3.0-3.6, 4.2, 5.0-5.3, 5.5-5.6, 6.0-6.3, 6.5-6.6, 10.2, 10.3)
3. Robert W. Sebesta, "Concepts of Programming Languages", 7th ed., Pearson Education, 2006. (Unit 3) (Sections 6.9, 9.3, 9.5, 10.1-10.3, 12.10.2)

References:

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers", Pearson Education, 1986.
2. Terrance W Pratt, Marvin V Zelkowitz, T V Gopal, "Programming Languages", 4th ed., Pearson Education, 2006.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th ed., McGraw Hill, 2002. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th ed., Wiley, 2003.

COURSE DESIGNERS

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1	Mrs. T.GEETHA	Assistant Professor	CSE	geetha@vmkvec.edu.in
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	WEB TECHNOLOGY	Category	L	T	P	Credit
		CC	3	0	3	3

PREAMBLE

This course is designed to be familiar with the roles, methodologies, and best practices of designing and developing modern websites. Students will take part in the entire production cycle of websites from information gathering to designing layout to development utilizing HTML, CSS, and JavaScript web applications.

PREREQUISITE :

COURSE OBJECTIVES

1.	To create simple Web pages and provide client side validation
2.	To create dynamic web pages using server side scripting
3.	To design and create user interfaces using JSP
4.	To write the business logic for the middle tier
5.	To provide transaction and security support for enterprise applications

COURSE OUTCOMES

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

CO1. Explain the basic concepts of network and web page	Understand
CO2.Learn the concepts of scripting and developing the webpage.	Apply
CO3. Apply the concept of JSP .	Apply
CO4. Apply and develop the application using the concept of ASP	Apply, Analyze
CO5.Develop the web page by using all the application.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Web essentials – clients – servers - communication – markup languages – XHTML – simple XHTML pages style sheets – CSS

Client side programming – Java script language – java script objects – host objects : Browsers and the DOM

Server side programming – java servlets – basics – simple program – separating programming and presentation – ASP/JSP - JSP basics ASP/JSP objects – simple ASP/JSP pages.

Representing Web data – data base connectivity – JDBC – Dynamic Web pages – XML – DTD – XML schema – DOM – SAX – Xquery.

Building Web applications - cookies – sessions – open source environment – PHP – MYSQL – case studies.

TEXT BOOKS:

1. Jeffrey C Jackson, " Web Technology – A computer Science perspective", Persoson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

REFERENCES:

1. Behrouz A. Forouzan ,"TCP/IP Protocol Suite", Tata McGraw-Hill ,4th Edition,2010
2. Jeffrey C.Jackson, "Web Technologies–A Computer Science Perspective", Pearson Education, 2006.
3. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
4. R. Krishnamoorthy & S. Prabhu, "Internet and Java Programming", New Age International Publishers, 2004.

   Thomno A. Powell, "The Complete Reference HTML and XHTML", fourth edition, Tata McGraw Hill, 2003.

COURSE DESIGNERS

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1	Dr. M. Nithya	Professor	CSE	hodcse@vmkvec.edu.in
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	DATA STRUCTURES LAB	Category	L	T	P	Credit
		CC	0	0	3	2

PREAMBLE

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

PRERQUISITE

NIL

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS:

1. Min Heap
2. Deaps
3. Leftist Heap
4. AVL Tree
5. B-Tree
6. Tries
7. Quick Sort
8. Convex hull
9. 0/1 Knapsack using Dynamic Programming
10. Graph coloring using backtracking

COURSE DESIGNERS				
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	NETWORKING LAB	Category	L	T	P	Credit
		CC	0	0	3	2

PREAMBLE

This laboratory enables the students clearly understand the concepts of Networks. Also students can implement the Socket Programming and protocols.

PRERQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge in UDP and TCP concepts.
2	To introduce Simulation of Sliding Window Protocol
3	To introduce Simulation of Routing Protocols
4	To learn Simulation of Network Management Protocols
5	To provide knowledge in Network Simulator Packages

COURSE OUTCOMES

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

CO1. Develop program for the concepts of UDP and TCP .	Apply
CO2. Able to Simulation of Sliding Window Protocol concepts	Apply
CO3. Construct implementations of Routing Protocols	Apply
CO4. Construct implementations of Network management Protocols	Apply
CO5. Implement knowledge in Network Simulator Packages	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS:

1. Socket Programming
    a. TCP Sockets
    b. UDP Sockets
    c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat

5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

COURSE DESIGNERS

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	OPERATING SYSTEM LAB	Category	L	T	P	Credit
		CC	0	0	3	2

PREAMBLE

PREREQUISITE :

COURSE OBJECTIVES

1.	To provide basic knowledge in Semaphores.
2.	To introduce Multithreading in Multiprocessor operating systems concepts
3.	To introduce Network operating systems
4.	To learn Network Transactions and Concurrency
5.	To provide knowledge in Distributed operating systems

COURSE OUTCOMES

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

CO1. Develop and execute the program for the concepts of Semaphores in Multiprocessor operating systems.	Apply
CO2. Able to program for Multithreading in Multiprocessor operating systems concepts	Apply
CO3. Establish a Lab setup for the network operating systems	Apply
CO4. Construct implementations of Network management Protocols	Apply
CO5. Implement knowledge in RMI concepts	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

MULTIPROCESSOR OPERATING SYSTEMS

PROGRAM 1 – Semaphores - Multiprocessor operating systems

Assume there are three processes: Pa, Pb, and Pc. Only Pa can output the letter A, Pb B, and Pc C.
Utilizing only semaphores (and no other variables) the processes are synchronized so that the output satisfies the following conditions:

a) A B must be output before any C's can be output.
b) B's and C's must alternate in the output string, that is, after the first B is output, another B cannot be output until a C is output.
Similarly, once a C is output, another C cannot be output until a B is output.
c) The total number of B's and C's which have been output at any given point in the output string cannot exceed the number of A's which have been output up to that point.

Examples

AACB -- invalid, violates a)
ABACAC -- invalid, violates b)
AABCABC -- invalid, violates c)
AABCAAABC -- valid
AAAABCBC -- valid
AB -- valid

PROGRAM 2 – Multithreading - Multiprocessor operating systems
The Cigarette Smokers Problem

Consider a simulation with three *smoker* threads and one *agent* thread. Each smoker continuously makes a cigarette and smokes it. But to make a cigarette, a smoker needs three ingredients: tobacco, paper, and matches. One of the smoker threads has only paper, another has only tobacco, and the third has only matches. The agent thread has an infinite supply of all three materials. The three smoker threads are initially blocked. The agent places two randomly chosen (different) ingredients on the table and unblocks the one smoker who has the remaining ingredient. The agent then blocks. The unblocked smoker removes the two ingredients from the table, makes a cigarette, and smokes it for a random amount of time, unblocking the agent on completion of smoking the cigarette. The agent then puts out another random two of the three ingredients, and the cycle repeats.

Write a multi-class multithreaded Java program that uses a monitor to synchronize the agent thread and the three smoker threads. **Do not mechanically translate semaphore code into monitor code!** The agent thread executes in an agent object created from an agent class. Each smoker thread executes in a smoker object. All smoker objects are created from one smoker class whose constructor is used to specify the ingredient possessed by the smoker object. A driver class with a main method constructs the objects and starts the threads.

Use a single monitor object instantiated from a class Control for synchronization. Each of the four threads invokes a synchronized monitor method for its synchronization. No semaphores are allowed. No synchronized blocks are allowed, only synchronized methods. No busy waiting is allowed. No calls to nap inside a synchronized method are allowed (do not nap while holding the monitor object's lock, that is, while inside a synchronized method or while inside a method called by a synchronized method).

PROGRAM 3 – Multiple sleeping barbers - Multiprocessor operating systems

Write a multi-class multithreaded Java program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single Customer class, each barber is instantiated from a single Barber class.

Network operating systems

PROGRAM 4 – Network operating systems

Establish a Lab setup for the following network operating systems based programs based on the skills in networking on your own. E.g. for identifying networking hardware, identifying different kinds of network cabling and network interface cards can be done.

Exercises

1. Identifying Local Area Network Hardware
2. Exploring Local Area Network Configuration Options
3. Verifying TCP/IP Settings
4. Sharing Resources
5. Testing LAN Connections

Real time operating systems

PROGRAM 5 – Real time operating systems

A real-time program implementing an alarm clock shall be developed.
[Alarm clock, using C and Simple_OS]

The program shall fulfill the following requirements:

Clock with alarm functionality shall be implemented, It shall be possible to set the time, It shall be possible to set the alarm time, the alarm shall be *enabled* when the alarm time is set, the alarm shall be *activated* when the alarm is enabled, and when the current time is equal to the alarm time, an activated alarm must be acknowledged. Acknowledgement of an alarm shall lead to the alarm being *disabled, the* alarm is enabled again when a new alarm time is set, an alarm which is not acknowledged shall be repeated every 10 seconds. The program shall communicate with a graphical user interface, where the current time shall be displayed, and where the alarm time shall be displayed when the alarm is enabled. It shall be possible to terminate the program, using a command which is sent from the graphical user interface.

Database operating systems

PROGRAM 6 – **Transactions and Concurrency -Database operating systems**

Exercises
Assume any application(e.g.banking) on your own and do the following exercises.

1. Investigate and implement the ObjectStore's concurrency options.
2. Implement the concurrency conflict that occurs between multiple client applications.
3. Observe and implement the implication of nested transactions.

Distributed operating systems

PROGRAM 7 – Distributed operating systems

1. Design a RMI Lottery application. Each time you run the client program -- "**java LotteryClient n**", the server program "**LotteryServer**" will generate **n** set of Lottery numbers. Here **n** is a positive integer, representing the money you will spend on Lottery in sterling pounds. Write this program in a proper engineering manner, i.e. there should be specifications, design (flow chart, FD, or pseudo code), coding, test/debug, and documentation.

2. Consider a distributed system that consists of two processes which communicate with each other. Let P be a state predicate on the local state of one process and Q be a state predicate on the local state of the other process. Assume that neither P nor Q are stable (i.e. closed).
   Design a superimposed computation which detects that there exists an interleaving of underlying events in this system where at some state P ^Q holds. (A superposed computation is one that does not a_ect the underlying system; it may \read" but not \write" the state of the underlying system. Events in a superposed computation may occur in at the same instant as the underlying events and/or at di_erent instants.) State any assumptions you make.
   [Hint: Use vector clocks.]

TEXT BOOKS:

1. Mukesh Singhal and N. G. Shivaratri, “Advanced Concepts in Operating Systems”, McGraw-Hill, 2000

REFERENCES: .

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Edition, Addison Wesley Publishing Co., 2003.
Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.

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	Dr. S. Senthilkumar	Assistant Professor	Computer science and engineering	senthilkumars@vmkvec.edu.in

	WEB TECHNOLOGY LAB	Category	L	T	P	Credit
			0	0	3	2

PREAMBLE

This course aims at introducing to the students about to provide the web concepts and enable the student to create simple Web based applications and to create an overview of 3-tier architecture and enable the student to create enterprise applications

PREREQUISITE :

COURSE OBJECTIVES

1.	To create simple Web pages and provide client side validation
2.	To create dynamic web pages using server side scripting
3.	To design and create user interfaces using JSP
4.	To write the business logic for the middle tier
5.	To provide transaction and security support for enterprise applications

COURSE OUTCOMES

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

CO1. Explain the basic concepts of network and web page	Understand
CO2.Learn the concepts of scripting and developing the webpage.	Apply
CO3. Apply the concept of JSP .	Apply
CO4. Apply and develop the application using the concept of ASP	Apply, Analyze
CO5.Develop the web page by using all the application.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

1. Creation of HTML pages with frames, links, tables and other tags
2. Usage of internal and external CSS along with HTML pages
3. Client side Programming
   - # Java script for displaying date and comparing two dates
   - # Form Validation including text field, radio buttons, check boxes, list box and other controls
4. Usage of ASP/JSP objects response, Request, Application, Session, Server, ADO etc
   - # Writing online applications such as shopping, railway/air/bus ticket reservation system with set of ASP/JSP pages
   - # Using sessions and cookies as part of the web application
5. Writing Servlet Program using HTTP Servlet
6. Any online application with database access
7. Creation of XML document for a specific domain
8. Writing DTD or XML schema for the domain specific XML document
9. Parsing an XML document using DOM and SAX Parsers
10. Sample web application development in the open source environment

TEXT BOOKS:

1. Jeffrey C Jackson, " Web Technology – A computer Science perspective", Persoson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

REFERENCES:

1. Behrouz A. Forouzan ,"TCP/IP Protocol Suite", Tata McGraw-Hill ,4th Edition,2010
2. Jeffrey C.Jackson, "Web Technologies–A Computer Science Perspective", Pearson Education, 2006.
3. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
4. R. Krishnamoorthy & S. Prabhu, "Internet and Java Programming", New Age International Publishers, 2004.

   Thomno A. Powell, "The Complete Reference HTML and XHTML", fourth edition, Tata McGraw Hill, 2003.

COURSE DESIGNERS

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1	Dr. M.Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Dr. R. Jaichandran	Associate Professor	Computer science and engineering	jaichandran@avit.ac.in

	AD-HOC NETWORKS	Category	L	T	P	Credit
		EC	3	0	3	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 adhoc and sensor networks , to analyze protocols developed for adhoc and sensor networks , to Identify different issues in wireless adhoc and sensor networks and to Identify and critique security issues in adhoc and sensor networks.

PREREQUISITE

Computer networks

COURSE OBJECTIVES

1.	To learn about the issues in the design of wireless adhoc networks
2.	To understand the working of protocols in different layers of mobile adhoc and sensor networks
3.	To identify different issues in wireless adhoc and sensor networks routing
4.	To expose the students to different aspects in transport layer and QOS in wireless sensor networks
5.	To understand various security issues in adhoc and sensor networks and solutions to the issues

COURSE OUTCOMES

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

CO1: Understand the adhoc and wireless sensor networks	Understand
CO2: Can analyze TCP's challenges and design issues in adhoc and sensor networks	Analyze
CO3: Can identify different issues in MAC Protocols for wireless sensor networks	Analyze
CO4: Identify different issues in Transport Layer and QOS in Wireless Sensor Networks	Analyze
CO5: Identify and solve security issues and routing attacks in adhoc and sensor networks	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M

S- Strong; M-Medium; L-Low

SYLLABUS

AD-HOC MAC

Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

AD-HOC NETWORK ROUTING & TCP

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

WSN -MAC

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

MESH NETWORKS

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

TEXT BOOKS

1. C.Siva Ram Murthy and B.Smanoj, " Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.

2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.

REFERENCES:

1. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.

2. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

COURSE DESIGNERS

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1	Dr. Nitishagarwal	Assistant Professor	CSE	nitishaaggarwal@avit.ac.in
2	Dr.S.Senthilkumar	Assistant Professor	CSE	senthilkumars@vmkvec.edu.in

	ADVANCED ARTIFICIAL INTELLIGENCE	Category	L	T	P	Credit
		EC	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 ARTIFICIAL INTELLIGENCE AND ITS EXPERT SYSTEMS

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

INTRODUCTION **8**

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics -Constraint Satisfaction

Problems - Game playing.

KNOWLEDGE REPRESENTATION AND REASONING **9**

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

PLANNING AGENTS **9**

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

MACHINE LEARNING AND UNCERTAINITY **10**

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks- -Hidden Markov Models-Learning from Observation-Supervised Learning-Inductive Learning-Decision Trees-Statistical Learning Methods-Reinforcement Learning

Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.

HIGHER LEVEL AGENTS **9**

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI.

TEXT BOOK:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002

REFERENCES:

1. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, III Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

COURSE DESIGNERS

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

	ADVANCED DATABASES	Category	L	T	P	Credit
		EC	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:

DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES

1	To describe a relational database and object-oriented database.
2	To create, maintain and manipulate a relational database using SQL.
3	To describe ER model and normalization for database design.
4	To examine issues in data storage and query processing and can formulate appropriate solutions.
5	To 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 database adminstrators.	Understand
CO2. Build and manipulate the relational database using Structured Query Language and relational languages.	Apply
CO3. Develop a normalized database for a given application by incorporating various constraints like integrity and value constraints.	Apply
CO4. Apply concurrency control & recovery mechanism for database problems.	Apply
CO5. Construct data structures like indexes and hash tables for the fast retrieval of data.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

PARALLEL AND DISTRIBUTED DATABASES **9**

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies**.**

OBJECT AND OBJECT RELATIONAL DATABASES **9**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational feature sin SQL/Oracle – Case Studies.

XML DATABASES **9**

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

MOBILE DATABASES **9**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

MULTIMEDIA DATABASES **9**

Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design.

REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006.

COURSE DESIGNERS

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

	AGENT BASED INTELLIGENT SYSTEMS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE:

.An intelligent system is a system that has, similar to a living organism, a coherent set of components and subsystems working together to engage in goal-driven activities. In general, an intelligent system is able to sense and respond to the changing environment; gather and store information in its memory; learn from earlier experiences; adapt its behaviors to meet new challenges; and achieve its pre-determined or evolving objectives

PREREQUISITE:

FUZZY LOGIC

COURSE OBJECTIVES

1	To understand Agent development
2	To gain knowledge in Multi agent and Intelligent agents
3	To understand Agents and security
4	To gain knowledge in Agent Applications

COURSE OUTCOMES

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

CO1. Understand the history, development and various applications of artificial intelligence	Understand
CO2. Learn the knowledge representation and reasoning techniques in logic programming	Understand
CO3. Familiarize with constructing plans in planning agents	Understand
CO4. Analysis the concept in presence of uncertainty.	Analyse
CO5. Apply and integrate various artificial intelligence techniques in intelligent system development	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9**

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics -Constraint Satisfaction Problems - Game playing.

KNOWLEDGE REPRESENTATION AND REASONING **9**

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-

Knowledge Representation-Objects-Actions-Events

PLANNING AGENTS **9**

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

AGENTS AND UNCERTAINITY **9**

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.

HIGHER LEVEL AGENTS **9**

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI

TEXTBOOKS

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002

REFERENCES

1. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, III Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

COURSE DESIGNERS

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	BIOINFORMATICS	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE:

This course is an introduction to bioinformatics (and data science) for biology and biomedical students. It introduces bioinformatics methodology and technologies without relying on any prerequisites. The aim of this course is for students to be in a position to understand important notions of bioinformatics and tackle simple bioinformatics-related problems

PREREQUISITE:

DATA WAREHOUSING AND DATA MINING, STATISTICS

COURSE OBJECTIVES

1	To understand the genesis of Bioinformatics, comparison with its allied disciplines, theoretical and computational models to study big data.
2	To explain nucleic acid and protein sequence databases, structural databases, literature databases, genome and organism-specific databases
3	To understand development of biological databases, display, annotation, and retrieval tools of biological data.
4	To describe database similarity searching, biological file formats, and 3D structure visualization of biomacromolecules.
5	To explain applications of bioinformatics in the area of biological and biomedical sciences, statistical mining of gene and protein databanks.

COURSE OUTCOMES

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

CO1. Understand the genesis of Bioinformatics, comparison with its allied disciplines, theoretical and computational models to study big data.	Understand
CO2. Explain nucleic acid and protein sequence databases, structural databases, literature databases, genome and organism-specific databases.	Understand
CO3. Understand development of biological databases, display, annotation, and retrieval tools of biological data.	Understand
CO4. Describe database similarity searching, biological file formats, and 3D structure visualization of biomacromolecules.	Understand
CO5. Explain applications of bioinformatics in the area of biological and biomedical sciences, statistical mining of gene and protein databanks.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

CO4	M	M	L	M	L	L	L	L	M	M	S	L	M	L	L
CO5	M	M	L	M	L	L	L	L	M	M	S	L	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTORY CONCEPTS **9**

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

SEARCH ENGINES AND DATA VISUALIZATION **9**

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface – Animation Versus simulation – General Purpose Technologies.

STATISTICS AND DATA MINING **9**

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods – Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

PATTERN MATCHING **9**

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices – Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies – Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities – Sequence Databases.

MODELING AND SIMULATION **9**

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – AbInitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications – standards - Issues – Security – Intellectual property.

TEXTBOOKS

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.

REFERENCES

1. T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen, 1999.

COURSE DESIGNERS

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	CLOUD COMPUTING	Category	L	T	P	Credit
		EC	3	0	0	3

PREAMBLE

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

PREREQUISITE : COMPUTER NETWORKS

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

CO1: Understand basics in Cloud Computing	Understand
CO2: Apply cloud computing concepts in real time	Apply
CO3: Apply cloud computing projects	Apply
CO4: Apply cloud services	Apply
CO5: Develop and 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	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

CLOUD ARCHITECTURE AND MODEL **9**

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture.

Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand

VIRTUALIZATION **9**

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

CLOUD INFRASTRUCTURE **9**

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

PROGRAMMING MODEL **9**

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative

MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula,OpenStack, Aneka, CloudSim

SECURITY IN THE CLOUD **9**

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

TEXT BOOKS:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

REFERENCES:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

2. Kumar Saurabh, " Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

4. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

5. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.

6. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.

7. Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, 'Mastering Cloud Computing", TMGH,2013.

8. Gautam Shroff, Enterprise Cloud Computing, Cambridge University Press, 2011,

9. Michael Miller, Cloud Computing, Que Publishing, 2008

10. Nick Antonopoulos, Cloud computing, Springer Publications, 2010

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	COMPONENT BASED TECHNOLOGY	Category	L	T	P	Credit
		EC	3	0	3	3

PREAMBLE

This course Component Based Technology provides an introduction and Basic Concepts of Various Platform Component Based Technology

PREREQUISITE : JAVA PROGRAMMING

COURSE OBJECTIVES

1.	To distinguish between various object-oriented concepts
2.	To design the solution using multithreading and generic classes
3.	To develop applications using frameworks and applets with events handling
4.	To develop programs using JDBC and Servlets.
5.	To create J2ee component using JSP and EJB technology.

COURSE OUTCOMES

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

CO1: Distinguish between various object-oriented concepts	Understand
CO2: Apply the solution using multithreading and generic classes	Apply
CO3: Apply the applications using frameworks and applets with events handling	Apply
CO4: Apply programs using JDBC and Servlets	Apply
CO5: Create J2ee component using JSP and EJB technology.	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION **9**

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

JAVA COMPONENT TECHNOLOGIES **9**

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

CORBA TECHNOLOGIES **9**

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

COM AND .NET TECHNOLOGIES **9**

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

COMPONENT FRAMEWORKS AND DEVELOPMENT **9**

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

TEXT BOOKS:

1. "Component Software: Beyond Object-Oriented Programming", Pearson Education publishers, 2003.

REFERENCES:

1. Ed Roman, "Enterprise Java Beans", Third Edition , Wiley , 2004.

COURSE DESIGNERS

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	DATA WAREHOUSING AND DATA MINING	Category	L	T	P	Credit
			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.	To distinguish a data warehouse from an operational database system, and appreciate the needs for developing a data warehouse for large corporation.
2.	To 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.	Understand
CO3: To learn the association rules and its algorithms.	Understand
CO4: To learn the classification and clustering rules and the respective algorithms	Understand
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	PSO1	PSO2	PSO3
CO1	S	L	-	M	-	-	-	-	-	-	-	-	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M
CO3	S	L	-	L	-	-	-	-	-	-	-	-	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M
CO5	S	M	M	L	-	-	-	-	-	-	-	-	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

Data Warehousing and Business Analysis **9**

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

Data Mining **9**

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

Classification and Prediction **9**

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Cluster Analysis **9**

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

Mining Object, Data and Analysis **9**

Mining Object, Spatial, Multimedia, Text and Web Data:

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

REFERENCES:

1. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

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	DIGITAL IMAGING	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

Digital Image Processing provides an introduction to the fundamental concepts and general principles of image processing. It covers the key stages of digital image processing techniques. Students will also get an opportunity to implement the algorithms that are specific to real time image processing systems/applications.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To discuss the digital image fundamentals
2.	To describe the image enhancement techniques
3.	To explain the image segmentation and feature analysis techniques used for images
4.	To discuss the resolution analysis using wavelet transformations and compression techniques
5.	To discuss about the applications of image processing

COURSE OUTCOMES

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

CO1: Discuss digital image fundamentals.	Understand
CO2: Examine image enhancement techniques	Analyze
CO3: Execute restoration and segmentation techniques	Apply
CO4: Demonstrate the image wavelet and compression Techniques	Apply
CO5: Discuss the applications of the image processing	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS OF IMAGE PROCESSING

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

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IMAGE ENHANCEMENT

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening.Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

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IMAGE SEGMENTATION AND FEATURE ANALYSIS

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

MULTI RESOLUTION ANALYSIS AND COMPRESSIONS

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms.
Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

APPLICATIONS OF IMAGE PROCESSING

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing

TEXT BOOKS:

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing" Second Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thomson Learning, 2001
3. Anil K.Jain, "Fundamentals of Digital Image Processing", Person Educaiton, 2003.

COURSE DESIGNERS

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	DISTRIBUTED COMPUTING	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

The course facilitates students to understand the foundations of distributed systems along with design and implementation details. Students can get an idea of peer to peer services and file system. The student can understand the system-level support required for a distributed system and the need for process and resource management

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the various paradigms of distributed applications
2.	To explain the communication techniques and distributed operating systems.
3.	To discuss the various resource management models in distributed systems.
4.	To discuss on the fault tolerance techniques.
5.	To apply the techniques to the real time applications.

COURSE OUTCOMES

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

CO1: Understand the various paradigms of distributed applications	Understand
CO2: Explain the communication techniques and distributed operating systems techniques	Understand & Apply
CO3: Discussion on the various resource management models in distributed systems	Apply
CO4: Discussion on the fault tolerance techniques	Apply
CO5: Apply the techniques to the real time applications	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

COMMUNICATION IN DISTRIBUTED ENVIRONMENT

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

DISTRIBUTED OPERATING SYSTEMS

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms –Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols .

DISTRIBUTED RESOURCE MANAGEMENT

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

FAULT TOLERANCE AND CONSENSUS

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

CASE STUDIES

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

TEXT BOOKS:

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley, 2004.
3. Mukesh Singhal, "Advanced Concepts In Operating Systems", McGrawHill Series in Computer Science, 1994.
4. A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004.

   M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

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	EMBEDDED SYSTEMS	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

The objective of this module is to help fresh graduates and practicing engineers to enhance their knowledge and skills of embedded product design covering the various aspects of product development process and design of a stand- alone embedded system.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the concept of embedded system, microcontroller
2.	To understand the different components of microcontroller and their interactions
3.	To get familiar with the programming environment in embedded systems
4.	To write a program in embedded systems.
5.	To understand the main components of the embedded systems.

COURSE OUTCOMES

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

CO1: Understand the concept of embedded system, microcontroller.	Understand
CO2: Understand the different components of microcontroller and their interactions.	Understand
CO3: Get familiarized with programming environment to develop embedded solutions.	Understand & Apply
CO4: Program ARM microcontroller to perform various tasks.	Apply
CO5: Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices	Understand & Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

EMBEDDED COMPUTING

Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

EMBEDDED C PROGRAMMING

C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

OPTIMIZING ASSEMBLY CODE

Profiling and cycle counting – instruction scheduling – Register allocation – conditional execution – looping constructs – bit manipulation – efficient switches – optimized primitives.

PROCESSES AND OPERATING SYSTEMS

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

EMBEDDED SYSTEM DEVELOPMENT

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components : Principles of Embedded Computer System Design", Morgan Kaufmann / Elsevier, 2nd. edition, 2008.

REFERENCES:

1. Andrew N Sloss, D. Symes, C. Wright, " ARM System Developers Guide", Morgan Kaufmann / Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.
3. Wayne Wolf, "Computers as Components : Principles of Embedded Computer System Design", Morgan Kaufmann / Elsevier, 2nd. edition, 2008.
4. Steve Heath, "Embedded System Design" , Elsevier, 2nd. edition, 2003.

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	GRID COMPUTING	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

To provide a thorough knowledge about the technology application and tool kits for grid computing.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the fundamentals of grid computing.
2.	To detailed discussion of grid computing architecture.
3.	To understand the concepts of grid technologies.
4.	To understand the concepts of grid computing toolkits.
5.	To learn the advanced technologies in grid computing.

COURSE OUTCOMES

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

CO1: Understanding the fundamentals of grid computing.	Understand
CO2: Discussing the grid computing architecture.	Understand & Apply
CO3: Learning the concepts of grid technologies.	Apply
CO4: Understanding the concepts of grid computing toolkit.	Understand & Apply
CO5: Understanding the advanced technologies in grid computing.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO GRID COMPUTING

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

GRID COMPUTING ARCHITURE

Grid Computing anatomy – Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

GRID COMPUTING TECHNOLOGIES

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

GRID COMPUTING TOOL KIT

Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

HIGH LEVEL GRID SERVICES

High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

TEXT BOOKS:

1. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR-2003.

REFERENCES:

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a reality ", John Wiley and sons,2003.
2. Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications", Charles River media, 2003.

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	INFORMATION SECURITY	Category	L	T	P	Credit
			3	0	3	3

PREAMBLE

This course provides basic knowledge on information security model made up of the three main components: confidentiality, integrity and availability. Each component represents a fundamental objective of information security.

PREREQUISITE : COMPUTER NETWORKS

COURSE OBJECTIVES

1.	To understand the fundamentals of information security
2.	To understand security concepts
3.	To understand different types of components
4.	To learn applying security in evolving technologies
5.	To learn about Program Security concepts.

COURSE OUTCOMES

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

CO1: Able to understand fundamentals of information security	Understand
CO2: Able to understand and apply security concepts	Understand and Apply
CO3: Able to prevent different types of components	Apply
CO4: Able to apply security concepts in emerging technologies	Analyze and Apply
CO5: Able to investigate Program Security concepts.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

9

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

9

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

9

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

Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection	**9**
Network Security, System Security, User Security and Program Security	**9**

TEXT BOOKS

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

REFERENCES:

1. Mark Merkow, James Breithaupt " Information Security : Principles and Practices" First Edition, Pearson Education,
2. Whitman, "Principles of Information Security", Second Edition, Pearson Education
3. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education.
4. "Security in Computing ", Charles P.Pfleeger and Shari Lawrence Pfleeger, Third Edition.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2.	Dr.R.Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

	MANAGING BIG DATA	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course focuses on big data technologies used for storage, analysis and manipulation of data. The student will learn about fundamentals of Hadoop, MapReduce, Pig, Hive, R and have hand on training on the same It also help to develop projects and apply existing data analytics tools to gain comprehensive knowledge on Data analytics.

PREREQUISITE : Data warehousing and Data mining

COURSE OBJECTIVES

1.	To introduce the basic concepts of Big Data.
2.	Summarize the NoSQL Data management.
3.	To discuss the basic concepts of Hadoop.
4.	To discuss the map reduce applications in big data.
5.	To discuss the hadoop related other tools like Pig, Hive, HBase and Cassandra.

COURSE OUTCOMES

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

CO1: Outline the basic big data concept.	Remember
CO2: Categorize and summarize the processing in Big Data and its importance.	Understand
CO3: Simulate various Big data technologies like Hadoop MapReduce, Pig, Hive, Hbase and No-SQL.	Apply
CO4: Determine tools and techniques to analyze Big Data	Analyze
CO5:Discuss the Hadoop related tools.	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNDERSTANDING BIG DATA

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics

NOSQL DATA MANAGEMENT

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication – consistency – relaxing consistency –

version stamps – map-reduce – partitioning and combining – composing map-reduce calculations

BASICS OF HADOOP

Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures

MAPREDUCE APPLICATIONS

MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of
MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats

HADOOP RELATED TOOLS

Hbase – data model and implementations – Hbase clients – Hbase examples – praxis.Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration.
Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts.
Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.

REFERENCES:

1. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
2. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
3. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
5. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
6. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
   Alan Gates, "Programming Pig", O'Reilley, 2011.

COURSE DESIGNERS

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	MOBILE APPLICATION DEVELOPMENT	Category	L	T	P	Credit
			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: Expose to technology and business trends impacting mobile applications	Understand
CO2: Understand enterprise scale requirements of mobile applications	Understand
CO3: Familiarize in the Graphics used for Android application development	Apply
CO4: Competent with the characterization and architecture of mobile applications	Apply
CO5: Competent with designing and developing mobile applications using one application development framework	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

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.

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.

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.

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. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012

REFERENCES:

1. http://developer.android.com/develop/index.html
2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
3. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012
4. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013.

COURSE DESIGNERS

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	MOBILE COMPUTING	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

To learn the standards and issues in Mobile Computing.

PREREQUISITE : Nil

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	PSO1	PSO2	PSO3
CO1	M	M	M	S	M	S						M	S	
CO2	M	S	S	M	M	S						M	S	
CO3	M	S	S	S	M	S						M	S	
CO4	M	S	S	S	M	S						M	S	
CO5	M	M	M	M	M	S						L	M	

S- Strong; M-Medium; L-Low

SYLLABUS

WIRELESS COMMUNICATION FUNDAMENTALS

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

TELECOMMUNICATION SYSTEMS

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

WIRELESS NETWORKS

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Adhoc Network – Blue Tooth.

NETWORK LAYER

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

TRANSPORT AND APPLICATION LAYERS

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML –WML Script – WAE – WTA.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
4. Burkhardt, “Pervasive Computing”, First Edition, Pearson Education, 2003.

COURSE DESIGNERS

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	MULTIMEDIA SYSTEMS	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course provides adequate knowledge in multimedia applications and usage of tools used in multimedia environment.

PREREQUISITE : Problem solving using C

COURSE OBJECTIVES

1.	Multimedia concepts and various I/O technologies
2.	Develop their creativity in multimedia
3.	Basic in multimedia operating system

COURSE OUTCOMES

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

CO1: Discuss the characteristics of different media, multimedia data, data formats a multimedia system designs.	Understand
CO2: Demonstrate various Multimedia tools and compression techniques	Apply & Analyze
CO3: Apply the basic operations of Multimedia operating systems.	Apply
CO4: Discuss the various reference models needed for synchronization.	Analyze
CO5: Model the multimedia systems according to the requirements of multimedia applications.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I INTRODUCTION AND QOS

Introduction-QOS Requirements and Constraints-Concepts-Resources- Establishment Phase-Run-Time Phase-Management Architectures.

UNIT II OPERATING SYSTEMS

Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management-Server Architecture-Disk Management

UNIT III FILE SYSTEMS AND NETWORKS

Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Ethernet-Gigabit Ethernet-Token Ring-100VG Any LAN-Fiber Distributed Data Interface (FDDI)- ATM Networks-MAN-WAN.

UNIT IV COMMUNICATION

Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Computer Supported Cooperative Work-Architecture-Session Management-MBone Applications.

UNIT V SYNCHRONIZATION

Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME.

TEXT BOOKS:

1. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", Springer, I Edition 2004

REFERENCES:

1. Ralf Steinmetz and Klara Nahrstedt , Media Coding and Content Processing, Prentice hall, 2002.
2. Vaughan T, Multimedia, Tata McGraw Hill, 1999.
3. Mark J.B., Sandra K.M., Multimedia Applications Development using DVI technology, McGraw Hill, 1992.
4. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovacovic, D. A. Milovacovic , Multimedia Communication Systems: Techniques, Standards, and Networks, Prentice Hall, 1st Edition, 2002
5. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson, 2004.

COURSE DESIGNERS

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2	Dr. R. Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

	NETWORK SECURITY	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course describes the explosive growth in computer systems and their interconnections via networks, has increased the dependence of both organizations and individuals on the information stored and communicated using these systems. This, in turn, has led to a heightened awareness of the need to protect data and resources from disclosure, to guarantee the authenticity of data and messages, and to protect systems from network-based attacks and the disciplines of network security have matured, leading to the development of practical, readily available applications to enforce network security

PREREQUISITE : Computer Networks

COURSE OBJECTIVES

1.	To understand basics of Network Security.
2.	To be able to secure a message over insecure channel by various means
3.	To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4.	To understand various protocols for network security to protect against the threats in the networks.

COURSE OUTCOMES

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

CO1: Understand the basic of concepts of Network Security	Understand
CO2: Apply the key encryption techniques	Apply
CO3: Maintain the Confidentiality, Integrity and Availability of a data through message authentication techniques.	Understand & Apply
CO4: Practice the security in IP, Web, Email and maintain the system security from viruses and etc.,	Understand & Apply
CO5: Implement various networking protocols	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques – Encryption Algorithms - Confidentiality.

PUBLIC KEY ENCRYPTION

RSA - Elliptic Curve Cryptography - Number Theory Concepts

MESSAGE AUTHENTICATION

Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

NETWORK SECURITY PRACTICE

Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

SYSTEM SECURITY

Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.

TEXT BOOK:

1. Stallings, Cryptography & Network Security - Principles & Practice, Prentice Hall, 3rd Edition 2002.

REFERENCES:

1. Bruce, Schneier, Applied Cryptography, 2nd Edition, Toha Wiley & Sons, 1996 Man Young Rhee, "Internet Security", Wiley, 2003.
   Pfleeger & Pfleeger, "Security in Computing", Pearson Education, 3rd Edition, 2003.

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	PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course studies methods and concepts of computer and communication network modeling and system performance evaluation. Topics include some of stochastic processes, measurement techniques, monitoring tools, statistical analysis of performance experiments, simulation models, analytic modeling and queuing theory, work load characterization and performance evaluation problems.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	Select appropriate evaluation techniques, performance metrics and workloads for a system.
2.	Conduct performance measurements correctly.
3.	Use proper statistical techniques to compare several alternatives.
4.	Design measurement and simulation experiments to provide the most information with the least effort.
5.	Use simple queuing models to analyze the performance of systems.

COURSE OUTCOMES

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

CO1: Understand the evaluation techniques, performance metrics and workloads for system	Understand
CO2: Understand the types queuing models to networks	Understand & Apply
CO3: Understand FIFO queuing systems to networks and similar models	Understand & Apply
CO4: Maintain the system performance and optimizing the networks	Analyze
CO5: Use simple queuing models to analyze the performance of systems.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I

Performance Characteristics – Requirement Analysis: Concepts –User, Device, Network Requirements – Process – Developing RMA ,Delay, Capacity Requirements – Flow Analysis – Identifying and Developing Flows –Flow Models – Flow Prioritization –Specification.

UNITII

Random variables - Stochastic process –Link Delay components – Queuing Models – Little's Theorem – Birth & Death process – Queuing Disciplines.

UNITIII

Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov-Non-Markovian and self-similar models – Network of Queues –Burke's Theorem –Jackson's Theorem.

UNITIV

Multi-User Uplinks/Downlinks - Capacity Regions - Opportunistic Scheduling for Stability and Max Throughput - Multi-Hop Routing - Mobile Networks - Throughput Optimality and Backpressure

UNITV

Performance of Optimal Lyapunov Networking - Energy Optimality- Energy-Delay Tradeoffs - Virtual Cost Queues - Average Power Constraints - Flow Control with Infinite Demand - Auxiliary Variables - Flow Control with Finite Demand - General Utility Optimization.

TEXT BOOKS

1. James D.McCabe , Network Analysis , Architecture and Design , 2nd Edition,Elsevier,2003
2. Bertsekas & Gallager , Data Networks , second edition ,Pearson Education,2003
3. Introduction to Probability Models by Sheldon Ross (8th edition) Academic Press, New York ,2003

REFERENCES

1. D. Bertsekas, A. Nedic and A. Ozdaglar, Convex Analysis and Optimization, Athena Scientific, Cambridge , Massachusetts , 2003
2. Nader F.Mir Computer and Communication Networks,Pearson Education.2007
3. Paul J.Fortier, Howard E.Michel, Computer Systems Performance Evaluation and Prediction, Elsevier,2003

COURSE DESIGNERS

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	SOFT COMPUTING	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course focus on giving introduction to some new fields in soft computing with its principal components of fuzzy logic and GA which helps students to differentiate traditional and genetic algorithm.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the concept of Software Computing and Neural Networks
2.	To implement the Genetic Algorithm in Machine Learning
3.	To understand the in depth knowledge and Advancement of Neural Networks
4.	To learn detailed about the Fuzzy Logic
5.	To analyze and implement the concept of Neuro-Fuzzy Logic

COURSE OUTCOMES

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

CO1: Understand the concept of Software Computing and Neural Networks	Understand
CO2: Implement of Genetic Algorithm in Machine Learning	Apply
CO3: Understand the in depth knowledge and Advancement of Neural Networks	Understand &Analyze
CO4: Learn Detailed about the Fuzzy Logic	Analyze
CO5: Study and Implement the concept of Neuro-Fuzzy Logic	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

GENETIC ALGORITHMS

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

NEURO-FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms _ Rulebase Structure Identification – Neuro-Fuzzy Control _ Case studies**.**

TEXT BOOKS:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995 James A. Freeman and David M. Skapura, "Neural Networks Algorithms,Applications, and Programming Techniques", Pearson Edn., 2003

REFERENCES:

1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
4. S.N.Sivanandam · S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992.

COURSE DESIGNERS

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	SOFTWARE ARCHITECTURE	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course covers the principles of software Architecture . It also includes Architectural view and documentation,

Architectural styles &design and Architectural evaluation.

PREREQUISITE : Computer Architecture

COURSE OBJECTIVES

1.	To understand the concept of Software Architecture
2.	To know the in depth knowledge of views and documentation using UML
3.	To understand and analyse the concept of Architectural Styles
4.	To understand the knowledge of Architectural Design
5.	To study the need for Architectural Evaluation

COURSE OUTCOMES

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

CO1: Understand the concept of Software Architecture	Understand
CO2: Know the in depth knowledge of views and documentation using UML	Understand & Apply
CO3: Understand and analyze the concept of Architectural Styles	Analyze
CO4: Understand the knowledge of Architectural Design	Understand
CO5: Study the need for Architectural Evaluation	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

ARCHITECTURAL DRIVERS

Introduction – Standard Definitions of Software Architecture– Architectural structures – Influence of software architecture on organization – Architecture Business Cycle – Functional requirements – Technical constraints – Quality Attributes – Quality Attribute Workshop (QAW) – Documenting Quality Attributes – Six part scenarios

ARCHITECTURAL VIEWS AND DOCUMENTATION

Introduction – Standard Definitions for views – Structures and views- Perspectives: Static, dynamic and physical and the accompanying views – Representing views-available notations – Good practices in documentation– Documenting the Views using UML – Merits and Demerits of using visual languages – Need for formal languages - Architectural Description Languages – ACME

ARCHITECTURAL STYLES

Introduction – Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style

ARCHITECTURAL DESIGN

Approaches for architectural design – System decomposition – Attributes driven design – Architecting for specific quality attributes – Performance, Availability – Security – Architectural conformance

UNIT V ARCHITECTURE EVALUATION AND SOME SPECIAL TOPICS

Need for evaluation – Scenario based evaluation against the drivers – ATAM and its variations – Case studies in architectural evaluations – SOA and Web services – Cloud Computing – Adaptive structures

TEXT BOOKS:

REFERENCES:

. Len Bass, Paul Clements, and Rick Kazman, "Software Architectures Principles and Practices", 2n Edition, Addison-Wesley, 2003.

2. Anthony J Lattanze, "Architecting Software Intensive System. A Practitioner's Guide", Auerbach Publications, 2010.

3. Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford, "Documenting Software Architectures. Views and Beyond", 2nd Edition, Addison-Wesley, 2010.

4. Paul Clements, Rick Kazman, and Mark Klein, "Evaluating software architectures: Methods and case studies.", Addison-Wesley, 2001.

5. David Garlan and Mary Shaw, "Software architecture: Perspectives on an emerging discipline", Prentice Hall, 1996.

6. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, "Cloud Computing. Principles and Paradigms", John Wiley & Sons, 2011

7. Mark Hansen, "SOA Using Java Web Services", Prentice Hall, 2007

8. David Garlan, Bradley Schmerl, and Shang-Wen Cheng, "Software Architecture-Based Self-Adaptation," 31-56. Mieso K Denko, Laurence Tianruo Yang, and Yan Zang (eds.), "Autonomic Computing and Networking". Springer Verlag, 2009.

COURSE DESIGNERS

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	SOFTWARE PROJECT MANAGEMENT	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course will enable the students to have an understanding on the need for Software Project Management. It highlights different techniques for software cost estimation and activity planning. Software Project Management provides the platform for students to gain knowledge on procedures, skills, tools and techniques for applying in real world scenarios.

PREREQUISITE : Software Engineering

COURSE OBJECTIVES

1.	To understand the basic concept of Software Project Management
2.	To understand and illustrate the Format Process Model and their uses
3.	To design the umbrella activities in projects
4.	To design the in stream activities in projects
5.	To analyse Engineering and people issues in project management

COURSE OUTCOMES

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

CO1: Describe the basic concepts of software project management with its life cycle	Understand
CO2: Understand and illustrate the Format Process Model and their uses	Understand &Apply
CO3: Designing the umbrella activities in projects	Apply
CO4: Designing in stream activities in projects	Apply
CO5: Analyse Engineering and people issues in Project Management	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

BASIC CONCEPTS

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

FORMAT PROCESS MODELS AND THEIR USE

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UMBRELLA ACTIVITIES IN PROJECTS

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

IN STREAM ACTIVITIES IN PROJECTS

Project Initiation **–** Project Planning **–** Execution and Tracking **–** Project Wind up **–** Concept of Process/Project Database.

ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT

Phases (Requirements, Design, Development, Testing , Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

TEXT BOOKS:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.

REFERENCES:

1. Humphrey,Watts,"Managing the Software Process ",Addison Wesley,1986.
2. Pressman,Roger,"Software Engineering",A Practitioner's approach.McGraw Hill,1997.
3. Bob Hughes and Mike Cotterell,"Software Project Management".
4. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

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	SOFTWARE QUALITY ASSURANCE	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course covers the principles of software development emphasizing processes and activities of quality assurance.

PREREQUISITE : Software Engineering

COURSE OBJECTIVES

1.	To Understand the objectives and components of SQA.
2.	To know the in depth knowledge of Software Testing
3.	To Analyze about the Testing strategies
4.	To study the detailed concept of Software Quality
5.	To study about the Project Management and its role in SQA

COURSE OUTCOMES

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

CO1: Understand the objectives and components of SQA.	Understand
CO2: know about the in depth knowledge of Software Testing	Understand
CO3: Analyze about the Testing strategies	Analyze
CO4: study the detailed concept of Software Quality	Analyze & Apply
CO5: study about the Project Management and its role in SQA**.**	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testingTest plan – management – execution and reporting – software test automation – automated testing tools

Hierarchical models of software quality – software quality metrics –function points -Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

Project progress control – costs – quality management standards – project process - standards management and its role in SQA – SQA unit

TEXT BOOKS:

1. Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.

REFERENCES:

1. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
2. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006
3. Ron Patton, Software testing , second edition, Pearson education, 2007
4. Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, Second edition, 2003

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	THEORY OF COMPUTATION	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This Course helps the learners to know the models of computation, along with their variants in the context of formal languages and their recognizers. This can be applied in designing compilers and pattern recognition system.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the concept of Automata.
2.	To understand and apply the concept of Regular Expressions and Language**s.**
3.	To design a Pushdown automata for context free grammar and vice versa.
4.	To learn about concept the properties of content free languages.
5.	To understand and illustrate about in decidability**.**

COURSE OUTCOMES

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

CO1: Understand the concept of Automata.	Understand
CO2: Understand and apply the concept of Regular Expressions and Language**s.**	Understand & Apply
CO3: Design a Pushdown automata for context free grammar and vice versa.	Understand & Apply
CO4: Learn about concept the properties of content free languages.	Analyze
CO5: Understand and illustrate about in decidability.	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

AUTOMATA

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – No deterministic Finite Automata – Finite Automata with Epsilon Transitions**.**

REGULAR EXPRESSIONS AND LANGUAGES

Regular Expression – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

CONTEXT FREE GRAMMAR AND LANGUAGES

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

PROPERTIES OF CONTEXT FREE LANGUAGES

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

INDECIDABILITY

A Language That Is Not Recursive Enumerable – An Undecidable Problem that Is RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P And NP.

TEXT BOOKS:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2003.
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

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	VISUALIZATION TECHNIQUES	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

This course provides the fundamental concepts in visualization techniques. It includes Data Classification, Sources of Data , computer visualization and multidimensional visualization, data mapping ,web work ,document visualization and some case studies.

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PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To know the concept of visualization.
2.	To know the in depth knowledge of data visualization.
3.	To understand the concept and application of computer visualization.
4.	To know about the multidimensional visualization.
5.	To discuss case studies.

COURSE OUTCOMES

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

CO1: know the concept of visualization.	Understand
CO2: Understand in depth knowledge of data visualization	Understand
CO3: Understand the concept and application of computer visualization.	Understand &Apply
CO4: know about the in depth knowledge of multidimensional visualization.	Understand & Apply
C**O5**: discussion of case studies..	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

VISUALIZATION

Introduction – Issues – Data Representation – Data Presentation – Interaction

FOUNDATION FOR DATA VISUALIZATION

Visualization stages – Experimental Semiotics based on Perception Gibson‘s Affordance theory – A Model of Perceptual Processing – Types of Data.

COMPUTER VISUALIZATION

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

MULTIDIMENSIONAL VISUALIZATION

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping:

Document Visualization – Workspaces.

CASE STUDIES

Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis.

TEXT BOOKS:

1. Colin Ware, "Information Visualization Perception for Design" Margon Kaufmann Publishers, 2004, 2nd edition.

2. Robert Spence "Information visualization – Design for interaction", Pearson Education, 2 nd Edition, 2007

REFERENCES:

1. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers.

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	XML AND WEB SERVICES	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE

To understand the fundamental building blocks in the move to distributed computing on the Internet'

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To understand the concept of distributed database and conventional database.
2.	To understand and illustrate the concept of object oriented database
3.	To know the in depth knowledge of emerging system
4.	To illustrate and understand the concepts of database design issues
5.	To know about the current issues

COURSE OUTCOMES

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

CO1: Understand the concept of distributed database and conventional database	Understand
CO2: Understand and illustrate the concept of object oriented	Understand & Apply
CO3: Know the in depth knowledge of emerging system	Understand
CO4: Understand and illustrate and the concepts of database design issues	Understand and Apply
CO5: Discuss about the current issues	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

OBJECT ORIENTED DATABASES

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks - Recovery

EMERGING SYSTEMS

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

DATABASE DESIGN ISSUES

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

UNIT V CURRENT ISSUES

Semantic Web – Role of Meta data in web content - Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL – BPEL4WS

TEXT BOOKS:

1. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services",First Edition, Apress, 2004.

REFERENCES:

1. Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
3. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
4. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
5. Russ Basiura and Mike Batongbacal, "Professional ASP .NET Web Services", Apress, 2003.

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	BIO MEMS	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

The rapid development of the integrated circuit (IC) industry has led to the emergence of micro electronics process engineering as a new advanced discipline. The combination of MEMS and integrated intelligence has been put forward as a disruptive technology.Gives brief knowledge about applications of Bio-MEMS technology for therapeutics and diagnostics.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To train the students in the design aspects of Bio MEMS devices and Systems.
2	To learn the basic principles of BioMEMS/Microfluidic device manufacturing.
3	To make the students aware of applications in various medical specialists especially the Comparison of conventions methods and Bio MEMS usage.
4	To Classify the different mechanisms of micro sensors and actuators.

COURSE OUTCOMES

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

CO1. Understand the Micro fluidic Principles and study its applications.	Understand
CO2. Explain the principles and applications of Micro Total Analysis.	Understand
CO3. Discuss and realize the MEMS applications in Bio Medical Engineering	Understand
CO4. Classifying the principles of Micro Actuators and Drug Delivery system	Apply
CO5.Utilizing the concept of MEMS with biological applications	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Unit I

Introduction-The driving force behind Biomedical Applications – Biocompatibility - Reliability Considerations- Regularity Considerations – Organizations - Education of Bio MEMS-Silicon Micro fabrication-Soft Fabrication techniques

Unit II

Micro fluidic Principles- Introduction-Transport Processes- Electro kinetic Phenomena-Micro valves – Micro mixers- Micro pumps.

Unit III

SENSOR PRINCIPLES and MICRO SENSORS: Introduction-Fabrication-Basic Sensors-Optical fibers-Piezoelectricity and SAW devices-Electrochemical detection-Applications in Medicine

Unit IV

MICRO ACTUATORS and DRUG DELIVERY: Introduction-Activation Methods-Micro actuators for Microfluidics-equivalent circuit representation-Drug Delivery

Unit V

MICRO TOTAL ANALYSIS: Lab on Chip-Capillary Electrophoresis Arrays-cell, molecule and Particle Handling- Surface Modification-Microsphere-Cell based Bioassay Systems Detection and Measurement Methods-Emerging BioMEMS Technology-Packaging, Power, Data and RF Safety-Biocompatibility, Standards

Text Books/ References Books :

. 1. Steven S. Saliterman, Fundamentals of Bio MEMS and Medical Micro devices, Wiley Interscience, 2006.

2. Albert Folch , Introduction to Bio MEMS, CRC Press, 2012
3. Gerald A. Urban, Bio MEMS, Springer, 2006
4. Wanjun wang, steven A. Soper, Bio MEMS, 2006.
5. M. J. Madou, “Fundamentals of Micro fabrication”,2002.
6. G.T. A. Kovacs, “Micro machined Transducers Sourcebook”, 1998.

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	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE:

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

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the basics of Startups Management and components.
2. To analyze the startups fund management practices
3. To practice the various kinds of stocks and employment considerations in startups.
4. To apply the importance of intellectual property rights and its procedures.
5. To explore the entrepreneurial mindset and culture.

COURSE OUTCOMES:

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

CO4	S	S	S	M	M	M	-	-	-	-	M	-	M	L
CO5	S	S	-	M	M	M	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS:

Elements of a successful Start up: Startup Process – Create Management Team and Board of Directors – Evaluate market and Target Customers – Define your product or service – preparation of business plan - specific problems and challenge in startup.

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 – Equity Ownership – 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.

Startup Capital Requirements and Legal Environment:

Identifying Startup capital Resource requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics - The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures..

Text Book:

1. James A. Swanson & Michael L. Baird, "Engineering your start-up: A Guide for the High-Tech Entrepreneur" 2nd ed, Professional Publications.inc
2. Donald F Kuratko, " Entrepreneurship – 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.

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	INNOVATION, PRODUCT DEVELOPMENT AND COMMERCIALIZATION	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

Commercialization of innovation and new products in fast-paced, high-tech markets and matching technological innovation to market opportunities.

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	To make students understand multiple-perspective approach in organization to capture knowledge and creativity to develop successful products and services for Volatile, Uncertain, Complex and Ambiguous (VUCA) world.
2	Inculcate a disruptive thought process to generate ideas for concurrent and futuristic problems of society in general and markets in particular which focus on commercialization
3	Improved understanding of organizational best practices to transform exciting technology into successful products and services
4	Critically assess and evaluate innovation policies and practices in organizations especially from a cultural and leadership point of view
5	Explain why innovation is essential to organizational strategy – especially in a global environment

COURSE OUTCOMES

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

CO1: Understand the role of innovation in gaining and maintaining competitive advantage	Understand
CO2: Integrate the innovation basis and its role in decision making especially under uncertainty	Apply
CO3: Analyze business challenges involving innovation management	Apply
CO4: Having problem solving ability – solving social issues and business problems	Apply
CO5: Comprehend the different sources of innovation	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012
CO1	M	-	-	-	-	M	S	S	-	M	-	-
CO2	S	S	S	M	M	M	-	-	-	-	-	-
CO3	S	S	S	M	M	M	-	-	-	-	-	-
CO4	S	S	S	M	M	M	-	-	-	-	-	-
CO5	S	S	S	M	M	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction to Innovation Management - Innovation – What it is? Why it Matters? - Innovation as a Core Business Process – system thinking for innovation – Framework for System Thinking - system thinking tools

Creating New Products and Services - Product and Service Innovation – Exploiting Open Innovation and Collaboration –The Concept of Design Thinking and Its Role within NPD and Innovation – framework for design thinking

Capturing Innovation Outcome - New Venture – Benefits of Innovation, and Learning from Innovation – Building

Innovative Organization and Developing Innovation Strategy - Globalization for Innovations, Innovating for Emerging Economies and Role of National Governments in Innovation

New Product Brand Development and Pricing Strategies - Importance of Brand decisions and Brand identity development; Pricing of a new product, Pre-test Marketing

The Product offer Selecting Market opportunity and Designing new market offers-Concept Generation and Evaluation, Developing and Testing Physical offers - Pre-launch, during launch and Post launch preparations;

Text Book:

1. Joe Tidd, John Bessant (2013), Managing Innovation: Integrating Technological, Market and Organizational Change, 5th edition, Wiley.

Reference Books:

1. Schilling, M (2013), Strategic management of technological innovation, 4th edition, McGraw Hill Irwin.
2. Allan Afuah (2003), Innovation Management: Strategies, Implementation and Profits, 2nd edition, Oxford University Press.
3. Michael G. Luchs, Scott Swan, Abbie Griffin (2015), Design Thinking: New Product Development Essentials from the PDMA, Wiley-Blackwell.
4. John Boardman, Brian Sauser (2013), Systemic Thinking: Building Maps for Worlds of Systems, 1st edition, Wiley.
5. Rich Jolly (2015), Systems Thinking for Business: Capitalize on Structures Hidden in Plain Sight, Systems Solutions Press

COURSE DESIGNERS:

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	A. Mani	Associate Professor	Management Studies	mani@vmkvec.edu.in
2	Dr. V. Sheela Mary	Associate Professor	Management Studies	sheelamary@avit.ac.in

	INTELLECTUAL PROPERTY RIGHTS AND ALTERNATE DISPUTE RESOLUTION	Category	L	T	P	Credit
			3	0	0	3

PREAMBLE: IPR & ADR

Intellectual Property Rights are valuable assets and most important for any kind of business because set the business apart from competitors, offer customers something new and different, be sold or licenced form an essential part of marketing or branding. ADR is a familiar mechanism to resolve the business issues in a faster way and less expensive with help of a neutral third party.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand and learn the basic concept of IPR and Patent filing procedure.
2. To understand and familiarize various procedure for grants of patent, trademark and trade secrets.
3. To apply various legal aspects in patent ownership and transfer.
4. To apply and practice the laws relating to the Intellectual property rights.
5. To Create model contexts to practice the ADR mechanism.

COURSE OUTCOMES:

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

CO1: Understand the different aspects of intellectual property rights.	Understand
CO2: Explain the procedure and requirement of to apply New IPR development and related system in India and across the Globe.	Apply
CO3: Analyze the various issues of transfer of patent ownership with reference to International Patent Law.	Analyze
CO4: Evaluate the present system of Patent Act in India and changes aligned with international standards.	Evaluate
CO5: Prepare and assess the mechanism to apply in the business issues in the context of ADR	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

UNIT – I: Introduction To IPRs **9**

Basic concepts of Intellectual Property- Patents Copyrights, Geographic Indicators, History of IPRs- the way from WTO to WIPO- TRIPS, Nature of Intellectual Property, Industrial Property, Technological Research, Inventions and Innovations - Defining Intellectual Property and Patents, Patent Searches and Application.

UNIT – II: New Developments in IPR **9**

Procedure for grant of Patents, TM, GIs, Trade Secrets, Patenting under PCT, Administration of Patent system in India, Patenting in foreign countries - International Treaties and conventions on IPRs, The TRIPs Agreement.

UNIT – III: Patent Ownership and Transfer **9**

Defining Intellectual Property and Patents, Patent Searches and Application, Patent Ownership and Transfer, Patent Infringement, New Developments and International Patent Law

UNIT – IV: Legislation of IPRs **9**

The Patent Act of India, Patent Amendment Act (2005), Design Act, Trademark Act, Geographical Indication Act, Bayh- Dole Act and, IPR strength in India - Patent Ownership and Transfer, Patent Infringement, New Developments and International Patent Law

UNIT – V: Alternate Dispute Resolution **9**

Alternate Dispute Resolution and Arbitration – ADR Initiatives - Reason for Choosing ADR – Advantages and Disadvantages of ADR – Assessment of ADR's – Litigation – Arbitration - Effective Mechanism for Business Issues.

TEXT BOOK:

1. Deborah E. Bouchoux, Intellectual Property Rights, Delmar, Cengage Learning, 2005.

REFERENCES:

1. V. Sople Vinod, Managing Intellectual Property by (Prentice hall of India Pvt.Ltd), 2006.
2. A. Primer, R. Anita Rao and Bhanoji Rao, Intellectual Property Rights, Lastain Book company. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2006.
3. Tejaswini Apte, A single guide to Intellectual property rights, Biodiversity and Traditional knowledge.
4. WIPO Intellectual Property Hand book.
5. Intellectual Property rights and copyrights, Ess Ess Publications.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	mail id
1	Dr. G. Murugesan	Professor	Management Studies	murugesan@vmkvec.edu.in
2	B. Rajnarayanan	Assistant Professor	Management Studies	rajsachin.narayanan@gmail.com

	NEW VENTURE PLANNING AND MANAGEMENT	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

Contemporary methods and best practices for the entrepreneur to plan, launch, and operate a new venture and creation of a business plan

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	An opportunity for self-analysis, and how this relates to success in an entrepreneurial environment.
2	Information and understanding necessary to launch and grow an entrepreneurial venture.
3	A realistic preview of owning and operating an entrepreneurial venture.
4	An entrepreneur must understand the diversity, emotional involvement, and workload necessary to succeed.
5	The opportunity to develop a business plan.

COURSE OUTCOMES

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

CO1: Explain the concept of new venture planning, objectives and functions and its components.	Understand
CO2: Analyze the business plan issues and remuneration practices in startups business.	Apply
CO3: Explore an entrepreneurial idea to the point where you can intelligently and decide whether to "go for it" or not.	Apply
CO4: Compare and contrast the different forms entrepreneurial environment in terms of their key differences and similarities.	Apply
CO5: Explore the business plan and business model canvas for your idea.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012
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:

STARTING NEW VENTURE: Opportunity identification - Search for new ideas - Sources of innovative ideas - Techniques for generating ideas - Entrepreneurial imagination &creativity - The role of creative thinking - Developing your creativity - Impediments to creativity.

METHODS TO INITIATE VENTURES: Pathways to new venture - Creating new ventures - Acquiring an existing venture - Advantages of acquiring an established venture - Examination of key issues – Franchising - How a franchise works and franchise law - Evaluating franchising opportunity.

THE SEARCH FOR ENTREPRENEURIAL CAPITAL: The venture capital market - Criteria for evaluating new venture proposals - Evaluating venture capitalists - stage of venture capital financing -

Alternate sources of financing for Indian entrepreneurs - Bank funding - State financial corporations - Business incubators and facilitators - Informal risk capital - Angel investors.

THE MARKETING ASPECTS OF NEW VENTURE: Developing a marketing plan - Customer analysis - Sales analysis - Competition analysis - Market research - Sales forecasting - Sales Evaluation - Pricing decisions.

BUSINESS PLAN PREPARATION FOR NEW VENTURE: Business plan concept - Pitfalls to avoid in business plan - Developing a well conceived business plan - Elements of a business plan - Harvest strategy - Form of business organization - Legal acts governing businesses in India .

Text Book:

1. The Successful Business Plan, Secrets & Strategies, Rhonda Abrams, Published by The Planning Shop Titan, Ron Chernow, Random House
2. Osterwalder, A. and Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Hoboken, NJ: John Wiley & Sons

Reference Books:

1. Blackwell, E. (2011). How to Prepare a Business Plan: Create Your Strategy; Forecast Your Finances; Produce That Persuasive Plan. Kogan Page Publishers.
2. Levi, D. (2014). Group Dynamics for Teams. Sage Publications, Inc. Thousand Oaks.
3. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.
4. Business Model Generation by Osterwalder and Pigneur.

COURSE DESIGNERS:

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	A. Mani	Associate Professor	Management Studies	mani@vmkvec.edu.in
2	Dr. V. Sheela Mary	Associate Professor	Management Studies	sheelamary@avit.ac.in

	SMART GRID TECHNOLOGIES	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

PRERQUISITE

Nil

COURSEOBJECTIVES

1	To Know about the Power Quality Problems and Smart Grid
2	To Discuss about high frequency AC power distribution platforms
3	To Understand Smart Distribution Technologies
4	To Analyse process of installation and operation of different active power controllers in smart grid network.
5	To Understand Energy Storage in Smart Grid

COURSEOUTCOMES

Onthesuccessful completionofthecourse, studentswill beable to	
CO1.Detailed knowledge about Power quality Issues are acquired	
CO2.	
CO3. Design and Implementation of Smart Distribution Technologies	
CO4. Installation of various active Power Controllers in SmartGrid	
CO5.	

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

SYLLABUS

INTRODUCTION TO SMART GRIDS:

Definition, justification for smart grids, smart grid conceptual model, smart grid architectures, Interoperability, communication technologies, role of smart grids standards, intelligrid initiative, national smart grid mission (NSGM) by Govt. of India

SMART TRANSMISSION TECHNOLOGIES:

Substation automation, Supervisory control and data acquisition (SCADA), energy management system (EMS), phasor measurement units (PMU), Wide area measurement systems (WAMS)

SMART DISTRIBUTION TECHNOLOGIES:

Distribution automation, outage management systems, automated meter reading (AMR), automated metering infrastructure (AMI), fault location isolation and service restoration (FLISR), Outage Management Systems (OMS), Energy Storage, Renewable Integration

DISTRIBUTED GENERATION AND SMART CONSUMPTION:

Distributed energy resources (DERs), smart appliances, low voltage DC (LVDC) distribution in homes / buildings, home energy management system (HEMS), Net Metering, Building to Grid B2G, Vehicle to Grid V2G, Solar to Grid, Microgrid

Energy Storage Systems:

Introduction, structure of power storage devices, pumped – storage hydroelectricity, compressed air energy storage system, flywheels, battery storage, hydrogen storage, super conducting magnet energy storage, super capacitors, applications of energy storage devices.

TEXTBOOKS:

1. Clark W Gellings, "The Smart Grid, Enabling Energy Efficiency and Demand Side Response"- CRC Press, 2009.
2. Jean Claude Sabonnadière, Nouredine Hadjsaïd, "Smart Grids", Wiley-ISTE, IEEE Press, May 2012

REFERENCEBOOKS:

1. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong. Wu, Akihiko Yokoyama, Nick Jenkins, "Smart Grid: Technology and Applications"- Wiley, 2012.
2. James Momoh, "Smart Grid: Fundamentals of Design and Analysis" – Wiley, IEEE Press, 2012.

COURSEDESIGNERS

S.No.	NameoftheFaculty	Designation	Department	MailID
1.	Mr.A.BALAMURUGAN	ASSOCIATE PROFESSOR	EEE	balamurugan@vmkvec.edu.in
2.	Mr.V.RATTANKUMAR	ASSOCIATE PROFESSOR	EEE	rattankumar@avit.ac.in

	SOLAR AND ENERGY STORAGE SYSTEMS	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

This subject deals with the general concept of Solar and Energy Storage Systems, and improvement.

PREREQUUISITE : Nil

COURSE OBJECTIVE

1.	• To explain basics of solar photovoltaic systems and energy storage system
2.	• To understand the concepts and various componants of stand-alone system
3.	• To gain the sound knowledge about grid connected PV system
4.	• To know the design of various PV-interconnected systems.
5.	• To provide the knowledge about the various applications of solar system

COURSE OUTCOMES

On the successful completion of the course, students will be able to	Understand
CO1: Describe the basics of solar system.	Understand
CO2:Recognize the concepts of standalone PV system.	Analysis
CO3: Design the grid connected system for various applications.	Analysis
CO4: Select the suitable storage system for particular applications.	Analysis
CO5: Recognize the various applications of solar system.	Create

Mapping with programme outcomes and programme specific outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO12	PSO1	PSO3
CO1	S	M	-	-	M	S	S	M	-	-	L	M	-	M
CO2	S	S	-	-	M	S	S	M	-	-	L	L	-	L
CO3	S	S	L	-	S	S	S	M	-	-	M	M	L	L
CO4	S	M	L	M	S	S	M	M	-	-	M	M	-	-
CO5	S	M	L	M	S	S	M	L	L	-	M	M	-	M

S-STRONG ,M-MEDIUM,L-LOW

SYLLABUS

Introduction

Characteristics of sunlight: the sun and its radiation, Solar radiation, Direct and diffusion radiation,

greenhouseeffect, solar isolation data and estimation-semiconductors and P-N junctions: semiconductors and types,absorption of light, recombination and PN junctions –behavior of solar cells – cell properties: efficiency andlosses, Top contact design, Laser grooved, Buried contact solar cell – PV cell interconnection: Module andcircuit design, Environmental and thermal protection.

Stand-alone PV System

Solar modules – storage systems: Types, applications, requirements, efficiency, Lead acid batteries – power conditioning and regulation: Diodes, Regulators, Inverters- Balance of system components - protection – standalonePV systems design – sizing: Reliability maps, sizing for high reliability, existing methods.

Grid Connected PV Systems

PV systems in buildings – Utility applications for photo voltaic – design issues for central power stations – safety– Economic aspect – Efficiency and performance - International PV programs – Integration of PV and Wind –Indian Specific Standard for Integration.

Energy Storage Systems

Impact of intermittent generation: Wind, gas and coal integration, impacts of cycling, PSCO case studies – Battery energy storage – solar thermal energy storage – pumped hydroelectric energy storage.

Applications

Water pumping – battery chargers – solar car – direct-drive applications –Space – Telecommunications.

Total Hours = 45

Text book(s):

1. Solar Energy – S.P. Sukhatme, Tata McGraw Hill, 2017.

2. Stuart R.Wenham, Martin A.Green, Muriel E. Watt and Richard Corkish, “Applied Photovoltaics”, 2011.

Reference(s):

1. Frank S. Barnes & Jonah G. Levine, “Large Energy storage Systems Handbook”, CRC Press, 2017.

2. S. Sumathi, “Solar PV and Wind Energy Conversion Systems (Green Energy and Technology)”, L. Ashok Kumar , P. Surekha, 2015.

3 https://nptel.ac.in/courses/112/105/112105051/

4 https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Mail-id
1.	Mr.A.BALAMURUGAN	ASSOCIATE PROFESSOR	EEE	balamurugan@vmkvec.edu.in
2.	Mr.V.RATTANKUMAR	ASSOCIATE PROFESSOR	EEE	rattankumar@avit.ac.in

	SOCIAL ENTREPRENEURSHIP	Category	L	T	P	Credit
		OE	3	0	0	3

PREAMBLE

Social entrepreneurship involves the creativity, imagination and innovation often associated with entrepreneurship.

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	To provide students with a working knowledge of the concepts, opportunities and challenges of social entrepreneurship..
2	To demonstrate the role of social entrepreneurship in creating innovative responses to critical social needs (e.g., hunger, poverty, inner city education, global warming, etc)..
3	To engage in a collaborative learning process to develop a better understanding of the context and domain of social entrepreneurship..
4	To help prepare you personally and professionally for meaningful employment by reflecting on the issues of social entrepreneurship.
5	Engage with a diverse group of social entrepreneurs

COURSE OUTCOMES

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

CO1: Explain the concept social entrepreneurship and distinguish its elements from across a continuum of organizational structures from traditional nonprofits to social enterprises to traditional for profits	Understand
CO2: Analyze the operations of a human service organization using social entrepreneurial orientation and industry assessment and diagnostic tools.	Apply
CO3: Apply the Social Business Model Canvas and lean startup methods for planning, developing, testing, launching and evaluating social change ventures.	Apply
CO4: Compare funding options for social change ventures.	Apply
CO5: The outcomes of social entrepreneurship are focused on addressing persistent social problems particularly to those who are marginalized or poor.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012
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:

Social entrepreneurship – dimensions of social entrepreneurship – social change theories – equilibrium and complexity – theory of social emergence

Social entrepreneurs – mindset, characteristics and competencies – developing a social venture sustainability model – feasibility study – planning – marketing challenges for social ventures

Microfinance– MFI (Micro Finance Institutions) in India – regulatory framework of MFI – Banks and MFIs – sustainability of MFI – Self Help Groups– successful MFI models

Angel Investors & Venture Capitalists – difference – valuation of firm – negotiating the funding agreement – pitching idea to the investor

Corporate entrepreneurship – behavioral aspects – identifying, evaluating and selecting the opportunity – venture– location – organization – control – developing business plan – funding the venture – implementing corporate venturing in organization.

Text Book:

1. Constant Beugré, Social Entrepreneurship: Managing the Creation of Social Value, Routledge, 2016.

2. Björn Bjerke, Mathias Karlsson, Social Entrepreneurship: To Act as If and Make a Difference, Edward Elgar Publishing, 2013.

Reference Books:

1. Wei-Skillern, J., Austin, J., Leonard, H., & Stevenson, H. (2007). Entrepreneurship in the Social Sector (ESS). Sage Publications.
2. Janus, K. K. (2017). Social startup success. New York, NY: Lifelong Books.
3. Dancin, T. M., Dancin, P. A., & Tracey, P. (2011). Social entrepreneurship: A critique and future directions.
4. Alex Nicholls, Social Entrepreneurship: New Models of Sustainable Social Change, OUP Oxford, 2008.
5. David Bornstein, Susan Davis, Social Entrepreneurship: What Everyone Needs to Know, Oxford University Press, 2010.

COURSE DESIGNERS:

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	A. Mani	Associate Professor	Management Studies	mani@vmkvec.edu.in
2	Dr. V. Sheela Mary	Associate Professor	Management Studies	sheelamary@avit.ac.in

	PROJECT WORK PHASE I	Category	L	T	P	Credit
		OE	**0**	**0**	**6**	**3**

PREAMBLE

The primary emphasis of the project work phase-I is to understand and gain the knowledge of the principles of Computer Science and Engineering practices, so as to participate and manage main 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).	Apply
2. Design of Modules.	Apply
3. Perform coding.	Apply
4. Analyze and Apply various types of testing techniques and prepare documentation.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

- 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

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	Professor	CSE	hodcse@vmkvec.edu.in
2	Dr. S. Rajaprakash	Associate Professor	CSE	rajaprakash@avit.ac.in

	PROJECT WORK PHASE II	Category	L	T	P	Credit
		OE	**0**	**0**	**24**	**12**

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).	Apply
2. Design of Modules.	Apply
3. Perform coding.	Apply
4. Analyze and Apply various types of testing techniques and prepare documentation.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

- Not more than one student is permitted to work on 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	Dr.S.Rajaprakash	Associate professor	CSE	rajaprakash@avit.ac.in.

	INTERNSHIP	Category	L	T	P	Credit
		OE	0	0	0	3

PREAMBLE

The Engineering Internship course is a Canvas-based course that offers students the opportunity to explore and develop their careers through professional practice. The structured plan of education impacts student work readiness through a number of professional development skill-building activities, including goal setting; analysis and reflection; feedback from employer; informational interviewing and debriefing their experience.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	An understanding of how liberal arts coursework ties to professional careers of interest.
2	Gain insight into a possible career path of interest while learning about the industry in which the organization resides, organizational structure, and roles and responsibilities within that structure.
3	Develop professional connections and identify a strategy for maintaining those connections
4	Identify and articulate next steps in their career trajectory.

COURSE OUTCOMES

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

CO1. Add details about your experience including new skills developed and results obtained .	Understand
CO2. Analyze your internship experience, reflecting on lessons learned and how your liberal arts education prepared you for the internship.	Apply
CO3. Identification of additional skills that will need to be developed to ensure career readiness.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

General Procedure

Final Reflection Report:

I. General 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	Professor	CSE	hodcse@vmkvec.edu.in
2.	Dr.S.Rajaprakash	Associate professor	CSE	rajaprakash@avit.ac.in.

	ENGLISH FOR RESEARCH PAPER WRITING	Category	L	T	P	Credit
		HSS	1	0	0	0

COURSE OBJECTIVES

1	To understand research problem formulation.
2	Need to analyze research related information
3	Evaluate and Follow research ethics
4	To equip with oral and appropriate written communication skills
5	To assist with employability and job seeking skills

COURSE OUTCOMES

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

CO1. Recall appropriate English language usage	Remember
CO2. Find, evaluate and use information effectively	Understand
CO3. Apply and express opinions and ideas in writing	Apply
CO4. Use writing to learn and synthesize new concepts	Apply
CO5.Develop written documents that are appropriate for the audience or purpose.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I - RESEARCH

Meaning of research problem - Sources of research problem- Criteria Characteristics of a good research problem - Errors in selecting a research problem - Scope and objectives of research problem

UNIT II - DATA ANALYSIS

Approaches of investigation of solutions for research problem - data collection, analysis, interpretation -

Necessary instrumentations

UNIT III - PLAGIARISM

Effective literature Reviews - approaches, analysis Plagiarism – Definition of Plagiarism – Consequences of Plagiarism – Unintentional Plagiarism – Forms of Plagiarism - Related Issues - Research ethics

UNIT IV - RESEARCH PAPER FORMAT

Effective technical writing, how to write report, Paper Developing a Research Proposal

UNIT V - FORMAT

Format of research proposal – Margin – Text Formatting - Heading and Title – Page Numbers –Tables and Illustrations – Corrections and Insertions –Binding – Bibliography

REFERENCES:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"

COURSE DESIGNERS

COURSE INSTRUCTOR	DESIGNATION	NAME OF THE INSTITUTION	MAIL ID
Dr. Premkishor	Assistant Professor	AVIT	PREM.ENGLISH@avit.ac.in
Dr.Jennifer G Joseph	HoD - H&S	AVIT	jennifer@avit.a.cin
Dr.P.Saradha	Associate Professor	VMKVEC	saradha@vmkvec.edu.in

	DISASTER MANAGEMENT	Category	L	T	P	Credit
		MC	0	0	0	0

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.

PRE-REQUISITE - Nil

COURSE OBJECTIVES

1	To provide students an exposure to disasters, their significance and types.
2	To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
3	To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4	To enhance awareness of institutional processes in the country
5	To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

COURSE OUTCOMES
Upon completion of this course, the student will be able to

CO1.Differentiate the types of disasters, causes and their impact on environment and society	Understand
CO2. Assess vulnerability and various methods of risk reduction measures as well as mitigation.	Understand
CO3. Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.	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	PSO1	PSO 2	PSO 3
CO:1	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO:2	S	M	S	-	-	-	-	-	M	-	-	-	-	-
CO:3	L	-	-	M	L	-	M	-	-	-	-	-	-	-
CO:4	M	L	M	-	-	-	-	-	-	L	-	-	-	-
CO:5	S	L	-	-	-	-	-	-	L	-	M	-	-	-

S – STRONG, M – MEDIUM and L – LOW

SYLLABUS

INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

DISASTER MANAGEMENT MECHANISM:

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

INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

APPROACHES TO DISASTER RISK REDUCTION (DRR)

Disaster cycle – Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Process and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies

DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

Text Books

1.Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427ISBN-13: 978-9380386423

2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India EducationPvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management,NIDM, New Delhi, 2011

4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers,New Delhi, 2010.

Reference Books

1 Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

2. Government of India, National Disaster Management Policy,2009.

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	E-Mail ID
1	Mr.C.Kathirvel	Associate Professor & Head	Civil	kathirvel@vmkvec.edu.in

		Category	L	T	P	Credit
		MC	0	0	0	0

	VALUE EDUCATION				

PREAMBLE

The course highlights the importance of values and ethics for human life and organization.

PREREQUISITE

Nil

COURSE OBJECTIVES

1	To understand value of education and self- development
2	To inculcate good values in students to make them patriotic with humanity
3	To groom the personality with positive thinking with universal brotherhood and religious tolerance.
4	To impart the value of true friendship and happiness
5	To enhance the character and competence for developing into self-control person

COURSE OUTCOMES

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

CO1. Identify the value of education and self- development with work ethics	Remember
CO2. Interpret sense of duties with good values in students to make them patriotic with humanity	Understand
CO3. Explain the integration, scientific attitude, overall personality with labor dignity	Understand
CO4. Discuss the value of true friendship and happiness	Understand
CO5. Paraphrase the character and competence for developing into self-control person	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Unit I

Values and self-development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles, value judgements

Unit II

Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature, Discipline

Unit III

Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking. Integrity and discipline., Punctuality, Love and Kindness, avoid fault Thinking, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance

Unit IV

True friendship, Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, doing best for saving nature

Unit V

Character and Competence –Holy books vs Blind faith, Self-management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of Women, all religions and same message, mind your Mind, Self-control, Honesty, Studying effectively

Text Books/ References Books :

Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID