SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Outcome based Curriculum for

Postgraduate Degree Courses in Computer Technology & Application

Department of Computer Science & Engineering.

(1) Vision: Creating knowledge of fundamental principles and innovative technologies through research within the core areas of computer science and also in inter-disciplinary topics. Serving the communities to which we belong at local and national levels, combined with a deep awareness of our ethical responsibilities to our profession and to society.

(2) Mission:

- To provide quality education to meet the need of profession and society.
- Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit and ethical responsibilities.
- Establish Industry Institute Interaction program to enhance the entrepreneurship skills
- Provide exposure of latest tools and technologies in the area of engineering and technology.
- Promote research based projects/activities in the emerging areas of technology convergence.

(3) Program Educational Preambles (PEO's):

PEO1: To produce engineering graduates who shall excel in a career utilizing their education in computer engineering.

PEO2: Pursue higher education for professional development.

PEO3: Exhibit leadership qualities with demonstrable attributes in lifelong learning to contribute to the societal needs.

(4) Programme Outcomes (PO's) :

PO01. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engg. Specialization to the solution of complex engineering problems.

PO02. Problem analysis: Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

PO03. Design/development of solutions: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO04. Conduct investigations of complex problems: User research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO05. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO06. The engineer and society: 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.

PO07. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO08. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO09. Individual and team work: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO12. 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.

(5) Program Specific Outcomes (PSOs)

PSO-1 Apply standard Software Engineering practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success.

PSO- 2 Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics of varying complexity.

(06) Programme PO's and PSO's Mapping

Program	Courses Category	PO1 Comp. Knowledge	PO 2 Prob. Analysis	PO3 Design Sol	PO4 Invest. Probl	PO5 Tools	PO6 Ethics	PO7 Learn	PO8 Proj. Mgt	PO9 Comm n	PO10 Soc, Enviro	PO11 Team Work	PO12 Entrepreneurship	PSO1	PSO2
MTECH (CTA)	Foundation Courses	*						*		*			*		
	Professional Core	*	*	*	*	*	*	*	*		*	*		*	*
	Professional Electives	*	*	*	*	*	*	*	*		*	*		*	*
	Employability Enhancement Courses	*					*	*		*		*	*		

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(07) Semester wise PO's and SPO's Mapping

Semester	Name of the Courses	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		Engineering Knowledge	Problem Analysis	Design/ Development of Solution	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management	Life-Long Learning		
Semester-Ist	Advanced Mathematics	*	*	*	*							*			
	Advanced Data Structures and Algorithm	*	*	*	*	*				*		*	*		
	Software Engg.	*	*	*	*	*	*	*	*	*		*	*		
	Object Oriented Technology & UML	*	*	*	*	*				*		*	*		
	Advanced Computer Networking	*	*	*	*	*	*	*		*		*	*	*	
Semester-IInd	Information Security, Coding & Cryptography	*	*	*	*	*	*		*	*			*		
	Advance Distributed System	*	*	*	*	*		*		*		*	*		
	Advance Database Management System	*	*	*	*	*	*			*		*	*		
	Artificial Intelligence	*	*	*	*	*	*			*		*	*		
	Cellular Mobile Systems	*	*	*	*	*	*	*		*		*	*		*
Semester-IIIrd	Data Mining and Warehousing	*	*	*	*	*	*	*	*	*		*	*		
	Web Engineering	*	*	*	*	*	*			*			*		
	Simulation & Modeling	*	*	*	*	*	*			*		*	*		
	Ad-hoc Networks	*	*	*	*	*	*	*		*		*	*		
	Software testing and quality assurance	*	*	*	*	*	*	*		*		*	*		
	Analysis Design & Embedded Systems	*	*	*		*				*		*	*		
	Parallel Computation & Applications	*	*	*	*	*	*			*		*	*		
	Dissertation Part- I	*	*	*	*	*						*			
Semester-IV	Dissertation Part- II	*	*	*	*	*						*			

(08) Structure of Programme: To fulfill the need of development of all the POs/ GAs, as per above mapping, the following semester wise programmed structure are as under.

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Total Credits*= 104

Structure of Post Graduate Engineering program:

S. No.	Course Category	Credits of the Curriculum
1.	Foundation Courses	8
2.	Professional Core	20
3.	Professional Electives	16
4.	Employability Enhancement Courses	60
	Total	**104**

***Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	1 Credit

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(09) Scheme of Exanimation

I Semester

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. *Exam.*	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/Presentation	
1.	**MCTA 101**	**Advanced Mathematics**	3	1	-	4	70	20	10	-	-	**100**
2.	**MCTA 102**	**Advanced Data Structures and Algorithm**	3	1	-	4	70	20	10	-	-	**100**
3.	**MCTA 103**	**Software Engg.**	3	1	-	4	70	20	10	-	-	**100**
4.	**MCTA 104**	**Object Oriented Technology & UML**	3	1	-	4	70	20	10	-	-	**100**
5.	**MCTA 105**	**Advanced Computer Networking**	3	1	-	4	70	20	10	-	-	**100**
6.	**MCTA 106**	**Lab-I**	-	-	6	6	-	-	-	90	60	**150**
7.	**MCTA 107**	**Lab-II**	-	-	6	6	-	-	-	90	60	**150**
		Total	**15**	**5**	**12**	**32**	**350**	**100**	**50**	**180**	**120**	**800**

L: Lecture- T: Tutorial- P: Practical ***w.e.f. July- 2015***

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II Semester

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. *Exam*.	Tests (Two)	Assignments / Quiz	End Sem. Practical / Viva	Practical Record / assignment/Quiz /Presentation	
1.	**MCTA 201**	**Information Security, Coding & Cryptography**	3	1	-	4	70	20	10	-	-	100
2.	**MCTA 202**	**Advance Distributed System**	3	1	-	4	70	20	10	-	-	100
3.	**MCTA 203**	**Advance Database Management System**	3	1	-	4	70	20	10	-	-	100
4.	**MCTA 204**	**Artificial Intelligence**	3	1	-	4	70	20	10	-	-	100
5.	**MCTA 205**	**Cellular Mobile Systems**	3	1	-	4	70	20	10	-	-	100
6.	**MCTA 206**	**Lab-III (MCTA-202 &MCTA-205)**	-	-	6	6	-	-	-	90	60	150
7.	**MCTA 207**	**Lab-IV (MCTA-203 &MCTA-204**	-	-	6	6	-	-	-	90	60	150
		Total	**15**	**5**	**12**	**32**	**350**	**100**	**50**	**180**	**120**	**800**

L: Lecture- T: Tutorial- P: Practical ***w.e.f. July- 2015***

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III SEMESTER

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem *Exam*.	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/Presentation	
1.	**MCTA301**	**Elective I**	3	1	-	4	70	20	10	-	-	100
2.	**MCTA302**	**Elective II**	3	1	-	4	70	20	10	-	-	100
3.	**MCTA303**	**Seminar**	-	-	4	4	-	-	-	-	100	100
4.	**MCTA304**	**Dissertation Part- I**	-	-	8	8	-	-		120	80	200
		Total	**6**	**2**	**12**	**20**	**140**	**40**	**20**	**120**	**180**	**500**

L: Lecture- T: Tutorial- P: Practical ***w.e.f. July- 2015***

Elective – I (MCTA- 301)

(A) Data Mining and ware housing (B) Web Engineering

(C) Simulation & Modeling (D) Ad-hoc Networks

Elective-II (MCTA- 302)

(A) Software testing and quality assurance (B) Analysis Design & Embedded Systems

(C) Parallel Computation & Applications

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Fourth Semester

S.No.	Sub Code	Subject Name	Periods per Week			Credits	Max Marks Theory			Max. Marks Practical		Total Marks
			L	T	P		End Sem Exam	Mid Sem	TW	End Sem Practical / Viva	Practical Record/Quiz /Assignment / Presentation	
1	MCTA 401	Dissertation Part- II	-	-	20	20	-	-	-	300	200	500
TOTAL			-	-	20	20	-	-	-	300	200	500

L: Lecture- **T: Tutorial-** **P: Practical** ***w.e.f. July- 2015***

10) Course Content

Semester- I

MCTA-101- ADVANCED MATHEMATICS

MCTA-101	**Advanced Mathematics**	**3L:1T:0P**	**4 CREDITS**	**3 HRS/WEEK**

Objective:-

Mathematics majors will be able to learn and explain mathematics on their own incorporate specific examples from one branch of mathematics into their study of another branch of mathematics (e.g., Lp-spaces as an example in linear algebra) and identify and explain cases in which major results of one branch of mathematics rely nontrivially on results from another branch (e.g., the application of linear algebra to solving systems of differential equations).

OUTCOMES-

Describe several areas of mathematics beyond calculus, Solve problems using mathematics in unfamiliar settings, Solve equations and inequalities, both algebraically and graphically, and Solving and model applied problems

Total 40 Hours

Unit 1 : Partial Differential Equation **8 Hrs.**

Solution of Partial Differential Equation (P DE) by separation of variable method, Numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference Methods.

Unit 2 : Matrices And Linear System Of Equations **8Hrs.**

Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods -Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

Unit 3 : Calculus Of Variations **9 Hrs.**

Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation, Rayleigh-Ritz method, Galerkin method.

Unit 4 : Fuzzy Logic **8 Hrs.**

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

Unit 5 : Reliability **7 Hrs.**

Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis.

Reference Books:

1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Calculus of Variations - by Elsgole; Addison Wesley.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.

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MCTA-102- ADVANCE DATA STRUCTURES AND ALGORITHMS

MCTA-102	**Advance Data Structures And Algorithms**	**3L:1T:0P**	**4 Credits**	**3 Hrs /Week**

Objective: The main objective is to impart the basic concepts of data structures and algorithms, to understand concepts about searching and sorting techniques, to Understand basic concepts about stacks, queues, lists, trees and graphs, to understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Outcomes: Students will be able to learn:

1. Ability to analyze algorithms and a algorithm correctness.
2. Ability to summarize searching and sorting techniques
3. Ability to describe stack, queue and linked list operation.
4. Ability to have knowledge of tree and graphs concepts.

Total 40 hours

UNIT-I **6 hours**

Introduction:- : Basic Terminology, Data types and its classification, Algorithm complexity notations like big Oh, Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Array as Parameters, Ordered List and operations, Sparse Matrices.

UNIT-II **8 hours**

Recurs ion:- Recursion-definition and processes, simulating recursion, Backtracking, Recursive algorithms, Tail recursion, Removal of recursion. Tower of Hanoi Problem.Linear Data Structure: -Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack, Queue, Array and linked implementation of queues, Circular queues, D -queues and Priority Queues.

UNIT-III **10 hours**

Introduction of Linked list, Implementation of Singly Linked List, Two-way Header List, Doubly linked list, Linked List in Array. Generalized linked list, Non Linear Data Structure : -Trees: Basic terminology, Binary Trees, , algebraic Expressions , Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree (BST), Height-balanced and weight-balanced trees, B- trees, B+ -trees.

UNIT-IV **8hours**

Searching, Sorting And Design Techniques : -Searching Techniques, Sorting- Internal Sorting, Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Rad ix Sort, External Sorting, Merge Sort, Multi-way Merge Sort,Design Techniques - Divide and Conquer, Dynamic Programming, Greedy Algorithm, Backtracking, Local Search Algorithms.

UNIT-V **8 hours**

Memory Management: - Issues - Managing Equal Sized Blocks, Garbage Collection Algorithms for Equal Sized Blocks , Storage Allocation for Objects with Mixed Sizes, Buddy Systems, Garbage collection and compaction.

REFERENCES:

1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
2. Lipschutz; Data structure (Schaum); TMH
3. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002

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MCTA-103-SOFTWARE ENGINEERING

MCTA-103	**Software Engineering**	**3L:1T:0P**	**4 Credits**	**3 Hrs/week**

Objective:

This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering. • It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems. It aims to set these techniques in an appropriate engineering and management context. • It provides a brief account of associated professional and legal issues.

Outcomes: Students will be able to:

1. Understand and demonstrate basic knowledge in software engineering.
2. Identify requirements, analyze and prepare models.
3. Plan, schedule and track the progress of the projects.
4. Design & develop the software projects.
5. Identify risks, manage the change to assure quality in software projects.
6. Apply testing principles on software project and understand the maintenance concepts.

Total 40 hours

UNIT-I **7 hours**

Sys tem Analys is and Design:- Overview of System Analys is & Design , Bus iness System Concept, System Development Life Cycle, Waterfall Model , Spira l Model, Feasibility Analys is, Technical Feasibility, Cost-Benefit Analysis, COCOMO model.

UNIT II **8hours**

Design related issues:-System Requirement Specification – DFD, Data Dictionary, ER diagram, Process Organization & Interactions. System Design – Problem Partitioning, Top-Down And Bottop-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

UNIT III **8 hours**

Coding & Documentation:-Coding & Documentation – Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control.

UNIT IV **8 hours**

Coding standard and guidelines, programming style, code sharing, code review, software components, rapid prototyping, specialization, construction, class extensions, inte lligent software agents, reuse performance improvement, debugging.

UNIT V **9 hours**

Software quality Assurance – Software quality factors – Quality assurance, quality metrics – Halstead's S/W Science. Software, Testing Techniques S/W testing fundamentals – White Box testing, Blackbox – testing, Validation Testing, system Testing, debugging, software maintenance maintainability – maintenance tasks – Reverse engineering and Re-engineering.

TEXT BOOK:

1.Roger S. Pressman – "Software Engineering", Mc.Graw Hill.
2. Rajiv mall: Software engineering"

Reference Books:

1. Rambaugh, James Michael, Blaha - "Object Oriented Modelling and Design" - Prentice Hall India/ Pearson Education
2. Jana, C++ & Object Oriented Programming, PHI
3. OOP in C++ by Lafore, Galgotia Pub.
4. Balagurusamy; Object oriented programming with C++; TMH

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OBJECT ORIENTED TECHNOLOGY & UML

MCTA-104

MCTA-104	**Object Oriented Technology & UML**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objective:

This course teaches students the basic principles of object orientation and OO analysis and design. We will use the Unified Process and the Unified Modeling Language (UML) as tools. Illustrative programming examples use the Java language, but Java programming experience is not required.

Outcome: student will be able to:

1. Describe the three pillars of object-orientation and explain the benefits of each.
2. Create use case documents that capture requirements for a software system.
3. Create class diagrams that model both the domain model and design model of a software system.
4. Create interaction diagrams that model the dynamic aspects of a software system.
5. Explain the facets of the Unified Process approach to designing and building a software system.
6. Describe how design patterns facilitate development and list several of the most popular patterns.

Total 40 hours

UNIT-I **8 hours**

C++ pre liminaries :- Tokens, Keywords, Variable , scope of variables, Data type, pointers, operators -scope resolution, member de-referencing operators, memory management operators, manipulators , type cast operators; Symbolic constants, Type compatibility, Dynamic initialization, Reference variable, Call by reference.

UNIT-II **8 hours**

Objects & Classes:-abstract & declaration syntax, visibility label-private, public, protected, Inline concept, Static data member & member function, Array of objects, Pointer to objects & members, Array of pointers to objects.

Functions :-Declaration & definition, exploring arrays & strings, function overloading, const. function, Passing &returning object through function, The Friend function.

UNIT-III **10 hours**

Constructors & Destructors:-Default constructors, default argument constructor, parameterized constructor, Copy constructor, Destructor.

Inheritance and Polymorphism:- Visibility modes, Single Inheritance, Multi-level Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual base class, abstract class. Function Overloading, Operator overloading, overloading unary, binary, string manipulation using operators. Run time - Virtual function, pointer to object, this pointer, pure virtual function.

UNIT-IV **7 hours**

Object Modeling Technique (OMT):- object model, function model, relationship among mode ls, object diagrams, state diagrams, data flow diagrams, analysis.

Object oriente d Design: Overview of object design, Comb ination the mode ls, Designing algor ithms, design optimization, Implementation of control, Adjustment, Design of association

UNIT-V **7 hours**

Unified Modeling Language (UML): Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs .object oriented database, the architecture of object oriented database, query language for Object Oriented database.

Reference Books:

1. Rambaugh, James Michael, Blaha - "Object Oriented Modelling and Design" - Prentice Hall India/ Pearson Education
2. Jana, C++ & Object Oriented Programming, PHI
3. OOP in C++ by Lafore, Galgotia Pub.
4.Balagurusamy; Object oriented programming with C++; TMH

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ADVANCED COMPUTER NETWORK

MCTA-105

MCTA-105	**ADVANCED COMPUTER NETWORK**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objective:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols.

Outcomes: The students will be able to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Total 40 hours

UNIT- I **8 hours**

Introduction: Data Communication, components, data representation, data flow.

Networks : distributed processing, network criteria, phys ical structures, network models, categories of network, inter connection of networks;

The Internet: brief history, internet today**.**

UNIT- II **8 hours**

Protocols &standard layers : protocols, standards, standard organization, internet standards,

The OSI models: layered architecture, peer to peer process, encapsulation,

Layers in OSI model: physical layer, data link layer, Network layer, transport layer, session layer , presentation layer , application layer. TCP/IP protocol suite: physical and data link layers, network layer, transport layer, application layer,

UNIT-III **8 hours**

Addressing: physical address, logical address, port address, specific address.

B luetooth : Architecture, blue tooth layers, Protocol stack, Frame structure ,Cellur Te le phony-frequency reuse Transmitting, receiving, roaming, Sate llite Networks –GEO,LEO,MEO satellite.

UNIT-IV **8 hours**

Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling

Internet protocols and protocol layering. DNS, Applications : TELNET, RLOGN , FTP, TFTP, NFS, SMTP, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.

UNIT-V **8 hours**

Introduction to Router, Conf igur ing a Router, Interior & Exterior Routing, RIP, Distance Vector Routing,

OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols : DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

REFERENCES:

1) Data communications and networking 4thedtion Behrouz A Fourzan, TMH
2) Computer networks 4thediton Andrew S Tanenbaum, Pearson
3) Computer networks, Mayank Dave, CENGAGE
4) . Internetworking with TCP/IP: Comer.

LAB I

MCTA-106

MCTA-106	LAB I (MCTA-103, MCTA-105)	0L:0T:6P	6 CREDITS	6 HRS/WEEK

LIST OF EXPERIMENT

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user‘s view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. Case study of Parallel search algorithm.
7. Implementing Sliding window protocol.
8. Implementing Dijksta's shortest path routing algorithm.
9. Implementing distance vector routing algorithm.
10. Implementing File transfer program

LAB II

MCTA-107

MCTA-107	LAB II (MCTA-102, MCTA-104)	0L:0T:6P	6 CREDITS	6 HRS/WEEK

LIST OF EXPERIMENT

1. To know the concepts of current project and define SRS according to SDLC
2. Metrics help us understand the technical process that is used to develop a product. The process is measured to improve it and the product is measured to increase quality.
3. Size-oriented metrics are not universally accepted. The use of LOC as a key measure is the center of the conflict. Proponents of the LOC measure claim.
4. Design: To understand the concept of designing models in software projects with the help of DFD and UML diagrams.
5. Project development consists of various phases of SDLC. An example is illustrated below that deals with various phases that are involved in development of software and a project starts with analyzing its domain.
6. Write a program to insert node from a link list.
7. Write a program to delete node from a link list.
8. Write a program to infix to postfix Expression.
9. Write a program to doubly link list and to perform traverse & insertion in it.
10. Write a program to implementing stack Operation push, pop & display.

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Department of Computer Science & Engineering.

INFORMATION SECURITY, CODING AND CRYPTOGRAPHY
MCTA- 201

MCTA- 201	**INFORMATION SECURITY, CODING AND CRYPTOGRAPHY**	**3L:1T:0P**	**4 Credits**	**3 Hrs/week**

Objective:

The objectives of this course are to understand the fundamentals of Cryptography, to acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity, to understand the various key distribution and management schemes, to understand how to deploy encryption techniques to secure data in transit across data networks, to design security applications in the field of Information technology.

Outcome:

The students at the end of the course will be able to:

1. Understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them.
2. Describe the real life applications based on the fundamental theory.
3. Calculate entropy, channel capacity, bit error rate, code rate, steady-state probability and so on.
4. Implement the encoder and decoder of one block code or convolutional code using any program language

Total 40 hours

UNIT-I **7 hours**

Information Theory, Probability and Channel: Introduction, Information Measures, Review probability theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem, redundancy, Huffman Coding, Discrete random Variable. Gaussian random variables, Bounds on tail probabilities.

UNIT-II **7 hours**

Error Control Coding: Channel Coding: Linear Block Codes: Introduction, Matrix description, Decoding, Equivalent codes, Parity check matrix, Syndrome decoding, Perfect codes Hamming Codes ,Optimal linear codes ,.Maximum distance separable (MDS) codes.

UNIT-III **8 hours**

Cyclic Codes: Introduction, generation, Polynomials, division algorithm, Matrix description of cyclic codes, burst error correction, Fire Codes, Golay Codes, and CRC Codes. BCH Codes: Introduction, Primitive elements, Minimal polynomials, Generator Polynomials in terms of Minimal Polynomials, Decoding of BCH codes.

UNIT-IV **9 hours**

Coding for Secure Communications: Review of Cryptography, Introduction, Encryption techniques and algorithms, DES, IDEA , RC Ciphers ,RSA Algorithm ,Diffi-Hellman, PGP, Chaos Functions, Cryptanalysis, Perfect security, Unicity distance, Diffusion and confusion, McEliece Cryptosystem.

UNIT-V **9 hours**

Advance Coding Techniques: Reed-Solomon codes, space time codes, concatenated codes, turbo coding and LDPC codes (In details), Nested Codes, block (in Details), Convolutional channel. Coding: Introduction, Linear convolutional codes, Transfer function representation & distance properties, Decoding convolutional codes (Soft-decision MLSE, Hard-decision MLSE),

References:

1. Rajan Bose “Information Theory, Coding and Cryptography”, TMH, 2002.
2. Kishor S. Trivedi “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, Wiley India, Second Edition.

3. J.C.Moreira, P.G. Farrell "Essentials of Error-Control Coding", Willey Student Edition
4. San Ling and Chaoping "Coding Theory: A first Course", Cambridge University Press, 2004.
5. G A Jones J M Jones, "Information and Coding Theory", Springer Verlag, 2004.
6. Cole, "Network Security", Bible, Wiley INDIA, Second Addition

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MCTA-202-ADVANCE DISTRIBUTED SYSTEM

MCTA- 202	**ADVANCE DISTRIBUTED SYSTEM**	**3L:1T:0P**	**4 CREDITS**	**3 HRS/WEEK**

Objective:

This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.

Outcome:

Students will be able to:

1. Define distributed systems.
2. Explain why you would design a distributed system and what the desired properties of such a system are.
3. List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions.
4. Discuss how the principles are applied in contemporary distributed systems and specific distributed infrastructure such as cloud infrastructure and cloud platforms.

Total 40 hours

UNIT-I **7 hours**

Introduction: Characterization of Distributed Systems - Examples - Resource Sharing and the Web -Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols – Case Studies.

UNIT-II **8 hours**

Processes And Distributed Objects: Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication- Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI -Case Study.

UNIT-III **8 hours**

Operating System Issues – I: The OS Layer - Protection - Processes and Threads - Communication and Invocation –OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures -Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System

UNIT-IV **9 hours**

Operating System Issues – II: Name Services -Domain Name System - Directory and Discovery Services – Global Name Service - X.500 Directory Service - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

UNIT-V **8 hours**

Distributed Transaction Processing: Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions – Atomic Commit Protocols - Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery - Overview of Replication And Distributed Multimedia Systems.

Reference Books:

1. G Coulouris, J Dollimore, T Kindberg, Distributed Sys Concept- Design, Pearson
2. Sape Mullender, Distributed Systems, Addison Wesley,
3. A Fleishman, Distributed Systems- Software Design and Implementation, S Verlag
4. M.L.Liu, Distributed Computing Principles and Applications, Pearson Education

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MCTA-203-ADVANCE DATABASE MANAGEMENT SYSTEM

MCTA- 203	**Advance Database management system**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objective:

This course is intended to provide you with an understanding of the current theory and practice of database management systems. To help you more fully appreciate their nature, the course provides a solid technical overview of database management systems, using a current database product as a case study. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database design principles, and database administration.

Outcome:

Students should be able to do the following:

1. Understand the role of a database management system in an organization.
2. Understand basic database concepts, including the structure and operation of the relational data model.
3. Construct simple and moderately advanced database queries using Structured Query Language (SQL).
4. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
5. Design and implement a small database project using Microsoft Access.
6. Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.
7. Describe and discuss selected advanced database topics, such as distributed database systems and the data warehouse.
8. Understand the role of the database administrator.

Total 40 hours

UNIT-I **8 hours**

Basic Concepts: - DBMS Concepts and architecture Introduction, Review of file organization techniques, Database approach v/s Traditional file, accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer.

UNIT-II **8 hours**

E-R Model: - Entitles and attributes, Entity types, Value, Sets, Key attributes, Relationships, Defining the E-R diagram of database. Concept of Generalization, Aggregation and Specialization. Transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model.

RELATIONAL DATA MODELS:- Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity.

UNIT-III **7 hours**

Structured Query Language: - Relational Query languages: Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union.

Functional Dependencies & Normalization:- Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and loseless join, problems with null valued and dangling tuples, multivalued dependencies.

UNIT-IV **9 hours**

Transaction, Concurrency& Recovery:- basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

UNIT-V **8 hours**

Advance Concepts: - Introduction to Distributed databases, protection, security and integrity constraints. Object Technology and DBMS, Comparative study of OODBMS Vs DBMS. Temporal, Deductive, Multimedia, Web & Mobile database.

References:-

1. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
2. Atul Kahate , " Introduction to Database Management System", Pearson Educations
3. Ashutosh Dubey"DataBase Management concepts" kataria publication

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MCTA-204-ARTIFICIAL INTELLIGENCE

MCTA- 204	Artificial Intelligence	3L:1T:0P	4 Credits	3 hrs/week

Objective:

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments. Assigned projects promote a 'hands-on' approach for understanding, as well as a challenging avenue for exploration and creativity.

Outcome:

The student shall be able to:

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate profciency in applying scientifc method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.
7.

Total 40 hours

UNIT-I **9 hours**

Meaning and definition of artificial intelligence, various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

UNIT-II **8 hours**

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

UNIT-III **7 hours**

Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

UNIT-IV **8 hours**

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

UNIT-V **8 hours**

Introduction to learning, various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

Reference Books:-

1. Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
2. Nelsson N.J., "Principles of Artificial Intelligence", Springer Verlag, Berlin.

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MCTA-205-CELLULAR MOBILE SYSTEMS

MCTA- 205	**Cellular Mobile System**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objective:

The objective of this course is to understanding the basic principles of mobile communication systems, an analysis of mobile communications with the interpretation of the call prints, the basic principles of the modern mobile and wireless communication systems, understanding the operation of mobile communications systems and their generation divisions.

Outcome:

Students will be able to:

1. Explain the basic physical and technical settings functioning of mobile communications systems,
2. Describe the basic principles of mobile communication system,.
3. Conduct field experiments and measurements, and measurements in the laboratory on actual components, devices, equipment and systems,
4. Interpret the collected data and measurement results,

Total 40 hours

UNIT-I **7 hours**

Introduction to cellular mobile systems: Basic cellular system, performance, criteria, Uniqueness of mobile Radio environment, operation of cellular systems, marketing Image of Hexagonal shaped cells, planning of cellular system, Analog cellular systems, digital cellular systems, cell splitting.

UNIT-II **6 hours**

Cell coverage for signal & Traffic: Introduction, obtaining the mobile point to point model, Propagation over water or flat open areas, Foliage loss, Propagation in near in distance, long distance Propagation obtain path less from a point to point Prediction model, call-site antenna Heights & Signal coverage calls, mobile to mobile Propagation.

UNIT-III **7 hours**

Co channel Interference reduction: Co channel interference , exploring co channel interference area, in a system, Real time co channel interference measurement at mobile radio Transceivers, Decision of an Omni directional antenna system, Design of a directional antenna system,. Lowering the antenna height, reduction of co channel interference by mean of a notech in the tilted antenna Pattern, Power control.

UNIT-IV **7 hours**

Frequency management &channel Assignment: Frequency management, Frequency spectrum utilization, set up channels definition of channel assignment, fixed channel assignment, non fixed channel assignment algorithms How to operate north additional spectrum, Traffic & channel assignment, Perception of call blocking from the subscribers.

UNIT-V **7 hours**

Handoffs & Dropped calls: Value of Implementing Handoffs, initiation of a hand off, Delaying a handoff, Forced Handoffs, Queuing of Handoffs, power difference handoff , Mobile assisted handoff & soft Handoff, call site Handoff only, intersystem Handoff, introduction to dropped call rate, Formula of Dropped call rate, Finding the values of g & u.

UNIT-VI **6 hours**

Special topics: Wireless and Mobile Computation – SS7, GSM, CDMA, Mobile IP, Wireless Mobile ATM, Multicast Routing Protocols, Location Management, Mobile Agents, Mobility Management.

Reference Books:

1. J. Schiller, Mobile Communication, Pearson Press.
2. Wireless Network, Kaveh Pahalwan
3. Adhoc Networking by Charles E. Perkins, Addison Wisely
4. Mobile cellular Telecommunications by William C.Y. Lee TMH.

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LAB III

MCTA-206

MCTA-206	**LAB III (MCTA-202, MCTA-205)**	**0L:0T:6P**	**6 CREDITS**	**6 HRS/WEEK**

LIST OF EXPERIMENT

1. Implement concurrent echo client-server application.
2. Incrementing a counter in shared memory
3. Create CORBA based server-client application
4. WSDL based: Implement Arithmetic Service that implements add, and subtract operations
5. To write Program multi-threaded client/server processes.
6. To write Program to demonstrate process/code migration
7. Explain co-channel interference & study?
8. Explain the design of directional antenna system?
9. Explain the case study of wireless & mobile computation.

LAB IV

MCTA-207

MCTA-207	**LAB IV (MCTA-203, MCTA-204)**	**0L:0T:6P**	**6 CREDITS**	**6 HRS/WEEK**

LIST OF EXPERIMENT

1. Write a pl/sql statements for rollback commit and savepoints .
2. Write a pl/sql for select,insert,update and delete statements
3. Write a pl/sql block to delete a record.If deleteoperation is successful return1 else return 0.
4. Display name, hire date of all employes using cursors.
5. Display details of first 5 highly paid employees
6. WAP to implement factorial, fibonacci of a given number.
7. Write a program to solve 4-Queen problem.
8. Write a program to solve traveling salesman problem.
9. Write a program to solve water jug problem using LISP
10. Write a program to solve 8 queens problem

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MCTA-301(A)-Data Mining and Warehousing

MCTA-301(A)	**Data Mining & Warehousing**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objectives: The objective of this course is to familiar with mathematical foundations of data mining tools, Understand and implement classical models and algorithms in data warehouses and data mining, Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

Outcomes : Students will be able to:

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modelling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining

TOTAL: 40 hours

UNIT I **5 hours**

Data Mining: Basic concept ,technology and rules, application of data mining, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

UNIT II **8 hours**

Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules. Clustering paradigms; Partitioning algorithms like K- Method, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

UNIT III **9 hours**

Data mining techniques: Exploration of data mining methodologies, decision tables, decision trees, classification rules, association rules, clustering, statistical models &linear models.
Web mining: Introduction to web mining techniques, web basics and HTTP, data sources on the web, personalization, working with logs, forms and cookies, user identification and path analysis. E-Metrics.

UNIT IV **8 hours**

Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

UNIT V **10 hours**

Data warehousing : Data ware house, OLAP and Data mining. OLTP vs. OLAP. Data Warehouse Design Identifying facts & dimensions, designing fact tables, dimension tables, star flake schema query redirection. OLAP operations Data ware house High Performance Computing architecture, Multidimensional schemes:1 partitioning strategy, aggregation, data marting, metadata. Capacity planning, tuning the data warehouse testing the data warehouse: developing test plan, testing operational environment Distributed and virtual data warehouses.

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List Of Books :

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.

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MCTA-301(B)-Web Engineering

MCTA 301(B)	**Web Engineering**	**3L:1T:0P**	**4 Credits**	**3 hrs/week**

Objective:

Web Engineering introduces a structured methodology utilized in software engineering to Web development projects. The course addresses the concepts, methods, technologies, and techniques of developing Web sites that collect, organize and expose information resources. Topics covered include requirements engineering for Web applications, design methods and technologies, interface design, usability of web applications, accessibility, testing, metrics, operation and maintenance of Web applications, security, and project management. Specific technologies covered in this course include client-side (HTML, JavaScript, and CSS) and server-side (ASP.NET).

Outcomes-

1. Employ techniques to analyze and evaluate software architectures on a real-world large-scale web-based software systems.
2. Create and document a reference architecture for a non-trivial Web based technological product.
3. Present findings of case study analysis of software architectures of a family of large-scale web-based software systems.
4. Envision an innovative product for a wicked problem and develop an architecture for the product that utilizes service-oriented computing technologies

Total 40 hours

UNIT I **8 hours**

Introduction to Web Engineering : History, Web Applications, layering, DNS - encapsulation, de-multiplexing, client /server model, port numbers, standardization process, the Internet. Link layer: introduction, Ethernet and IEEE 802 encapsulation, trailer encapsulation, SLIP, PPP- Loop back interface, MTU.

Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet Mask special case of IP addresses, a subnet example.

UNIT II **8 hours**

Binding Protocol Address- Address Resolution Protocol & RARP, ARP & RARP, packet format, Encapsulation, Internet protocol: Introduction, Ipv4 header, Ipv4Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Super-netting- special case of IP addresses, Ipv6-Motivation, frame format and addressing, comparison of Ipv4 and Ipv6.

UNIT III **7 hours**

ICMP: Introduction, ICMP Header, ICMP message types , ICMP timestamp request and reply, trace route, ping program, Intra & inter domain routing-distance vector routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP, Unicast Routing protocols, IGMP-IGMP message, operation, encapsulation.

UNIT IV **7 hours**

UDP: introduction,UDP Operation , header, checksum, IP Fragmentation, UDP Server design. DNS Introduction- basics, message format, simple example, pointer quires, resource records, caching, UDP. TFTP: introduction, protocol, security. BOOTP: introduction, packet format, server design, through router.

UNIT V **10 hours**

TCP: Introduction, TCP services, headers, connection establishment and termination, timeout of connection establishment- maximum segment size- half, close, state transition diagram, reset segments, simultaneous open and close-options, server design. SNMP Introduction, protocol, structure of management information, object identifiers, management information base, instance identification.

Telnet: rlogin protocols, examples, telnet protocol and examples. FTP, protocol, examples, SMTP protocols, examples, NFS, TCP/IP Applications.

Reference Books : _

1. W. Richard Stevens, TCP/IP Illustrated Volume-I "The Protocols ", Addison W 2
2. Jaiswal .S, TCP\IP Principles, Architecture, Protocols And Implementation, First Edition, Galgotia Publications Pvt Lt

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MCTA-301(C)-Simulation and Modeling

MCTA 301(C)	**SIMULATION AND MODELING**	**3L:1T:0P**	**4 CREDITS**	**4hrs/week**

Objective:

The aim of this course is to introduce various system modeling and simulation techniques, and highlight their applications in different areas. It includes modeling, design, simulation, planning, verification and validation. After learning the simulation techniques, the students are expected to be able to solve real world problems which cannot be solved strictly by mathematical approaches. This course begins by demonstrating the usefulness of simulation as a tool for problem solving in business, industry, government, and society.

Outcome:

Student will be able to:

1. Ability to model deterministic systems and differentiate between nonlinear and linear models.
2. Ability to numerically simulate linear and non-linear ordinary differential equations and deterministic systems.
3. Ability to estimate and validate a model based upon input and output data.
4. Ability to create a model prediction based upon new input and validate the output data.

Total 40 hours

UNIT I **8 hours**

Modeling and simulation: Models types, principles used in modeling, Modeling and simulation methodology, system modeling , concept of simulation, continuous and discrete time simulation, steps in computer simulation, advantages and disadvantages of simulation, simulation study, classification of simulation languages.

UNIT II **8 hours**

Probability concepts in simulation: Basic concept of probability , discrete and continuous probability function, continuous and discrete random variables, distribution of random variables: discrete and continuous, Compartmental models: linear, nonlinear and stochastic models.

UNIT III **7 hours**

Simulation of Queueing System: Queuing system, Characteristics of queuing system, Poisson arrival patterns, birth- death system, equilibrium of queuing system, analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems, computer networks etc.

UNIT IV **10 hours**

System Dynamics & Probability concepts in Simulation: Exponential growth and decay models, logistic curves ,Generalization of growth models ,System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

UNIT V **7 hours**

Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of Simulation sw -SIMULA, DYNAMO, STELLA, POWERSIM.

Reference Books :

1. Gorden G., System simulation, Printice Hall.
2. Payer T., Introduction to system simulation, McGraw Hill.
3. Seila, Applied Simulation Modeling, Cengage
4. Spriet, Computer Aided Modeling and Simulation, W.I.A.

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MCTA-301(D)-Ad-hoc Networks

MCTA 301(D)	AD-HOC NETWORKS	3L:1T:0P	4 CREDITS	4hrs/week

Objectives:

This course covers major aspects of ad hoc networks, from design through performance issues to application requirements. It starts with characteristics features, applications of ad-hoc networks, Modulation techniques and voice coding. It also covers the IEEE 802.11Wireless LAN and Bluetooth standards.

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Outcomes: Student will be able to:

1. Have gained an understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.
2. Have an understanding of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
3. Understand how proactive routing protocols function and their implications on data transmission delay and bandwidth consumption.

Total 40 hours

UNIT I **10 hours**

Ad Hoc Wireless : An introduction, Cellular vs Adhoc wireless Networks, Applications of Adhoc wireless Networks, Issues in Adhoc wireless N/WS. Heterogeneity in Mobile devices, Wireless Sensor N/WS, traffic Profiles, Types of Adhoc Mobile Communications, Types of Mobile Host movements, Challenges facing Ad hoc mobile N/WS. Model of operation, symmetric Links, Layer-2 Ad Hoc solutions, Proactive versus reactive protocols, multicast, commercial Applications of Ad Hoc networking, conferencing, Home Networking, Emergency services, personal Area Networks and Bluetooth, Embedded Computing Applications, Sensor Dust, Automotive/PC Interaction. Factors Affecting Ad Hoc Networks, Scalability, Wireless Data Rates, DARPA packet Radio network, Survivable Radio Networks.

UNIT II **7 hours**

Adhoc Protocols :- Adhoc Wireless Media Access Protocols, Introduction Synchronous MAC Protocol & asynchronous MAC protocol, Problems in Adhoc channel Access Receiver Initiated MAC protocols, Sender. Initiated MAC Protocol, Existing Adhoc MAC Protocol.

UNIT III **7 hours**

AdHoc Routing Protocols: Table-Driven Approaches, DSDV, WRP ,CSGR, Source, Initiated On demand Approaches : AODV, DSR, TORA, SSR, LAR, PAR, ZRP, RDMAR., Multicast Routing in Mobile Ad Hoc Networks, Existing Ad Hoc Multicast Routing Protocols, ABAM : Associativity-Based Ad Hoc Multicast.

UNIT IV **8 hours**

Transport Layer for Ad Hoc Wireless Network : Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

UNIT V **8 hours**

Quality of service in Ad-hoc wireless networks: Issues and challenges in providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, MAC Layer Solutions, Network Layer Solutions, Qos Frameworks for Ad Hoc Wireless Networks. Security issues in Ad Hoc Network: Security in Ad Hoc Wireless Network, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, and Secure Routing in Ad Hoc Wireless Networks.

Books Suggested

1. Ad Hoc Mobile Wireless Networks : Protocols and Systems, C. K. Toh, Springer.
2. Ad Hoc Network, C E Perkins, Pearson Education.
3. Ad Hoc Wireless Networks : Architectures and protocols, C, Siva Ram Murthy and B.S. Manoj, Pearson Education.

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MCTA 302(A) Software Testing & Quality Assurance

MCTA 302(A)	Software Testing & Quality Assurance	3L:1T:0P	4 CREDITS	4hrs/week

Objectives: The objectives of this subject is to discuss the distinctions between validation testing and defect testing, to describe the principles of system and component testing, to describe strategies for generating system test cases, to understand the essential characteristics of tool used for test automation.

Outcomes: Students will be able to:

- Fault identification: what fault caused the failure?
- Fault correction: change the system
- Fault removal: take out the fault

Total 40 hours

UNIT I **7 hours**

Introduction to software testing, concepts, issues and techniques, test activities, management and automation, Coverage and usage testing based on checklist, input domain portioning and boundary testing,

UNIT II **8 Hours**

Object oriented testing: testing OOA and OOD models, object oriented testing strategies, test case design for OO software, testing methods applicable at the class level, interclass test case design, Web application testing, debugging, security & reliability.

UNIT III **8 hours**

The Software Quality Challenge - Software Quality Factors - Components of the Software Quality Assurance System. Pre-Project Software Quality Components -Contract Review - Development and Quality Plans.

UNIT IV **11 hours**

Programming style and program quality: simple style rules, comment statements, program quality, quantifying program quality, Software quality and quality Assurance: Principle of Software Quality Assurance (SQA), Applying SQA to software project, proven factors for SQA success, SQA during software requirements, SQA during software design phase, SQA during software code and test, Advance quality engineering topics.

UNIT V **6 hours**

Human factors in software engineering: Human factors history, HCL requirements and design process, HCL testing.

Reference Books:

1. Ali Behforooz and Frederick J. Hudson, Software Engineering Fundamentals, Oxford University Press
2. JeffTain, Software Quality Engineering: Testing, Quality Assurance and Quantifiable improvement, WillyPub.
3. Aditya Mathur, Foundation of Software Testing 1/e, Pearson Education
4. Paul C. Jorgensen, Software Testing, A Craftsman's Approach, Second Edition, CRC Press

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Outcome based Curriculum for

Postgraduate Degree Courses in Computer Technology & Application

Department of Computer Science & Engineering

MCTA-302(B)-Analysis and Design of Embedded Systems

MCTA 302(B)	Analysis And Design Of Embedded System	3L:1T:0P	4 Credits	3 hrs/week

Objective: The main objective is to introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around. A modern embedded processor like the Intel ATOM.

Outcomes: Students are able to

Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems..

- Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
- Become aware of interrupts, hyper threading and software optimization.
- Design real time embedded systems using the concepts of RTOS.
- Analyse various examples of embedded systems based on ATOM processor.

Total 40 hours

UNIT I **8 Hours**

Embedded systems and their characteristics, challenges and issues in embedded software development, Hardware and electronics fundamentals for software engineers, categories of different processor microprocessor and micro controller, CPU, memory, peripherals, timers, communication interfaces,

UNIT II **7 Hours**

Software tool chains used for development and testing of programs, project manager editor, assembler, compiler, linker, locator, loader debugger, monitor and profiler, use of integrated development environment, GNU, command line tools, build process in embedded systems

UNIT III **9 Hours**

Operating system services: different categories of operating system, kernel architecture, root file system contents, storage device manipulate ions, setting up boot loader , Software architecture for implementing various tasks, round robin with and without interrupts, function queue scheduling architecture, real-time operating systems. Hardware and software development methodology and use of hardware debugging aids like in circuit emulators and logic analyzers.

UNIT IV **8 Hours**

Architecture of simple RTOS, definition of tasks, task controller, task information, scheduling priority, shared data problems and mutual exclusion critical section implementation. Intertask communication, semaphores, message queues, buffers pipes, reentrance issues, timer functions, interrupts and I/O,
designing a real time application using a RTOS, µ COS II or embedded linux.

UNIT V **8 Hours**

Power optimization strategies for processes, ACPI, design case studies, Networked embedded system, distributed embedded architecture, HW and SW architecture, IIC bus, CAN bus, Myrinet network based design, communication analysis, system performance analysis, HW platform design, allocation and scheduling, internet embedded systems. System design techniques.

Reference Books:

1. Simon DE; an embedded software primer; Pearson
2. Ayala K; 8051 programming and interfacing; Peram
3. Vahid F and Givargis T; Embedded system design...; John Wiley
4. Heath Steve; Embedded system designs; Oxford newness

SCHOOL OF ENGINEERING

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MCTA-302(C)-Parallel Computation and Applications

MCTA 302(C)	**Parallel Computation and Applications**	**3L:1T:0P**	**4 Credits**	**3 Hrs/week-**

Objective:

This course provides a basic, in-depth look at techniques for the design and analysis of parallel algorithms and for programming them on commercially available parallel platforms. Principles of parallel algorithms design and different parallel programming models are both discussed. MPI, POSIX threads, and Open MP all are discussed. This course is for anyone wanting to gain proficiency in all aspects of parallel and distributed programming.

Outcome:

Students learn:

1. To develop an understanding of various basic concepts associated with parallel computing environments.
2. To understand the effects that issues of synchronization, latency and bandwidth have on the efficiency and effectiveness of parallel computing applications.
3. To gain experience in a number of different parallel computing paradigms including memory passing, memory sharing, data-parallel and other approaches.
4. To earn experience in designing and testing parallel computing solutions to programming problems.
5. To develop improved communication and collaborative skills.

Total 40 hours

UNIT I **8 hours**

Parallel Processing-Evolution of Parallel architectures-Applications of architectural Parallelism- Architectural classification schemes- parallelism in algorithms- Parameters characterizing algorithm parallelism- speedup and efficiency of parallel algorithms- architectures- interconnection networks.

UNIT II **9 hours**

Array Processors -SIMD array processors: SIMD computer organization- SIMD interconnection networks: static v/s dynamic, mesh connected ILLIAC network, MIMD Computers and Multiprocessors, Shared memory and message passing architecture – overview of shared memory multiprocessor programming- pipelined MIMD-multithreading.

UNIT III **8 hours**

Multiprocessor Architecture -Functional structures, UMA and NUMA multiprocessors. Interconnection Networks: Time shared or common buses, Cross bar switch and multiport memories, Comparison of multiprocessor interconnection structure, multistage networks for multiprocessors.

UNIT IV **9 hours**

Data dependence and Parallelism: Discovering parallel operations in sequential code- variables with complex names-sample compiler techniques - data flow principles-data flow architectures- Implementing Synchronization and Data Sharing: The character of information conveyed by synchronization - synchronizing different kinds of cooperative computations-waiting mechanisms- mutual exclusion using atomic read and write.

UNIT V **6 hours**

Parallel Programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming.

References:

1. Harry F. Jordan and Gita Alaghband, "Fundamentals Of Parallel Processing", Pearson Education, 2003
2. Kaihwang and Faye A. Briggs, "Computer Architecture and Parallel Processing", McGraw Hill Series.
3. Kaihwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability".
4. Michael J. Quinn, "Parallel Computing – Theory and Practice **Simulation of Queueing System:** Queuing system, Characteristics of queuing system, Poisson arrival patterns, birth- death system, equilibrium of queuing system, analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems, computer networks etc.

(11) Assessment

PO/Course Assesment Tools Types	PO/Course Assesment Tools	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO 8	PO9	PO10	PO11	PO 12
		Engineering Knowledge	Problem Analysis	Design/ Development of Solution	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management	Life-Long Learning
Direct Tools	Test	*	*	*	*				*		*	*	
	Assignments	*	*			*				*			
	lab /seminar/industrial training/projects(Rubrics)	*	*	*		*		*	*	*	*	*	*
Indirect Tools	Course end survey	*				*		*					
	Exit survey	*	*										*
	Faculty Survey	*	*	*	*			*					
	Alumni Survey	*			*		*		*	*	*		*
	Program Statistics	*			*				*			*	