DEPARMENT OF COMPUTER SCIENCE
KAKTIYA UNIVERSITY,
HANUMAKONDA

Department Profile

Kakatiya University started MCA programme with the assistance from UGC in 1993. Later M.Sc. (Computer Science) M.Sc. (Information Systems) B.C.A. and PGDCA programs were also added. In 2001, the above programmes are made to be offered by a full-fledged department, Department of Informatics (the name later was changed to **Department of Computer Science**). The Department is updating the syllabus keeping in view the latest trends in the IT industry. The department has the best infrastructural facilities to facilitate the students to work on emerging technologies of the industry.

Vision

To produce the competent and ethically strong professionals with a benttowards research and innovation and thus the societal development.

Mission

To educate the students to create, share and apply knowledge in the Computer Science and related domains and be successful, ethical, effectiveproblem-solvers and life-long learners, leading their careers always for the economical well-being of out region in particular and the nation in general.

Master of Science in Computer Science (M.Sc(CS)) 2 Years duration

Master of Science in Computer Science (M.Sc(CS)): Students are selected through a state level Common Post Graduate Entrance Test (CPGET) conducted by a State University under Self Finance category with an intake of
45. Recently the intake has been increased to 60 which would be taken up with effect from the academic year 2022-23 onwards.

Master of Science in Computer Science Programme

The Master of Science in Computer Science Programme provides the students with knowledge, general competence, and analytical skills on an advanced level, needed in academics, industry, research.

Programme Objectives
- To develop core competence in Computer Science
- To prepare the students to carry out research and development work
- To prepare the students to take up a career in the IT industry.

Programme Outcomes

PO1 To apply the knowledge of computer application to find solutions for real-life application.

PO2 To analyze, design, develop and maintain the software application with latest technologies

PO3 To utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

PO4 To inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

PO5 To provides technology-oriented students with the knowledge and ability to develop creative solutions.

PO6 To develop skills to learn new technologies

PO7 To apply computer science theory and software development concepts to construct computing-based solutions.

PO8 To design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications.

Programme Specific Outcomes
Students will

- Understand the role of Computer Science in solving real time problems in society.

- Know the recent developments IT, future possibilities and limitations, and understand the value of lifelong learning

- Become technology-oriented with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society as a whole.

- Acquire some development experience within a specific field of Computer Science, through project work.

- Gain ability to apply knowledge of Computer Science to the real-world issues.

- Get familiar with current research trends in various fields of ComputerScience.

- Use creativity, critical thinking, analyses and research skills.

- Get prepared for placement by developing personality and soft skills.

- Gain ability to communicate scientific information in a clear and concisemanner.

- Build up programming, analytical and logical thinking abilities.

- Know the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.

- Get an ability to participate in debates, discussions in the society constructively.

- Gain management skills to cater the corporate sector.

Course Outcomes

Paper Code	Course / Paper Title	Course Outcomes
MSCCS111	**Discrete Mathematics**	1. To learn necessary mathematical concepts that are prerequisite for computer related subjects namely database management systems, knowledge based systems and artificial intelligence 2. To know about first-order logic , quantifier logic and predicator logic 3. To understand elementary combinations and permutations with repetitions, different methods of solving recurrence relations 4. To understand concepts and algorithms related to various types of graphs, trees andapplications to real life problems
MSCCS112	**Java Programming**	1. To learn about OOP language concepts 2. To learn basic programming using Java 3. To handle abnormal termination of a program using exception handling 4. To create flat files and packages 5. To design UI using Swing and AWT 6. To have exposure on multithreading
MSCCS113	**Operating Systems**	1. To understand functionality of OS 2. To understand process management andvarious related algorithms 3. To Schedule CPU time using scheduling algorithm for processors 4. To understand memory management andvarious related algorithms 5. To understand about different File management algorithms 6. To understand about different Main Memory allocation techniques 7. To Compare Memory allocation using Bestfit, Worst fit, and first fit policies 8. To Apply page replacement policies fordynamic memory management 9. To study about the significance of virtual memory under memory management.
MSCCS114	**Computer Networks**	1. To know about computer network architecture and reference model 2. To be aware of different types of data linkand medium access control protocols 3. To understand various routing algorithms and internet working 4. To understand about network protocols forreal time applications
MSCCS115	**Oops with Java Lab**	• To train the students in implementing all the concepts learnt as a part of the syllabus using Java as a programming language
MSCCS116	**Operating System**	• To train the students in implementing all the

	Lab	concepts learnt as a part of the syllabus using any programming language
MSCCS117	Computer Networks Laboratory	• To train the students in implementing all the concepts learnt as a part of the syllabus using NS2 tool.
MSCCS118	Seminar	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.
MSCCS121	Computer Organization	1. To understand the anatomy of the computer and how the functional units operate, interact, and communicate 2. To represent the data at the machine level and to know how computations are performed at the machine level 3. To know the working procedure of various input/output devices and transfer of data from different modes
MSCCS122	Advanced Java	1. To understand the basics of networking 2. To get an overview about the RPC and RMI applications 3. To learn how to use JDBC technology and different types of drivers 4. To get resultset metadata particulars 5. To know how to illustrate precompiled and call stored procedures 6. To get an idea about server-side technology and to understand how to write, deploy, and invoke java servlets 7. To know the advantages of JSP over other similar technologies 8. To understand how to create and use custom tags and to access databases
MSCCS123	Unix Network Programming	1. To know UNIX environment and basic UNIX commands 2. To understand fundamentals of shell programming. 3. To practice implementing different CPU scheduling algorithms, page replacement algorithms and dead 4. lock avoidance algorithm 5. To know the different types of file organization techniques
MSCCS124	Software Engineering	1. To learn the phases of software development 2. To understand process models and process system models 3. To gather, understand, analyze and specify requirements 4. To elicit, analyze and model requirements 5. To understand the components of Unified Modelling Language 6. To know the different types design concepts

		7. To know the metrics for different softwareand analyze the quality of a software
MSCCS125	**Advanced java laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus using Java, Servlets and JSP with database connectivity.
MSCCS126	**Unix Network Programming laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus in the UNIX environment.
MSCCS127	**Software Engineering laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus using different CASE tools.
MSCCS128	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.
MSCCS211	**Automata Theory and Finite Languages**	1. To construct finite state machines and the equivalent regular expressions 2. To identifying the given language is regularor not 3. To design pushdown automata and the equivalent context free grammars 4. To design Turing machines
MSCCS212	**Data Warehousing and Mining**	1. To know the fundamental theories and concepts of data warehouse and datamining 2. To be aware of pre-processing techniques, basic algorithms and techniques for mining frequent patterns, associations and correlations 3. To understand popular classification and prediction techniques 4. To know about clustering techniques, web mining and business applications of data mining
MSCCS213	**Elective-1 (a) .Net Programming**	1. To gain programming knowledge in .Net Framework. 2. To introduce .Net IDE Component Framework. 3. To know the programming concepts in .Net Framework. 4. To understand of making use of variouscontrols of .Net 5. To design various console, window, weband database applications.
	Elective-1 (b) Python Programming	1. To have exposure on the basic programming constructs of Python 2. To know the scope of applicability of Pythonas a programming language in different domains 3. To developing adequate skills in Python

		programming 4. To implement of various applications using Python
MSCCS214	**Elective-2 (a)** **PHP Programming**	1. To aware of www and web evolution 2. To know about client side scriptinglanguages 3. To design static web pages using HTML Tags, CSS properties, java script snippets 4. To get familiar with java script functions,events and objects 5. To know about server side scripting languages 6. To get accessing the data from the database using MySQL and different types of databases
	Elective-2 (b) **Programming withR**	1. To know the basics of statistical computingand data analysis 2. To explore the usage of R for analytical programming 3. To implement data structures in R 4. To know about R loop functions and debugging tools 5. To be aware of Object-oriented programming concepts in R 6. To visualize the data in R 7. To write custom R functions
MSCCS215	**Data Warehousing And Mining Lab**	1. To train the students in implementing all the concepts learnt as a part of the syllabus using WEKA tool. 2. Analyse datasets with the following unsupervised learning methods: for dimensionality reduction, principal component analysis; for grouping, kmeans clustering and hierarchical clustering.
MSCCS216	**Elective-1 (a)** **.Net Programming Lab**	• To train the students in developing console, windows, web and database applications on VB.NET platform.
	Elective-1 (b) **Python Programming Lab**	• To train the students in implementing all the concepts learnt as a part of the syllabus using different packages of Python.
MSCCS217	**Elective-2 (a)** **PHP Programming Lab**	• To train the students in developing varietyof web applications using different client and server side scripting languages.
	Elective-2 (b) **Programming withR Lab**	• To train the students in implementing all the concepts learnt as a part of the syllabus in R environment
MSCCS218	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills.

		• To improve the ability to think and question critically.
MSCCS221	**Artificial Intelligence**	1. To understand concept of knowledge representation and predicate logic and transform the real life information in different representation. 2. To understand state space and its searching strategies. 3. To understand machine learning concepts and range of problems that can be handled by machine learning. 4. To understand the numerous applications and huge possibilities in the field of AI . 5. Solve real-world problems in organizational processes and workflows by applying critical thinking, problem-solving, and cognitive computing skills.
MSCCS222	**Elective -1 (a) Cryptography and Net Work Security**	1. To learn fundamentals of cryptography and its application to network security. 2. To understand network security threats, security services, and countermeasures. 3. To acquire background on well known network security protocols such as IPSec, SSL, and WEP. 4. To acquire background on hash functions; authentication; firewalls; intrusion detection techniques. 5. To classify the symmetric encryptiontechniques 6. To Illustrate various Public key cryptographic techniques 7. To know the authentication and hash algorithms and authentication applications
	Elective -1 (b) Mobile Computing	1. To know about essentials of wireless networks and protocols 2. To understand wireless network communication, LAN technology and standards 3. To study about mobile computing and medium access control mechanisms 4. To understand mobile network and transport layer protocols

MSCCS223	**Elective -2 (a)** **Big Data Analytics**	1. To know about essentials of Big data management and applications 2. To have an idea of data analytics andreporting 3. To explore hadoop map reduce frameworkfor developing Big data applications 4. To develop big data applications capablewith Hadoop distributed file system
	Elective -2 (b) **Cloud Computing**	1. To understand the principles and paradigm of Cloud Computing 2. To have the ability to design and deploy Cloud Infrastructure 3. To understand cloud security issues and solutions 4. To analyze the virtualization and cloud computing concepts. 5. To learn the architecture, deployment models, and infrastructure models of Cloud Computing.
MSCCS224	**Major Project Work**	1. To apply the software engineeringprinciples on a real software project 2. To have problem based and project based learning 3. To choose major project in one of the selected areas of specialization with substantial multi-disciplinary component 4. To nurture the analytical and research skills 5. To develop team work, leadership and interpersonal skills
MSCCS225	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.

Doctor of Philosophy (Ph.D.) Programme in Computer Science

The Doctor of Philosophy programme promotes scientific research at the university level and encourages scientific publishing and actively contributes to the global progress in computing sciences.

Programme Objectives

1. To prepare the scholars to identify and design scientifically sound and ethical research to solve computational problems.
2. To prepare specialized and qualified scholars to meet the needs in applied scientific research in higher education locally and globally.
3. To contribute to the transfer of knowledge and experience, for the nation's scientific progress and building its applied research capabilities
4. Finding scientific solutions to the dilemmas facing society and its development by providing a high level of applied research and transfer of advanced technologies.

Programme Outcomes:

P01   To plan and conduct original research that addresses questions of significance in a particular subject area in Computer Science.

P02   To analyze and be able to articulate the scientific advances and limitations of results described in the research literature.

P03   To demonstrate the ability to   effectively communicate research proposals and results.

P04   To demonstrate in-depth knowledge of a particular subject area and broad knowledge of other areas in Computer Science.

P05   To demonstrate an understanding of and ability to follow ethical standards in research, teaching, and professional service.

P06   To demonstrate the ability to teach concepts in Computer Science

KAKATIYA UNIVERSITY
WARANGAL-506009

M.Sc. (Computer Science) Syllabus

Under the

CHOICE BASED CREDIT SYSTEM
(With effect from 2017-18 onwards)

DEPARTMENT OF COMPUTER SCIENCE

University College, KU, Warangal-506009

M.SC. I YEAR I SEMESTER:

| Paper No | Paper Title/Subject | Workload Per Week (Theory & Lab) | MARKS | | | CREDITS |
			Internal	External	Total	
MSCCS111	DISCRETE MATHEMATICS	04	20	80	100	4
MSCCS112	OOPS WITH JAVA	04	20	80	100	4
MSCCS113	OPERATING SYSTEMS	04	20	80	100	4
MSCCS114	COMPUTER NETWORKS	04	20	80	100	4
MSCCS115	OOPS WITH JAVA LABORATORY	04	0	75	75	3
MSCCS116	OPERATI NG SYSTEM LABORATORY	04	0	75	75	3
MSCCS117	COMPUTER NETWORK S LABORATORY	04	0	75	75	3
MSCCS118	SEMINAR	--	25		25	1
					650	26

MSCCS111	DISCRETE MATHEMATICS		DM
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**		**EXTERNAL MARKS: 80**

U N I T - I

FUNDAMENTALS: Sets, Relations and functions, Fundamental of logic, Logical inferences, First order logic, Q u a n t i f i e d propositions, Mathematical induction

ELEMENTARY COMBINATORICS: Combinations a n d P e r m u t a t i o n s , E n u m e r a t i o n - w i t h Repetitions, with constrained repetitions, The Principle of Inclusion-Exclusion.(Chapters 1-2)

U N I T -II

RECURRENCE RELATIONS: Generating functions, Coefficients of Generating functions, Recurrence Relations, Inhomogeneous Recurrence Relations (Chapter-3)

U N I T - III

RELATIONS AND DIAGRAMS: Relations and diagrams, Binary relations, Equivalence relations, Ordering relations, Lattices, Paths and Closures, Directed graphs, Adjacency matrices-Applications, Sorting and Searching (Chapter - 4)

U N I T - IV

GRAPHS: Graphs, Isomorphism, Trees, Spanning trees, Binary trees, Planar graphs, Euler'sCircuits, Hamiltonian graphs, Chromatic numbers, Four-color problem, Network flows (Chapter 5)

TEXT-BOOK:

1. Discrete Mathematics For Computer Scientists, By - J L Mott, A Kandel And T Pbaker

REFERENCE BOOKS:

1. Discrete Mathematical Structure - (Tmh) By - Trembley And Manohar
2. Discrete Mathematics With Algorithms - (John Wiley) By - M.O. Albertson And J.P.Hutchinson
3. Elements Of Discrete Mathematics-(Tmh, Second Edition) By - C.L.Liu
4. Discrete Mathematics - (Phi, Third Edition) By - Burnord Kolman
5. Discrete Mathematics By Kh Rossen (Tmh)
6. Discrete Mathematics By S Lipschutz And M. Lipson Schaum's Series (Tmh)
7. Discrete Mathematics For Computer Science By Garrry Haggard, J. Schilpf And S White Sides (Thomson Press)
8. Discrete &Combinatorial Mathematics By Ralph P Grimaldi(Pearson Education)
9. Discrete Mathematical Structures By Ds Mallik & M K Sen (Thomson Press)

MSCCS112	OOPS WITH JAVA	OOPS
WORK LOAD: 4 PPW	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

UNIT I

Introducing Classes, A Closer Look at Methods and Classes- Inheritance, Packages and Interfaces.
 (Chapters 6, 7, 8 and 9)

UNIT II

 Exception Handling – Multithreaded Programming – Enumerations, Autoboxing, Static Import and Annotations (Chapters 10, 11, 12)

UNIT III

String Handling, Collection Framework, Primitive type wrappers, Exploring java.io (Chapters 15, 17 & 19)

UNIT IV

The Applets classes, Events handling, understanding layout Managers– Introducing Swings, exploring swing (Chapters 22, 23, 30, 31)

TEXT BOOK:
1. Java the Complete Reference 8th Edition, Herbert Schildt, Tata McGrawHill Edition
References
1. Beginning Java, Java 7th Edition, Ivor Horton's, Wiley India Edition.
2. Java A Beginner's Guide, Fifth Edition, Tata McGRAW-HILL.

MSCCS113	OPERATING SYSTEMS		OS
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**	

U N I T – I

INTRODUCTION: What is an Operating Systems?, Mainframe Systems, Desktop Systems, Distributed Systems, Real-Time Systems, Handheld Systems, Feature Migration, Computing Environments. COMPUTER-SYSTEM STRUCTURES: Computer - System Operation, I/O Structure, Storage Structure, Hardware protection, Network Structure. OPERATING SYSTEM STRUCTURE: System Components, Operating System Services, System Calls, System Programs, System Structure, Virtual Machines, System Design and Implementation. PROCESSES: Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Inter process Communication, communication in Client-Server Systems. Multithreading concepts, Multithreading Models, Java Threads. (Chapters 1, 2, 3, 4 and 5)

U N I T - II

CPU SCHEDULING: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Process Scheduling Models.
PROCESS SYNCHRONIZATION: Background, The Critical-Section Problem, synchronization Hardware, Semaphores, Critical Regions, Monitors, OS Synchronization. DEADLOCKS: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection. (Chapters 6, 7 and 8)

U N I T - III

MEMORY MANAGEMENT: Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation. VIRTUAL MEMORY: Background, Demand Paging, Process Creation, Page Replacement, Allocation of Frames, Thrashing. FILE SYSTEM INTERFACE & IMPLEMENTATION: File Concept, Access Methods, Directory Structure, File-System Mounting, File Sharing, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space Management, and Recovery.   (Chapters 9, 10, 11 and 12)

U N I T - IV

MASS-STORAGE STRUCTURE: Disk Structure, Disk Scheduling, Disk Management, Swap Space Management, RAID Structure, Disk Attachment, Stable-Storage Implementation. PROTECTION: Goals of Protection, Domain of Protection, Access Matrix, Implementation of access Matrix, Revocation of Access Rights, Capability-Based Systems. (Chapters 14 and 18)

TEXT BOOKS

1. OPERATING SYSTEM CONCEPTS (6th Edition) By - SILBERSCHATZ, GALVIN, GAGNE Jhon-Wiley (2002)

REFERENCE BOOKS
1. Operating Systems (Iv Edition) By - William Stallings Phi (2002)
2. Operating Systems By - Gary Nutt (Pearson Education)
3. Operating Systems By - Charles Crowley Tmh (2000)

MSCCS114	COMPUTER NETWORKS		CN
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**	

U N I T - I

COMPUTER NETWORKS AND THE INTERNET: What is the Internet?, What is a Protocol?, The Network Edge, The Network Core, Access Networks and Physical Media, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models, Internet Backbones, NAPs, and ISPs, A Brief History of Computer Networking and the Internet.
APPLICATION LAYER: Principles of Application Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS - The Internet's Directory Service. (Chapter 1 and Chapter 2.1 to 2.5)

U N I T - II

TRANSPORT LAYER: Transport-Layer Services and Principles, Multiplexing and DE multiplexing Applications, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles   of Congestion Control. (Chapter 3.1 to 3.6)

U N I T - III

NETWORK LAYER AND ROUTING: Introduction   and   Network   Service   Models, Routing Principles, Hierarchical Routing, Inter Protocol, Routing in the Internet, What's Inside a Router? (Chapter 4.1 to 4.6)

U N I T - IV

LINK LAYER AND LOCAL AREA NETWORKS: The Data Link Layer: Introduction, Services, Error Detection and Correction   Techniques, Multiple Access Protocols and LAN's, LAN Addresses and ARP, Ethernet, Hubs, Bridges, and Switches,   IEEE 802.11 LANs,   PPP: The Point-to-Point Protocol, Asynchronous Transfer Mode (ATM), X.25 and Frame Relay. (Chapter 5.1 to 5.10)

TEXT BOOK:

 1. Computer Networking A Top-Down Approach Featuring The Internet By –
    James F. Kurose And Keith W. Ross (Pearson)

REFERENCE BOOKS:

 1. Business Data Communication & Networks By - Fitz Gerald (John Wiley)
 2. Data & Computer Communications - W Stallings (Pearson, Phi)
 3. Computer Communications&Networking Topologies-Magallo, V.M.Hancock (Thomson)
 4. Data Communication & Computer Networks - R. Agarwal, Bb Tiwari (Vikas)
 5. Computer Networks - As Tanenbaum (Phi)
 6. Computer Networks - Black (Phi)
 7. Under Standing Communications & Networks - Wa Shay (Thomson)

MSCCS115	OOPS WITH JAVA LAB	SLL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

The concepts covered in the corresponding theory paper are to be implemented.

MSCCS116	OPERATING SYSTEMS LAB	OSL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

1. Simulate the following CPU Scheduling algorithms
    a) Round Robin
    b) SJF
    c) FCFS
    d) Priority
2. Simulate all file allocation strategies.
    a) Sequential
    b) Indexed
    c) Linked
3. Simulate MVT and MFT
4. Simulate all File organization techniques.
    a) Single level directory
    b) Two level
    c) Hierarchical
    d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm Dead Lock Prevention.
7. Simulate all Page replacement algorithms.
    a) FIFO
    b) LRU
    c) LFU
    d) Etc….
8. Simulate Paging Techniques of memory management.
9. Shell Programming.
    a) Writing Simple shell scripts
    b) Control structures - sequence, selection, iteration
    c) Pipes & Redirections
    d) Passing arguments to shell programs
    e) Simple programs using system calls
10. UNIX System Administration:
    a) User account maintenance
    b) Security
    c) Print jobs
    d) Backup
    e) Package installations
    f) Resource management
    g) Device drivers

MSCCS116	COMPUTER NETWORKS LAB	NAPL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

PART A – Simulation Exercises
The following experiments shall be conducted using either NS228/OPNET or any other simulators.

1. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.

2. Simulate a four node point-to-point network, and connect the links as follows: n0- n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.

3. Simulate the different types of Internet traffic such as FTP a TELNET over a network and analyze the throughput.

4. Simulate the transmission of ping messaged over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

5. Simulate an Ethernet LAN using N-nodes(6-10), change error rate and data rate and Compare the throughput.

6. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and determine collision across different nodes.

7. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and plot congestion window for different source/destination.

8. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation And determine the performance with respect to transmission of packets.

MSCCS118	SEMINAR		S
WORK LOAD: 0 2	INTERNAL MARKS: 25	EXTERNAL MARKS: 00	

- This course is meant to give students practice of speaking in front of an audience and to explore topics of their own choosing in detail.
- Students have to search topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To improve students speaking skills, each student has to receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.

M.SC. I YEAR II SEMESTER:

| Paper No | Paper Title/Subject | Workload Per Week (Theory & Lab) | Marks | | | CREDITS |
			Intern al	External	Total	
MSCCS121	COMPUTER ORGANIZATION	04	20	80	100	4
MSCCS122	ADVANCED JAVA	04	20	80	100	4
MSCCS123	UNIX NETWORK PROGRAMING	04	20	80	100	4
MSCCS124	SOFTWARE ENGINEERING	04	20	80	100	4
MSCCS125	ADVANCED JAVA LABORATORY	04	0	75	75	3
MSCCS126	UNIX NETWORK PROGRAMING LABORATORY	04	0	75	75	3
MSCCS127	SOFTWARE ENGINEERIG LABORATORY	04	0	75	75	3
MSCCS128	SEMINAR	--	25		25	1
					650	26

MSCCS121	COMPUTER ORGANIZATION	CO
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I
BASIC STRUCTURE OF COMPUTER HARDWARE AND SOFTWARE: Functional units, Basic operational concepts, Bus structures, Software, Performance, Distributed Computing.
LOGIC CIRCUITS: Basic Logic Functions, Synthesis of Logic Functions Using ADN, OR, and NOT Gates, Minimization of Logic Expression, Synthesis with NAND and NOR Gates, Practical Implementation of Logic Gates, Flip-Flops, Registers and Shift Registers, Counters, Decoders, Multiplexers, Sequential Circuits.   (Chapter 1, A.1 to A.13)

UN I T - II
ADDRESSING METHODS: Basic Concepts, Memory Locations, Main Memory Operations, Addressing Modes, Assembly Language, Basic I/O operations, Stacks and Queues, Subroutines.   PROCESSING UNIT: Some Fundamental Concepts, Execution of a Complete Instruction, Hardwired Control, Performance Considerations, Micro Programmed Control, Signed Addition and Subtraction, Arithmetic and Branching Conditions, Multiplication of Positive Numbers, Signed-Operand, Integer Division, Floating-Point Numbers.(Chapter 2.1 to 2.83, 6.4 to 6.10)

U N I T - III
INPUT-OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, I/O Hardware, Standard I/O Interfaces, The Motorola 680X0 Family, The Intel 80X86 Family, The Power PC Family,   The   Alpha   AXP Family, Architectural and Performance Comparisons, A Stack Processor. (Chapter 4, 8.1 to 8.6)

U N I T - IV
MEMORY: Semiconductor RAM memories, Read-Only Memories, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements.
INTRODUCTION TO COMPUTER PERIPHERALS: I/O Devices, On-Line Storage. (Chapter 5, 9.1, 9.2)

TEXT BOOK:
1. Computer Organization, Tmh (Iv Edition) By -   V.C. Hamacher
REFERENCES:
 1.   Computer Organization, (Phi) By - Moris Mano
 2.   Computer Architecture & Organisationby - Hayes, (Tmh)
 3.   Computer Systems Organisation& Architecture By - Carpinelli, (Addison Wesley)
 4. The Architecture Of Computer Handwone And Sytems Handwone By- Englander (Wiely).
 5. Computer Sytems Design And Architecture By- Vp Heuring, Hf Jordan (Pearson).
 6. Computer Organization & Architectures By – Stallings (Pearson, Phi).
 7. Computer Organization & Design By - Pp Chaudari (Phi)

MSCCS122	ADVANCED JAVA PROGRAMMING	ADJ
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T – I
Network Programming, RMI, Naming Service, Serialization and Internationalization.
(Chapter 3, 4)

U N I T –II
Working with JDBC- introduction, exploring JDBC Drivers, Exploring the features of JDBC, Jdbc APIs, exploring major classes and interfaces, java.sql package, working with transactions, Introducing the Java EE platform. (Chapters 2, 5)

U N I T – III
Working with servlets, introducing Event Handling and Filters. (Chapters 6 and 7)

U N I T – IV

Working with Java Server Pages (JSP), JSP Tag Extensions and standard Tag Library
 (chapter 8 & 9)

TEXT-BOOK

1. Advance Java Technology – Prof. Savaliya- Dreamtech Press.
2. Java Server Programming (J2EE), Block Book, DreamTech Press.

REFERENCE BOOKS

1. Java Server Pages –Hans Bergsten, SPD O'Reilly.
2. J2EE 1.4 Bible (Dreamtech-2003).
3. JAVA HOW TO PROGRAM Third Edition - Deitel & Deitel.
4. Java Server Programming, J2EE 1.6- KONGENT- Dreamtech press.
5. THE JAVA TUTORIAL CONTINUED Compione, Walrath, Huml, Tutorial Team - Addison
Wesley

MSCCS123	UNIX NETWORK PROGRAMMING	UNP
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I

Inter-process Communication: Introduction, File and Record Locking, Simple Client- server Pipes, FIFO's, Streams and Messages, Name Spaces, System V IPC, Message Queues, Semaphores, Shared Memory, Socket and TLI. (Chapters 3, 3.1 to 3.12)

U N I T - II

A Network Primer Communication Protocols: Introduction, TCP/IP, XNS, SNA, NetBIOS, OSI Protocol, UUCP, Protocols Comparisons. (Chapters 4, 5, 5.1 to 5.8)

U N I T - III

Berkeley Sockets: Introduction, Overview, Unix Domain Protocols, Socket Addresses, Elementary Socket System Calls, Simple Examples, Advanced Socket System Calls, Reserved Ports, Stream Pipes, Passing File Descriptors, Socket Options, Asynchronous I/O, Input / Output Multiplexing, Out-of-Band and Data, Sockets and Signals, Internet Superserver, Socket Implementation. (Chapters 6, 6.1 to 6.17)

U N I T - IV

Transport, Overview, Transport Endpoint Addresses, Elementary TLI Functions, Simple Example, Advanced TLI Functions, Streams, TLI Implementation, Stream Pipes, Passing File Descriptors, Input/output Multiplexing, Asynchronous I/O, Out-of-Band Data.
(Chapter 7.1 to 7.13)

TEXT BOOK:

1.Unix Network Programming By W. Richard Stevens

REFERENCE BOOKS:

1.Unix Systems Programming - K.A. Robbins, S. Robbins (Pearson)

2.Unix The C Odyssey - M. Gandhi, Shetti, Shah (Bpb Publications)

MSCCS124	SOFTWARE ENGINEERING	SE
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I
INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving Role of Software - Software - The Changing Nature of Software - Software myths. A GENERIC VIEW OF PROCESS: Software Engineering-A Layered technology - A Process frame work - The capability Maturity Model Integration (CMMI) - Process Patterns - Process Assessment - Personal and Team Process Models - process Technology - Product and Process. PROCESS M O D E L S: Prescriptive M o d e l s - The waterfall Model - Incremental Process Models-Evolutionary Process Models - Specialized Process Models - The Unified Process. (Chapters1, 2 and 3)

UNIT- II
SOFTWARE ENGINEERING PRACTICE: Software engineering Practice - Communication Practice- Planning Practices - Modeling Practices - Construction Practice - deployment
SYSTEM ENGINEERING: Compute-Based systems - The System Engineering Hierarchy - Business Process Engineering: An Overview - Product Engineering:An Overview - System Modeling.REQUIRMENT ENGINEERING: A Bridge to Design and Construction - Requirements EngineeringTasks - Initiating the Requirements Engineering Process - Eliciting Requirements- Developing Use - Cases - Building the analysis Model - Negotiating Requirements - Validating Requirements. BUILDING THE ANALYSIS MODEL: Requirements Analysis - Analysis Modeling Approaches – Data Modeling Concepts-Object-oriented Analysis - Scenario-Based Modeling - Flow-OrientedModeling - Class-Based Modeling - Creating a Behavioral Model. (Chapters 5, 6, 7, 8)

UNIT - III
DESIGN ENGINEERING: Design within the Context of Software Engineering - design Process andDesign Quality - Design Concepts - The Design Model - Pattern-Based Software Design. CREATING AN ARCHITECTURAL DESIGN: Software Architecture - Data Design - Architectural Styles and Patterns - Architectural Design- Assessing Alternative Architectural Designs - Mapping Data Flow into Software Architecture. MODELING COMPONENT-LEVEL DESIGN: What is a Component? - Designing Class-Based Component-Level Design - Object Constraint Language - designing Conventional Components. (Chapters 9, 10 and 11)

UNIT - IV
PERFORMING USER INTERFACE DESIGN: The Golden Rules - User Interface Analysis and Design- Interface Analysis - Interface Design Steps - Design Evaluation.RISK MANAGEMENT: Reactive vs. Proactive Risk Strategies - Software Risks - Risk Identification - Risk Projection - Risk Refinement - Risk Mitigation, Monitoring, and Management - The RMMM Plan.QUALITY MANAGEMENT: Quality Concepts - Software Quality Assurance - Software Reviews -Formal Technical Reviews - Formal Approaches to SQA - Statistical Software Quality Assurance -Software Reliability - The ISO 9000 Quality Standards - The SQA Plan. (Chapters 12, 25, 26)

TEXT BOOK:
1.   Software Engineering By R.S. Pressman (Mc. Graw Hill Sixth Edition)
REFERENCE BOOKS:
1.   Software Engineering By Ghezzi (Phi)
2.   Software Engineering Fundamentals By Behforooz And Hudson Oxforduniversity Press
3.   Software Engineering By Fairley (Mc.Graw Hill)

MSCCS125	ADVANCED JAVA **LAB**	ADJL
WORK LOAD: 4 PPW	**REVIEW ASSESSMENT**	**EXTERNAL MARKS: 50**

The concepts covered in the corresponding theory paper are to be implemented.

MSCCS126	**UNIX NETWORK PROGRAMMING LAB**	**UNPL**
WORK LOAD: 4 PPW	**REVIEW ASSESSMENT**	**EXTERNAL MARKS: 50**

Programs Using UNIX or LINUX

1. Write a program that takes one or more file/directory names as command line input and reports the following information on the file:
    a. File type
    b. Number of links
    c. Time of last access
    d. Read, Write, Execution permissions.
2. Write a 'C' program that illustrates how to execute two commands concurrently with a command pipe.
3. Write a 'C' program that illustrates the creation of child process using fork system call.
4. Write a 'C' program that illustrates the real time of a day every 60 seconds.
5. Write a 'C' program that illustrates implementation of ls command.
6. Write a 'C' program that illustrates simple file locking.
7. Write a 'C' program that illustrates to read or write from a file.
8. Write a 'C' program that illustrates the
    following a.   Creation of
    FIFO
       b.   Reading
       from FIFO
    c.   Writing on to the FIFO.
9. Write a 'C' program that illustrates sending the data from parent to child using PIPE System
    Call.
10. Write a 'C' program which displays the current working directory by using **popen**.
11. Write a 'C' program that illustrates the file locking using semaphores.
12. Write a 'C' program that illustrates Read or Write operation using semaphore.
13. Write a 'C' program that illustrates the creation of shared memory.
14. Write a 'C' program that illustrates inter-process communication using shared memory system calls.
15. Write a 'C' program that illustrates the
    following a. Creating a message
    queue
    b. Writing to a message queue
    c. Reading from a message queue

BOOK FOR REFERENCE:

1.   Unix The C Odyssey - M. Gandhi, Shetti, Shah (Bpb Publications)
2.   Unix Network Programming - W. Richard Stevens

MSCCS217	**SOFTWARE ENGINEERING LAB**		**STL**
WORK LOAD: 4 PPW	**REVIEW ASSESSMENT**	**EXTERNAL MARKS: 50**	

SOFTWARE TESTING – Introduction, purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle. Basic Structural Modeling: Classes, Relationships, Class & Object Diagrams. Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Component, Deployment, Component diagrams and Deployment diagrams; Caste Study on Unified Library Application(ULA).

To learn and use the testing tools to carry out the functional testing, load/stress testing and use the following (or similar) automated testing tools to automate testing:

        a) Win Runner/QTP for functional testing.
        b) Load Runner for Load/Stress testing.
        c) Test Director for test management.

List of Sample Programs /Experiments

1. The student should take up the case study of Unified Library Application (ULA) which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.

2. Student has to take up another case study of his/her own interest and do the same whatever mentioned in first problem. Some of the ideas regarding case studies are given in reference books which were mentioned and it would be referred for some new idea.

REFERENCE BOOKS:

1. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech

2. Software Testing Concepts and Tools, P.Nageswara Rao, Dreamtech Press.

3. Grady Booch, James Rumbaugh, Ivan Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition

MSCCS128	**SEMINAR**		S
WORK LOAD: 0 2	**INTERNAL MARKS: 25**	**EXTERNAL MARKS: 00**	

- This course is meant to give students practice of speaking in front of an audience and to explore topics of their own choosing in detail.
- Students have to search topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To improve students speaking skills, each student has to receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.

M.SC. II YEAR I SEMESTER:

| Paper No | Paper Title/Subject | Workload Per Week (Theory & Lab) | M | | | CREDITS |
			Internal	External	Total	
MSCCS211	AUTOMATA THEORY AND FINITE LANGUAGES	04	20	80	100	4
MSCCS212	DATA WAREHOUSING AND MINING	04	20	80	100	4
MSCCS213 **Elective-1**	a) .NET PROGRAMMING b) PYTHON PROGRAMMING	04	20	80	100	4
MSCCS214 **Elective-2**	a) PHP PROGRAMMING b) PROGRAMMING WITH R	04	20	80	100	4
MSCCS215	DATA WAREHOUSING AND MINING LAB	04	0	75	75	3
MSCCS216 **Elective-1**	a) .NET PROGRAMMING LAB b) PYTHON PROGRAMMING LAB	04	0	75	75	3
MSCCS217 **Elective-2**	c) PHP PROGRAMMING a) PROGRAMMING WITH R LAB	04	0	75	75	3
MSCCS218	SEMINAR	--	25		25	1
					675	27

MSCCS211	AUTOMATA THEORY AND FINITE LANGUAGES	AFL
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I - I
FINITE AUTOMATA AND REGULAR EXPRESSIONS : Preliminaries, Finite state systems, Nondeterministic finite automata (NFA), Deterministic finite automata (DFA), NFA TO DFA conversion Regular   expressions, interconversions, Two-way finite automata,   finite automata with output, State minimization applications. PROPERTIES   OF   REGULAR SETS: Pumping Lemma, closure properties of regular sets. (Chapters 1, 2, 3.1 and 3.2)

U N I T - II
CONTEXT FREE GRAMMARS (CFG): Context free grammars Derivation tree, simplification of context - Free grammars, Normal forms. PUSHDOWN AUTOMATA: Informal description, Definitions, pushdown automata design. (Chapters 4.1 to 4.6, 5)

U N I T - III
PROPERTIES   OF CONTEXT FREE LANGUAGES (CFL):   Pumping Lemma, closure properties, decision algorithms for CFLs. TURING MACHINES (TM): The turning machine & model, computable languages and functions, design of TM, modification of TM, Church's hypothesis. (Chapters 6, 7)

U N I T - IV
RECURSIVE & RECURSIVELY INNUMERABLE LANGUAGES: UNDECIDABILITY: Properties of recursive and recursively innumerable languages, Universal turing machine, post correspondence problem. Decidable and Undecidable problems, universal turing   machine, Rice's theorem.THE CHOMSKY HIERARCHY: Regular   grammars, Unrestricted grammars, interconversions between regular grammars and finite automata, context - sensitive languages, (Chapters 8.1 to 8.8, 9)

Text Book:
1. Introduction to Automata Theory Languages and Computation by - J.E. Hopcroft, J.D.
   Ullman (Narosa)
Note: For Examples refer the book. Introduction to computer Theory - DIA Cohen (John Wiley)

REFERENCE BOOKS:
1. Introduction To Computer Theory-Daviel I.A.Cohen (John Wiley, Iind Edition)
2. Introduction To Languages And Theory Of Computation By - John C. Martin (Second Edition Tmh)
3. Theory Of Computation   By - Chandra Sekharan & Misra (Phi)
4. Introduction To Automata Thoery, Languages & Computation - Je Hopfcroft, R. Motwani, Jd Ullman (Pearson)
5. The Theory Of Computation Bernard M Moret (Pearson)
6. Introduction To Theory Of Computation - M Sipser (Thomson)

MSCCS212	DATA WAREHOUSE AND DATA MINING	DMW
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

UNIT-I
Data Mining- Data Mining Overview, Kinds of Data can be mined, Kinds of patterns can be mined, Data Mining Functionalities, Technologies used, Data Mining Applications, Major issues in Data Mining, Data objects and attribute types, Basic statistical descriptions of data, Measuring Data Similarity and Dissimilarity. (Chapters 1, 2.1 to 2.2.2, 2.4)

UNIT-II
Data Pre-Processing: Data Cleaning, Data Integration - Data reduction: Overview, Attribute subset selection, clustering, sampling, Data cube Aggregation, Histograms. Data Transformation and Data Discretization and concept Hierarchy Generation. Data Warehouse: Basic Concepts, Data Warehouse modeling, Data Warehouse Design. Data Warehouse implementation- Data cube implementation overview and OLAP server architecture, Attribute oriented induction. (Chapters 3.1 to 3.5, 4.1, 4.2, 4.3, 4.3.1, 4.3.2, 4.3.3, 4.4, 4.4.1, 4.4.4,4.5)

UNIT-III
Basic Concepts of frequent patterns- Frequent Item sets, Mining methods, Apriori and FP- Growth, Association rules. Classification and Prediction: Classification by Decision Tree Induction- Information gain, Gini Index, Tree Pruning. Classification methods: Bayesian Classification, Rule- Based Classification. Model evolution and Selection: Metrics for evaluating (Chapters 6.1, 6.2, 8.1, 8.2, 8.3, 8.4, 8.5)

UNIT - IV
Cluster analysis: Overview of Clustering Analysis Methods, Partitioning Methods- K-Means, K-Medoids. Hierarchical methods- BRICH. Density-based methods- DB-SCAN, DENCLUE. Grid Based methods- STING. Evolution of Cluster Analysis Overview. Outliers, Outlier Analysis. (Chapters 10.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.3.3, 10.4.1, 10.4.3, 10.5.1, 10.6, 12.1)

TEXT OOK:

1. DATA MINING CONCEPTS & TECHINIQUES BY JIAEEI HAN, MICHELINE & KAMBER
   (3nd EDITION) Harcourt India (Elsevier Publishing Company)

REFERENCE BOOKS:
1. Data Mining Introductory and advanced topics-MARGARET H DUNHAM, PEARSON EDUCATION
2.Data Mining Techniques - ARUN K PUJARI, University Press.
3.Data Warehousing in the Real World - SAM ANAHORY &DENNIS MURRAY. Pearson Ed   Asia.
4.Data Warehousing Fundamentals - PAULRAJ PONNAIAH WILEY STUDENT   EDITION
5.DATA WAREHOUSING, DATA MINING & OLAP BY ALEX BERSON AND STEPHEN J. SMITH (TMH)

MSCCS213 (elective) (A)	.NET PROGRAMMING		.NET
WORK LOAD: 4 PPW	INTERNAL MARKS: 20		EXTERNAL MARKS: 80

UNIT - I

Fundamentals of Visual Basic, Exception handling, windows forms, Control Classes, Different Types of Boxes, Labels, Buttons, Panels. (Chapters 1 to 7)

UNIT - II

WINDOWS FORMS: Different types of Bars, Menus, Views. OBJECT - ORIENTED PROGRAMMING: Classes and objects constructors and destructors, inheritance, modifiers, Interfaces, Polymorphism, Vate Binding, Graphics handling and File handling. (Chapters 8 to 13)

UNIT - III

WEB FORMS: Working with web forms, Web forms and HTML, The Web control class, Web Forms and Boxes, Web Forms and Buttons, Validation Controls, Ad Rotators, Web Forms and HTML controls. (Chapters 14 to 19)

UNIT - IV

DATA ACCESS WITH ADO.NET : Accessing data with the server explorer, Data adapters and Data sets, Binding Controls to databases, Handling databases in code, Database access in Web Applications. Creating user Controls, Webuser Controls, and Multithreading creating Windows services, Web Services and Deploying applications. (Chapters 20 to 25)

TEXT BOOK:

1. VB.NET Programming (Black Book) By Steven Holzner (Dreamtech- 2003) REFERENCE

REFERENCE BOOKS:

1. VB.NET Programming By T. Gaddis (Dreamtech)
2. Microsoft Visual Basic. Net step by step By Halvosrson (PHI)
3. OOP with Microsoft Visual Basic.Net By Reynold Hacrtte (PHI)

MSCCS213 (elective) (B)	PYTHON PROGRAMMING	.NET
WORK LOAD: 4 PPW	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

Unit – I
Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output. **Decision Structures and Boolean Logic**: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. **Repetition Structures**: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit – II
Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions- Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules. **File and Exceptions**: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

Unit – III
Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples. **Strings**: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. **Dictionaries and Sets**: Dictionaries, Sets, Serializing Objects. **Recursion**: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms.

Unit – IV
Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, Working with Instances, Techniques for Designing Classes, Inheritance, Polymorphism.
GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

Text Book:
Tony Gaddis, Starting Out With Python (3e)

References

1. Kenneth A. Lambert, Fundamentals of Python
2. Clinton W. Brownley, Foundations for Analytics with Python
3. James Payne, Beginning Python using Python 2.6 and Python 3
4. Charles Dierach, Introduction to Computer Science using Python
5. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3

MSCCS214 (elective) (A)	PHP PROGRAMMING		PP
WORK LOAD: 4 PPW	INTERNAL MARKS: 20		EXTERNAL MARKS: 80

UNIT – I

HTML- Basic HTML Tags, The document body, Text, Hyperlinks, Lists, Images, Tables, Frames, Forms-Toward Interactivity. CASCADING STYLE SHEETS – Introduction, using Inline Styles, Defining Your Own Styles; Properties in Values in Styles; Embedded Style Sheets, Linking external sheets;

UNIT – II

INTRODUCTION TO JAVASCRIPT- JavaScript, Basics, Variables, Statements, Obtaining User Input with prompt dialog boxes, FUNCTIONS – function definition; User defined functions; program modules in JavaScript; scope rules, global functions, Recursion; OBJECTS IN JAVA SCRIPT – Math Object, String Object, Date Object, Boolean and Number Object, document and window Objects. EVENTS - onclick, onchange, onload, onerror, onmouseover, onmouseout, onselect, onfocus, onblur, onsubmit, onunload.

UNIT – III

Essential PHP, Operators and Flow Control, Strings and arrays, Creating Function,
(Chapter 1, 2, 3, 4)

UNIT – IV

Reading Data in Web Pages, File Handling, working with Databases, Sessions, Cookies and FTP

(Chapter 5, 9, 10, 11)

TEXT BOOKS

1. Internet & World Wide Web- H. M. Deitel, P.J. Deitel, A. B. Goldberg-Third Edition.

2. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill
   Education (India), 2007.

3. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)",
   Wiley India Private Limited, 2008.

MSCCS214 (elective) (B)	PROGRAMMING WITH R	DAR
WORK LOAD: 4 PPW	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

Unit I
Introduction- What Is R?, Installing R, Choosing an IDE, Your First Program, Installing Extra Related Software, Scientific Calculator- Mathematical Operations and Vectors, Assigning Variables, Special Numbers, Logical Vectors; Inspecting Variables- Classes, Different Types of Numbers, Other Common Classes, Checking and Changing Classes, Examining Variables, Workspace

Unit II
Vectors, Matrices, and Arrays; Lists and Data Frames-Lists, NULL, Pairlists, Data Frames; Environments and Functions

Unit III
Strings and Factors, Flow Control and Loops, Advanced Looping; Packages- Loading Packages, Installing Packages, Maintaining Packages; Dates and Times-Date and Time Classes, Conversion to and from Strings, Time Zones, Arithmetic with Dates and Times, Lubridate.

Unit IV
Getting Data-Built-in Datasets, Reading Text Files, Reading Binary Files, Web Data, Accessing Databases; Cleaning and Transforming- Cleaning Strings, Manipulating Data Frames, Sorting, Functional Programming; Exploring and Visualizing- Summary Statistics, Three Plotting Systems, Scatterplots, Line Plots, Histograms, Box Plots, Bar Charts, Other Plotting Packages and Systems

TEXT BOOK:
1.   Richard cotton "A step-by-step function guide to data analysis: Learning R" First edition, O'REILLY, 2013
REFERENCES
1.   Michael J. Crawley "The R Book" Second Edition A John Wiley & Sons, Ltd., Publication, 2013.
2.   Garrett Grolemund "Hands-On Programming with R" First Edition, O'Reilly Media, 2014
3.   Roger D. Peng "R Programming for Data Science" Leanpub, 2014-15.

MSCCS215	DATA MINING LABORATORY		DML
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50	

Weka is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a datasets#. Weka contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization.

Launching WEKA, COMMAND-LINE(simple CLI), EXPLORER-User Interface, Preprocessing, Classification, Clustering, Associating, Selecting Attributes, Visualizing; EXPERIMENTER-Simple, Advanced; KNOWLEDGEFLOW-Introduction, Features, Components; ArffViewer; Converters;etc.,

RESOURCES:

Manuals and Software:
- http://www.cs.waikato.ac.nz/ml/weka/index.html
  Collections of Datasets:
- # http://www.cs.waikato.ac.nz/ml/weka/datasets.html

MSCCS216 ELECTIVE- 1 (A)	.NET PROGRAMMING LABORATORY		.NETL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50	

- The concepts covered in the corresponding theory paper are to be implemented.

MSCCS216 ELECTIVE-1 (B)	PYTHON PROGRAMMING LABORATORY		PPL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50	

- The concepts covered in the corresponding theory paper are to be implemented.

MSCCS217 ELECTIVE-2 (A)	PHP PROGRAMMING LABORATORY		PHPL
WORK LOAD: 0 4	INTERNAL MARKS: 00	EXTERNAL MARKS: 50	

- The concepts covered in the corresponding theory paper are to be implemented.

MSCCS217 ELECTIVE-2 (B)L	PROGRAMMING WITH R LABORATORY		PRL
WORK LOAD: 0 4	INTERNAL MARKS: 00	EXTERNAL MARKS: 50	

- The concepts covered in the corresponding theory paper are to be implemented.

MSCCS218	SEMINAR		S
WORK LOAD: 0 2	INTERNAL MARKS: 25	EXTERNAL MARKS: 00	

- This course is meant to give students practice of speaking in front of an audience and to explore topics of their own choosing in detail.
- Students have to search topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To improve students speaking skills, each student has to receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.

M.SC. II YEAR II SEMESTER:

Paper No	Paper Title/Subject	Workload Per Week (Theory & Lab)	Marks			CREDITS
			Internal	External	Total	
MSCCS221	ARTIFICAL INTELLIGENCE	04	20		100	4
MSCCS222	a) CRYPTOGRAPHY AND NET WORK SECURITY b) MOBILE COMPUTING	04	20		100	4
MSCCS223	a) BIG DATA ANALYTICS b) CLOUD COMPUTING	04	20		100	4
MSCCS224	MAJOR PROJECT	--	75	175	250	10
MSCCS225	COMPREHENSIVE VIVA	--	00	75	75	3
	SEMINAR	--	25	00	25	1
					650	26

MSCCS221	ARTIFICAL INTELLIGENCE	AI
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

Unit I:
Concepts in AI, problem solving in AI, Defining an AI Problem as state space search, production systems, AI problem characteristics. Search techniques: Breadth first search, depth first search.

Unit II:
Heuristic Search Techniques: Generate and test, hill climbing, best first search, Heuristic function applications, problem Reduction, simulated annealing.
Knowledge Representation in AI: knowledge representations approaches & issues in knowledge representation, Knowledge Representation using predicate logic, forward and backward reasoning, semantic nets, frames, scripts & conceptual Dependency.

Unit III:
Game Playing: The Minimax Search procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening.
Expert systems: Architecture, the knowledge base, inference engine, Knowledge acquisition Expert system development process MYCIN as an example. Types of Expert Systems – Rule Based, Case Based, Model Based
Reasoning in Uncertain Situations: Introduction to Non monotonic Reasoning, Logic-Based Abductive Inference

Unit IV:
Uncertainty Measures: Stochastic Approach to Uncertainty, Bayesian Belief Networks, Certainty Factor Theory, Dempster – Shafer Theory.
Machine Learning: Machine learning Systems, Supervised and unsupervised learning , Inductive Learning and Deductive Learning .
Artificial Neural Networks: Introduction, Single Layer and Multilayer Feed Forward Networks, Radial Basis Function, and Design Issues of ANN.

Text Books:

1. E. Rich and Knight,"Artificial Intelligence", 3nd Edition, 2009, TMH.
2. S. J. Russel and P. Norvig, "Artificial Intelligence: A Modern Approaches", Prentice Hall.
3. George F Luger, "Artificial Intelligence", Fourth Edition, Pearson Education Asia, ISBN No: 81-7808-491-0.

MSCCS222 ELECTIVE-3 (A)	CRPTOGRAPHY AND NETWORK SECURITY	CNS
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I

INTRODUCTION:- Attacks, Services, and Mechanisms, Security Services. CONVENTIONAL ENCRYPTION: CLASSICAL TECHNIQUES: Steganography, Classical Encryption Techniques. CONVENTIONAL ENCRYPTION: MODERN TECHNIQUES:- Simplified DES. The Data Encryption Standard, Differential and Linear Cryptanalysis, Block Cipher Modes of Operation.

U N I T - II

CONFIDENTIALITY USING CONVENTIONAL ENCRYPTION:- Traffic Confidentiality, Random Number Generation. PUBLIC-KEY CRPTOGRAPHY:- Principles of Public-Key Cryptosystems, The RSA Algorithm, DiffieHellman Key Exchange, Elliptic Curve Cryptography. INTRODUCTION TO NUMBER THEORY:- Prime and   Relatively   Prime   Numbers, Fermat's and Euler's Theorem, Euclid's Algorithm, The Chinese Remainder Theorem, Discrete Logarithms.

U N I T - III

MESSAGE   AUTHENTICATION   AND   HASHFUNCTIONS:-   AuthenticationRequirements, Authentication Functions, Message Authentication Codes, Hash   Functions, Security of Hash Functions and MACs. DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS:- Digital Signatures, Authentication Protocols, Digital Signature Standard.

U N I T - IV

ELECTRONIC MAIL SECURITY: S/MIME. IP SECURITY: IP   Security   Overview,   IP Security Architecture, Encapsulating Security Payload, Key Management. FIREWALLS: Firewall Design Principles, Trusted Systems. (Chapters 1,2,4,5,6,7,8,10,12,13 and 16)

TEXT BOOK:

1. Cryptography and Network Security principles and Practice FOURTH Edition By William Stallings (Pearson Asia)

REFERENCE BOOKS:

1.   Davies &Price: Security For Computer Networks - Wiley (1984)
2.   Mayer &Matyas: Cryptography - Wiley B. Schneier: Applied Cryptography - (John Wiley)

MSCCS222 ELECTIVE-3 (B)	MOBILE COMMUNICATIONS	MC
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

UNIT I

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture's : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services. (Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT II

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT III

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues. Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT IV

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and Treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TEXT BOOK:

1. Jochen Schiller,"Mobile Communications", Addison-Wesley. (Chapters: 4, 7, 9, 10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002 (Chapters 11, 15, 17, 26 and 27)

REFERENCE BOOKS

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional, 2005.

MSCCS223 ELECTIVE-4 (A)	BIG DATA ANALYTICS	BDA
WORK LOAD: 4 PPW	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

UNIT I
Introduction to Big Data- Introduction, Big Data, Defining Big Data, Why Big Data and why now, Big Data example, Working with Big Data- Introduction, Data explosion, Data volume, Data velocity, Data variety, Big Data Processing Architectures- Introduction, Data processing revisited, Data processing techniques, Data processing infrastructure challenges, Shared-everything and shared-nothing architectures, Big Data processing, Telco Big Data study.

UNIT II
Introducing Big Data Technologies- Introduction, Distributed data processing, Big Data processing requirements, Technologies for Big Data processing, Hadoop, NoSQL, Textual ETL processing, Data Warehousing Revisited- Introduction, Traditional data warehousing, or data warehousing 1.0, Data warehouse 2.0, Reengineering the Data Warehouse- Introduction, Enterprise data warehouse platform, Choices for reengineering the data warehouse, Modernizing the data warehouse, Case study of data warehouse modernization.

UNIT III
New Technologies Applied to Data Warehous- Introduction, Data warehouse challenges revisited, Data warehouse appliance; Cloud computing, Data virtualization, Integration of Big Data and Data Warehousing- Introduction, Components of the new data warehouse, Integration strategies, Hadoop & RDBMS, Big Data appliances, Data virtualization, Semantic framework. Data-Driven Architecture for Big Data- Introduction, Metadata, Master data management, Processing data in the data warehouse, Processing complexity of Big Data, Machine learning,

UNIT IV
Information Management and Life Cycle for Big Data- Introduction, Information life-cycle management, Information life-cycle management for Big Data, Big Data Analytics, Visualization, and Data Scientists- Introduction, Big Data analytics, Data discovery, Visualization, The evolving role of data scientists, Implementing the Big Data – Data Warehouse – Real-Life Situations- Introduction, building the Big Data – Data Warehouse, Customer-centric business transformation, Hadoop and MySQL drives innovation, Integrating Big Data into the data warehouse.

Text book:
1. Data Warehousing in the Age of Big Data by Krish Krishnan, Morgan Kaufmann.

REFERENCES
1. chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.
2. J Berman, "Principles of Big Data Preparing, Sharing, and Analyzing Complex Information", 1 st Edition, published by Morgan Kaufmann
3. David Loshin, "Big Data Analytics - From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph" , Morgan Kaufmann
4. Soumendra Mohanty , "Big Data Imperatives: Enterprise 'big Data' Warehouse, 'BI' Implementations and Analytics, Apress.
5. Peter Zadrozny , Raghu Kodali ,"Big Data Analytics Using Splunk", Apress 2013

MSCCS223 ELECTIVE-4 (B)	CLOUD COMPUTING	CC
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

UNIT I

Cloud Computing Basics-Overview, Applications, Intranets and the Cloud. Your Organization and Cloud Computing- Benefits, Limitations, Security Concerns. Hardware and Infrastructure- Clients, Security, Network, Services. Software as a Service (Saas)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA.

UNIT II

Platform as a Service (PaaS)-IT Evolution Leading to the Cloud, Benefits of Paas Solutions, Disadvantages of Paas Solutions. Infrastructure as a Service (Iaas)-Understanding IaaS, Improving Performance through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages, Server Types within an IaaS Solution. Identity as a Service (IDaaS)-Understanding Single Sign-On (SSO), OpenID, Mobile ID Management. Cloud Storage-Overview, Cloud Storage Providers.

UNIT III

Virtualization-Understanding Virtualization, History, Leveraging Blade Servers, Server Virtualization, Data Storage Virtualization. Securing the Cloud- General Security Advantages of Cloud-Based Solutions, Introducing Business Continuity and Disaster Recovery. Disaster Recovery-Understanding the Threats, Service Oriented Architecture-Understanding SOA, Web Services Are Not Web Pages, Understanding Web Service Performance, Web Service and Reuse, Web Service and Interoperability.

UNIT IV

Developing Applications-Google, Microsoft, Cast Iron Cloud, Bungee Connect, Development. Migrating to the Cloud-Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, and Migration. Coding Cloud Based Applications-Creating a Mashup using Yahoo Pipe, Using Google App Engine and creating a Windows Azure "Hello, World" Application. Application Scalability-Load-Balancing Process, Designing for Scalability, Capacity Planning Versus Scalability, Scalability and Diminishing Returns and Performance Tuning.

Text Books:

1. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by the McGraw-Hill.
2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. By Dr. Kris Jamsa.

References:

1. Cloud Computing Bible by Barrie Sosinsky, Published by Wiley Publishing, 2011.
2. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, Wiley Publishing, 2010.
3. Moving to the Cloud, Dinakar Sitaram, Elsevier, 2014.

MSCCS224	MAJOR PROJECT		MP
WORK LOAD: 0 0	INTERNAL MARKS: 75	EXTERNAL MARKS: 175	

The Project work constitutes a major component in most professional programmes. It needs to be carried out with due care, and should be executed with seriousness by the students. The project work is not only a partial fulfilment of the MSC requirements, but also provide a mechanism to demonstrate ASK (Attitude, Skills, and Knowledge) with specialisation. The project work should compulsorily include the software development. Physical installations/configuring of LAN/WAN or theoretical projects or study of the systems, which doesn't involve s/w development, *ARE STRICTLY NOT ALLOWED*.

The students are expected to work on a real-life project preferably in some industry/ R&D Laboratories / Educational Institution / Software Company. Students are encouraged to work in their interested area. The student can formulate a project problem with the help of his / her Guide of the concerned college. APPROVAL OF THE PROJECT PROPOSAL IS MANDATORY by his/her Guide. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project. Project problem domain selected and the specifications should be genuine.

MSCCS225	COMPREHENSIVE VIVA		CV
WORK LOAD: 0 0	INTERNAL MARKS: 00	EXTERNAL MARKS: 50	

- Conducting Comprehensive viva-voce to test the overall understanding on the various fields related to Computer Science and allied subjects.

- Most important is, need to be aware of the entire syllabus of computer science right from your first year. Be thorough with at least the content in that particular subject; recall all the units and prepare for probable questions.

MSCCS225	SEMINAR		S
WORK LOAD: 0 2	INTERNAL MARKS: 25	EXTERNAL MARKS: 00	

- This course is meant to give students practice of speaking in front of an audience and to explore topics of their own choosing in detail.
- Students have to search topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To improve students speaking skills, each student has to receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.