SNU
SISTER NIVEDITA UNIVERSITY

Master of Computer Application

02 YEARS SYLLABUS

Choice Based Credit System (CBCS)

Department of Computer Application

Master of Computer Application

Four Semesters Program

2020

Master of Computer Application

Semester I

Category	Paper Code	Paper Name	Contact Hours/Week			
			L	T	P	Credit
PC	2203211	Computer Architecture & Organization	3	1	4	6
PC	2203212	Programming & Data Structure	4	0	4	6
BS	2191113	Discrete Mathematics	3	1	0	4
HSM	2206114	Communicative English	3	1	0	4
PC	2203215	Data Base Management Systems	4	0	4	6
			Total Hours = 32			26

Semester II

Category	Paper Code	Paper Name	Contact Hours/Week			
			L	T	P	Credit
PC	2203221	Software Engineering	3	1	4	6
PC	2203222	Computer Networks	3	1	4	6
PC	2203223	Python Programming	4	0	4	6
BS	2191224	Numerical Analysis	4	0	4	6
HSM	2206125	Management Support System	3	1	0	4
			Total Hours = 36			28

Semester III

Category	Paper Code	Paper Name	Contact Hours/Week			
			L	T	P	Credit
PC	2203131	Operating Systems and System Programming	3	1	4	6
PC	2203232	Object Oriented Analysis and Design	4	0	4	6
PE	2204134-(A/B)	Elective-I	3	1	0	4
BS	2191135	Optimization Techniques	3	1	0	4
PSE	2207436	Project-I	0	0	12	6
			Total Hours = 36			26

Semester IV

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Category	Paper Code	Paper Name	Contact Hours/Week			
			L	T	P	Credit
PE	2204141 (A/B)	Elective-II	3	1	0	4
PSE	2207442	Project-II	0	0	28	14
PSE	2207343	Grand Viva	0	0	4	2
			Total Hours = 28			20
Total Credits = 100						

Elective I (2204125-A/B)

A. Cryptography and Network Security
B. Data Mining & Warehousing
C. Machine Learning
D. System Architecture and Internet of Things

Elective II (2204135-A/B)

A. Compiler Design
B. Distributed Database System
C. AI & Neural Network
D. Cloud Computing

PAPER NAME: Computer Organization and Architecture

Module-1 (12L): Principles of Computer design - Software, hardware interaction layers in computer architecture, Central processing unit. Machine language instructions, Addressing modes, instruction types, Instruction set selection, Instruction cycle and execution cycle.
Module-2 (8L): Control unit, Data path and control path design, Microprogramming Vs hardware control, RISC Vs CISC, Pipelining in CPU design: Superscalar processors.
Module-3 (10L): Memory system, Storage technologies, Memory array organization, Memory hierarchy, interleaving, cache and virtual memories and architectural aids to implement these.
Module-4 (10L): Input-output devices and characteristics, Input-output processing, bus interface, data transfer techniques, I/O interrupts, channels.
Module-5 (6L): Performance evaluation - SPEC marks, Transaction Processing benchmarks.

References:

1. Mano, M, "Computer System and Architecture", (3rd edition) Prentice Hall of India, New Delhi, 1994.
2. Pal Chauduri, P., "Computer Organisation and Design", Prentice Hall of India, New Delhi, 1994.
3. Rajaraman,V., and Radhakrishnan, T., "Introduction to Digital Computer Design" (4th edition). Prentice Hall of India, New Delhi, 1997.
4. Stallings. W, "Computer Organization and Architecture, (2nd edition) Prentice Hall of India, New Delhi

PAPER NAME: Programming and Data Structures

Module-1 (6L): Introduction to algorithms, Flow charts, tracing flow charts, Problem solving methods, need for computer languages, reading programs written in C language, C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants, Input-Output: getchar, putchar, scanf, printf, gets, puts, functions, Pre-processor command: # include, define, ifdef. Preparing and running a complete C program.
Module-2 (6L): Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators, Library functions, Control statements: while, do-while, for statements, nested loops. If-else, switch, break, continue and goto statements, comma operator.
Module-3 (6L): Functions: Defining and accessing: passing arguments, Function prototypes, Recursion, Use of library functions, Storage classes: automatic, external and static variables, Arrays: Defining and processing, Passing to a function, Multi dimensional arrays.
Module-4 (6L): Strings, operations on strings. Pointers: Declarations. Passing to a function, Operations on pointers, Pointers and arrays, Arrays of pointers.
Module-5 (4L): Structures: Defining and processing, Passing to a function, Unions.
Module-6 (3L): Data files: Open, close, create, process. Unformatted data files.

Module-7 (9L): Data Structures: Stacks, queues, lists, trees and their application

References

1. Hutchison, R., "Programming in C". McGraw Hill, New York, 1990.
2. Johnsonbaugh, R., and Kalin, M., "Applications Programming in C", Prentice Hall of India, 1989. Rajaraman, V, "Computer Programming in C", Prentice Hall of India, New Delhi, 1995.

PAPER NAME: Discrete Mathematics

Module-1 (10L): Mathematical Logic: Notation. Connectives Normal forms, Theory of inference for statement calculus.
Module-2 (10L): Predicate calculus, Inference theory of the predicate calculus, Relations and ordering, Functions, Recursion, Algebraic Structures: Groups, Application of residue arithmetic to computers, Group codes.
Module-3 (10L): Graph theory: Definition. Paths, reach ability, connectedness. Matrix representation of graphs, Trees.
Module-4 (8L): Storage representation and manipulation of graphs: Trees. List structures and graphs, Pert and related techniques.

References

1. Kolman, B., and Busby. R., "Discrete Mathematical Structures for ComJ;luter Science", Prentice Hall. 1987.
2. Sahni, S., "Concepts in Discrete Mathematics". Camelot Publisher. U.S.A. 1981.
3. Tremblay, J.P., el. al. "Discrete Mathematical Structures with Applications to Computer Science" McGraw Hill, 1987.

PAPER NAME: Communicative English

Note taking from lectures and reference material. essay and precis writing, slide preparation and oral presentation principles, written presentation of technical material, preparation of bibliography, basic of official correspondence, preparation of bio-data, students should be asked to prepare and present seminars during the practice session. Group discussions should also be used and feedback given to students.

References

1. The Chicago Manual of Style, 13th Edition, Prentice Hall of India, 1989 Gowers, Ernest, "The Complete Words". Penguin, 1973.

2. IEEE Transactions on "Written and Oral Communications" has many papers of relevance
3. Ludlow, R., and Panton, F., "The Essence of Effective Communication", Prentice Hall of India Pvt. Ltd. 1995.
4. Menzel, D.H., Jones, H.M., Boyd, L.G., "Writing a Technical Paper". McGraw Hill, 1961.
5. Strunk, W., White. E.B., "The Elements of Style", 3rd Edition, McMillan, 1979.
6. Munter, M., "Business Communication: Strategy and Style" Prentice Hall, New Jersey, 1987.
7. Tubian, K.L., "A Manual for Writen of 1erm Papers, Thesis and Dissertation", Univ. of Chicago Press, 1973.

PAPER NAME: Database Management Systems

Module-1(4L): -Introduction to Databases and Transactions: What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management.
Module- II(5L): Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.
Module-III(8L): Database Design, ER-Diagram and Unified Modeling Language Database design and ER Model: Overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).
Module- IV(8L): Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.
Module- V(7L): Constraints, Views and SQL What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.
Module-VI(8L): Transaction management and Concurrency Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.
References:

1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill.
2. Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning.

PAPER NAME: SOFTWARE ENGINEERING

Module 1(L6): Introduction to Software Engineering, Software life cycles - different models,
Module 2(L8): Software Project Management

Module 3(L8): Structured system design, Cost Estimation-COCOMO, Data Oriented Analysis and Design
Module 4(L6): Object Oriented Analysis & Design, development methodologies- Computer Aided Software Engineering (CASE) tool, Object Oriented modelling.
Module 4(L5): Software quality assurance, Software testing techniques and strategies, test planning, reporting and bug fixing, Test automation, regression testing
Module 5(L3): Software maintenance, Software Complexity & Reliability
Module 7(L4): Project using SPM.

References:

1. Software Engineering, Rogers G. Pressman, MH
2. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI
3. Software Engineering, Pankaj Jalote, PHI
4. Software Engineering, Ian Sommerville, 9th Edition, Pearson Education
2. Fundamentals of Software Engineering,2nd Ed.,Ghezzi,PHI
4. Classical and Object Oriented Software Engineering, Schach, TMH
5. Software Engineering: Principles & Practice,Van Vliet,SPD/JOHN WILEY

PAPER NAME: Computer Networks

Module 1(L2): Introduction to computer network- Topology; Base Band & Broad Band Topology; Guided & Unguided Media.
Module 2 (L3): Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM); Multiplexing (TDM, FDM, STDM).
Module 3 (L3): Encoding (RZ, NRZ, BIPLOAR, MANCHESTER, DIFF. MANCHESTER).
Module 4 (L2): Digital to Analog – ASK, PSK, FSK, QPSK.
Module 5 (L4): Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods.
Module 6 (L4): Goals of Layered protocols- Introduction to OSI, TCP/IP, IBM, SNA, ATM.
Module 7 (L2): Bit oriented (BSC) & Character oriented Protocol (SDLC, LAPB, LAPD, LLC)
Module 8 (L2): HDLC- frame format, station, states, configuration, access control.
Module 9 (L2): LAN Topology– Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)
Module10 (L2): Introduction to WAN – DQDB (IEEE 802.6) & FDDI.
Module 11(L3): Switching Technologies – Circuit, Message, and Packet.
Module 12(L3): X.25, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief Only).
Module 13(L3): ISDN- D channel, B-Channel, International Standards, NT1, NT2, TA, TE Devices.
Module 14(L2): Introduction to leased lines, DSL, Digital Carriers.
Module 15(L2): Bridging & Routing – Static & Dynamic (In Brief).
Module 16(L2): IP, IP addressing, ICMP, ARP.RARP.
Module 17(L3): Congestion Control, TCP, UDP.

Module 18(L2): HTTP, FTP, Telnet, SMTP.
Module 19(L2): Introduction to data security (private key, public key, ISO standards).
Module 20(L2): Introduction to Mobile technology (Topology, FDM, TDM, CDMA), Satellite Communication (LEO, GEO, TDM).

References:

1. Data Communication & Networking, Forouzan, TMH
2. Computer Networks, Tannenbaum, PHI
3. Data & Computer Communications, Stallings,PHI
4. Data Communications, Prakash C. Gupta, PHI
5. Computer Networking, Tittel, Schaum Outline Series, TMH
6. TCP/IP Network Administration, Hunt, SPD/O'REILLY

PAPER NAME: Python Programming

Module 1(2L): Introduction To Python -Installation and Working with Python Understanding Python variables Python basic Operators Understanding python blocks
Module 2(2L): Python Data Types -Declaring and using Numeric data types: int, float, complex Using string data type and string operations Defining list and list slicing Use of Tuple data type
Module 3(2L): Python Program Flow Control -Conditional blocks using if, else and elif Simple for loops in python For loop using ranges, string, list and dictionaries Use of while loops in python Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block
Module 4(2L): Python Functions, Modules And Packages -Organizing python codes using functions Organizing python projects into modules Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages
Module 5(4L): Python String, List And Dictionary Manipulations -Building blocks of python programs Understanding string in build methods List manipulation using in build methods Dictionary manipulation Programming using string, list and dictionary in build functions
Module 6(6L): Python File Operation -Reading config files in python Writing log files in python Understanding read functions, read(), readline() and readlines() Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming using file operations
Module 7(6L): Python Object Oriented Programming – Oops Concept of class, object and instances Constructor, class attributes and destructors Real time use of class in live projects Inheritance , overlapping and overloading operators Adding and retrieving dynamic attributes of classes Programming using Oops support

Module 8(4L): Python Regular Expression -Powerful pattern matching and searching Power of pattern searching using regex in python Real time parsing of networking or system data using regex Password, email, url validation using regular expression Pattern finding programs using regular expression
Module 9(4L): Python Exception Handling -Avoiding code break using exception handling Safe guarding file operation using exception handling Handling and helping developer with error code Programming using Exception handling
Module 10(2L): Python Database Interaction -SQL Database connection using python Creating and searching tables Reading and storing config information on database Programming using database connections
Module 11(2L): Python Multithreading -Understanding threads Forking threads Synchronizing the threads Programming using multithreading
Module 12(4L): Contacting User Through Emails Using Python -Installing smtp python module Sending email Reading from file and sending emails to all users addressing them directly for marketing
Module 13(2L): Python CGI Introduction -Writing python program for CGI applications Creating menus and accessing files Server client program

PAPER NAME: NUMERICAL ANALYSIS

Module 1(9 L) : SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS
Solution Of Algebraic And Transcendental Equations – Fixed Point Iteration Method – Newton Raphson Method- Solution Of Linear System Of Equations – Gauss Elimination Method – Pivoting – Gauss Jordan Method – Iterative Methods Of Gauss Jacobi And Gauss Seidel – Matrix Inversion By Gauss Jordan Method – Eigen Values Of A Matrix By Power Method.

Module 2 (7 L) : INTERPOLATION AND APPROXIMATION
Interpolation With Unequal Intervals – Lagrange's Interpolation – Newton's Divided Difference Interpolation – Cubic Splines – Interpolation With Equal Intervals – Newton's Forward And Backward Difference Formulae.

Module 3 (8L) : NUMERICAL DIFFERENTIATION AND INTEGRATION
Approximation Of Derivatives Using Interpolation Polynomials – Numerical Integration Using Trapezoidal, Simpson's 1/3 Rule – Romberg's Method – Two Point And Three Point Gaussian Quadrature Formulae – Evaluation Of Double Integrals By Trapezoidal And Simpson's 1/3 Rules.

Module 4(8L) : INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS
Single Step Methods – Taylor's Series Method – Euler's Method – Modified Euler's Method – Fourth Order Runge-Kutta Method for Solving First Order Equations – Multi Step Methods – Milne's and Adams- Bash Forth Predictor Corrector Methods for Solving First Order Equations.

Module 5(8L) : BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS Finite Difference Methods For Solving Two-Point Linear Boundary Value Problems – Finite Difference Techniques For The Solution Of Two Dimensional Laplace's And Poisson's Equations On Rectangular Domain – One Dimensional Heat Flow Equation By Explicit And Implicit (Crank Nicholson) Methods – One Dimensional Wave Equation By Explicit Method.

References:

1. S.A. Mollah, "Introduction to Numerical Analysis", Books & Allied Ltd; 3rd Revised edition (2012)
2. Grewal. B.S., And Grewal. J.S., "Numerical Methods In Engineering And Science", Khanna Publishers, 9th Edition, New Delhi, 2007.
3. Gerald. C. F., And Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.3
4. Chapra. S.C., And Canale. R .P., "Numerical Methods for Engineers, Tata McGraw Hill, 5th Edition, New Delhi, 2007.
5. Brian Bradie. "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.
6. Sankara Rao. K., "Numerical Methods for Scientists And Engineers", Prentice Hall Of India Private, 3rd Edition, New Delhi, 2007.

PAPER NAME: MANAGEMENT SUPPORT SYSTEM

Module 1 (L9) INTRODUCTION: Technology of Information Systems, concepts, definition; role and impact of MIS; role and importance of management; approaches to management; functions of the manager; management as a control system; concepts of data models; database design; client-server architecture.

Module 2 (L7) PROCESS OF MANAGEMENT: Planning, organization, staffing, coordination and controlling; management by exception; MIS as a support to management; organization structure and theory; basic model and organization structure; organizational behavior.

Module 3 (L8) DECSION MAKING AND INFORMATION: Decision making concepts, methods, tools and procedures; behavioral concepts in decision making; organizational decision making; information concepts as a quality product; classification of the information; methods of data and information collection; value of the information; organization and information system concepts, control types; handling system complexity; post implementation problems in systems.

Module 4 (L8) SYSTEM ANALYSIS AND DESIGN: Need for system analysis; system analysis of existing system; new requirement; system development model; structured system analysis and design; computer system design; development of MIS; development of long range plans of the MIS; ascertaining

the class of the information; determining the information requirement; development and implementation of the MIS; management of quality; MIS factors of success and failure.

Module 5 (L8) DECISION SUPPORT SYSTEMS: Deterministic systems; artificial intelligence; knowledge based systems; MIS and the role of DSS; enterprise management systems; enterprise resource planning (ERP); ERP features and benefits; implementation factors of ERP; Internet and Web based information system; Electronic Commerce.
TEXT BOOK: Management Information Systems, K. C Landon, J. P. Laudon, Prentice Hall, 2000.

REFERENCE: Management Information Systems, G. B. Davis, M. H. Olson, McGraw Hill,1998.

Elective List (SEM II)

PAPER NAME: Cryptography and Network Security

Module 1(9L): INTRODUCTION & NUMBER THEORY
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid‟s algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat‟s and Euler‟s theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

Module 2(10L): BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY
Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

Module 3(8L): HASH FUNCTIONS AND DIGITAL SIGNATURES
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – El Gamal – Schnorr.

Module 4(8L): SECURITY PRACTICE & SYSTEM SECURITY 8L
Authentication applications – Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs – SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Module 5 (8L): E-MAIL, IP & WEB SECURITY 9L

E-mail Security: Security Services for E-mail-attacks possible through E-mail – establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec – IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).

References:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

PAPER NAME: Data Mining & Warehousing

Module 1(9L): DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP): Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

Module 2(9L): DATA MINING – INTRODUCTION:

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Module 3(9L): DATA MINING – FREQUENT PATTERN ANALYSIS:

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

Module 4(9L): CLASSIFICATION AND CLUSTERING:

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering –

Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

Module 5(9L): WEKA TOOL:
Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

References:

1. Jiawei Han and Micheline Kamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

2. Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP , Tata McGraw – Hill Edition, 35th Reprint 2016.
3. K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

PAPER NAME: Operating Systems and System Programming

Module-1 (3L): Introduction-Evolution of operating systems, Types of operating systems, Different views of the operating system, operating system concepts and structure.

Module-2 (3L): Processes: The Process concept, systems programmer's view of processes. The operating system services for process management, scheduling algorithms, Performance evaluation.

Module-3 (6L): Memory Management: Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging systems, segmentation.

Module-4 (6L): Inter-process Communication and synchronization, the need for interprocess synchronization, mutual exclusion, semaphores, and hardware sport for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks.

Module-5 (4L): File Systems: File systems, directories, file system implementation, security protection mechanisms.

Module-6 (3L): Input/Output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access.

Module-7(4L): Disks: Disk hardware, scheduling algorithms, Error handling, trac-at-a-time caching, RAM Disks. Clocks: Clock hardware, memory mapped terminals, I/O software. Terminals: Terminal hardware, memory mapped terminals, I/O software.

Module-8 (4L): Processes and Processors in Distributed Systems: Threads, system models, processor Allocation, scheduling, Distributed File Systems: Design, implementation, trends.

Module-9 (6L): Assemblers: Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86, Algorithm of Single Pass Assembler, Multi-Pass Assemblers.

Module-10 (6L): Compilers: Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization

References:

1. Deitel. H. M .. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984. Milenkovic, M., "Operating Systems· Concepts and Design". McGraw Hill International Edition Computer Science series 1992.
2. Peterson, J. L .. Abraham Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company 1989.
3. Tanenbaum, A.S., "Modem Operating Systems", Prentice Hall of India Pvt. Ltd. 1995.

PAPER NAME: Object Oriented Analysis and Design

Module 1 (9L) Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.
Module 2 (9L) DESIGN PATTERNS
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer.

Module 3 (9L) CASE STUDY 9
Case study – the Next Gen POS system, Inception -Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description

classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

Module 4 (9L) APPLYING DESIGN PATTERNS
System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

Module 5 (9L) CODING AND TESTING
Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

References:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.
REFERENCES:
2. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
3. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1995.
4. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.
5. Paul C. Jorgensen, "Software Testing: - A Craftsman"s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

PAPER NAME: AI & Neural Network

Module 1(9L): Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Module 2(8L): Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

Module 3(8L): Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propos ional logic, Resolution, Forward & Backward. Chaining.

Module 4(8L): First order logic. Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.

Module 5(6L): Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

Module 6(8L): Feedforward Neural Networks:
Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

Module 7(6L): Feedback Neural Networks
Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Module 8(8L): Competitive Learning Neural Networks & Complex pattern Recognition
Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature
Mapping Networks, Associative Memory.

References:

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
2. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).
3. Artificial Intelligence and Expert Systems – Patterson PHI.
4. Neural Networks Simon Haykin PHI
5. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

PAPER NAME: Optimization Techniques

Module 1(9L): Introduction to Operation Research: Operation Research approach, scientific methods, introduction to models and modeling techniques, general methods for Operation Research models, methodology and advantages of Operation Research, history of Operation Research.

Module 2(8L): Linear Programming (LP): Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Integer linear programming.

Module 3(8L): Transportation & Assignment Problems: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems.

Module 4(6L): Network Analysis: Network definition and Network diagram, probability in PERT analysis, project time cost trade off, introduction to resource smoothing and allocation.

Module 5(7L): Sequencing: Introduction, processing N jobs through two machines, processing N jobs through three machines, processing N jobs through m machines.

Module 6(6L): Inventory Model: Introduction to inventory control, deterministic inventory model, EOQ model with quantity discount.

Module 7(6L): Queuing Models: Concepts relating to queuing systems, basic elements of queuing model, role of Poison & exponential distribution, concepts of birth and death process.

Module 8(6L): Replacement & Maintenance Models: Replacement of items, subject to deterioration of items subject to random failure group vs. individual replacement policies.

Module 9(6L): Simulation: Introduction & steps of simulation method, distribution functions and random number generation.

References:

1. J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.
2. N D Vohra, Quantitative Techniques in management, Tata McGraw Hill.
3. Handy A Taha, Operations Research – An Introduction, Prentice Hall of India, New Delhi.
4. Wagner H M, Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India, New Delhi.
5. Payne T A, Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co. Inc., Virginia.
6. Wilkes F M, Baum P and Smith G D, Management Science: An introduction, John Wiley and Sons, Santa Barbara.

Elective List (SEM III)

PAPER NAME: Compiler Design

Module 1(10L): INTRODUCTION TO COMPILERS:
Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors

Encountered in Different Phases-The Grouping of Phases-Compiler Programming Language basics.
Module 2(8L): LEXICAL ANALYSIS:
Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions- Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.
Module 3(10L): SYNTAX ANALYSIS:
Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies- Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item- Construction of SLR Parsing Table -Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .
Module 4(12L): SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT:
Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions-Design of predictive translator – Type Systems-Specification of a simple type checker- Equivalence of Type Expressions-Type Conversions.
RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation- Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.
Module 5(9L): CODE OPTIMIZATION AND CODE GENERATION:
Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms-Issues in Design of a Code Generator – A Simple Code Generator Algorithm.

References:

1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002.
1. Steven S. Muchnick, “Advanced Compiler Design and Implementation, “Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003.
2. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, 2008.

PAPER NAME: Distributed Database System

Module 1(10L): INTRODUCTION:
Definition –Relation to computer system components –Motivation –Relation to parallel systems – Message-passing systems versus shared memory systems –Primitives for distributed communication – Synchronous versus asynchronous executions –Design issues and challenges. A model of distributed computations: A distributed program –A model of distributed executions –Models of communication networks –Global state – Cuts –Past and future cones of an event –Models of process communications. Logical Time: A framework for a system of logical clocks –Scalar time –Vector time – Physical clock synchronization: NTP.

Module 2(8L): MESSAGE ORDERING & SNAPSHOTS:
Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) – Total order. Global state and snapshot recording algorithms: Introduction –System model and definitions –Snapshot algorithms for FIFO channels

Module 3(10L): DISTRIBUTED MUTEX & DEADLOCK:
Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart-Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

Module 4(10L): RECOVERY & CONSENSUS:
Check pointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure –free system – Agreement in synchronous systems with failures.

Module 5(10L): P2P & DISTRIBUTED SHARED MEMORY:
Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry. Distributed shared memory: Abstraction and advantages – Memory consistency models –Shared memory Mutual Exclusion.

References:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.
3. Tanenbaum A.S., Van Steen M., —Distributed Systems: Principles and Paradigms , Pearson Education, 2007.
4. Liu M.L., —Distributed Computing, Principles and Applications , Pearson Education, 2004.
5. Nancy A Lynch, —Distributed Algorithms , Morgan Kaufman Publishers, USA, 2003.