BHAGWANT UNIVERSITY

Sikar Road, Ajmer

Rajasthan

Syllabus

Institute of Computer Sciences

M. Phil I Semester

Information Technology

Course Category

MIte : M.Phil in Information Technology
CCC: Compulsory Core Course
ECC: Elective Core Course

Contact Hours:

L: Lecture
T: Tutorial
P: Practical or Other

Marks Distribution :

IA: Internal Assessment (Test/Classroom Participation/Quiz/Presentation/Assignment etc.)
EoSE: End of Semester Examination

M. Phil (Information Technology)

(Course Structure)

Subject code	Subject Name	Teaching hours			Marks		
		L	T	P	External	Internal	Total
01MIte101	**Research Methodologies**	3	0	0	70	30	100
01MIte102	**Software Technologies**	**3**	**0**	**0**	**70**	**30**	**100**
01MIte103	ADVANCED NETWORKING AND SECURITY	3	0	0	70	30	100

01MIte104	**Information Technology Concepts & MIS**	**3**	**0**	**0**	**100**		**100**
Total		**12**	**0**	**0**	**280**	**120**	**400**

SEMESTER II

Subject code	**Subject Name**	**Teaching hours**			**Marks**		
		L	**T**	**P**	**External**	**Internal**	**Total**
02MITE101	**Advanced Research Methodologies**	3	0	0	70	30	100
02MITE102	**Soft Computing**	**3**	**0**	**0**	**70**	**30**	**100**
02MITE103	**ADVANCED CONCEPTS IN COMPUTER SCIENCE**	3	0	0	70	30	100
02MITE201	**DISSERTATION**	**3**	**0**	**0**	**50**	**50**	**100**
Total		**12**	**0**	**0**	**260**	**140**	**400**

RESEARCH METHODOLOGIES

Paper Code: 01MIte101

UNIT-1: **Research Overview**

Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – research Methods versus Methodology – Research and Scientific Method – Importance of Knowing How Research is done – Research Process – Criteria of good Research – Necessity of Defining the Problem – Technique involved in Defining the Problem – Meaning of Research Design – Need for Research Design – Features of a Good Design – Important Concepts Relating to Research Design – Different Research Design – Data

UNIT-2: Data Analysis

Mathematical and statistical analysis using software tools like MAT Lab, SPSS or free wares tools.

UNIT-3: Report Writing

Report writing and analyzed data representation - Significance of Report Writing– Different Steps in writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a research Report – Precautions for Writing Research Reports.

UNIT-4: Quality Research Strategies

Building expertise in the areas of interest, generating the base content in the selected area, literature survey for research work- already done, being done by others and arriving at directions of research.

UNIT-5: Formulation Of Research

Formulation of research title , development of criteria based research proposal , Presentation for the research proposal and review of the proposal base on the feedbacks by evaluation experts.Planning for the research work with outcomes/achievable and time targets.Research monitoring publication of research outcomes in referred journals. Documentation of research work to generate thesis with norms and standards.

SOFTWARE TECHNOLOGIES

Paper Code: 01MIte102

UNIT-1. Software Management Concept

- Software process
- Software project Metrics
- Software project Planning
- Risk Management

UNIT-2. Software Quality Assurance

- Quality Concepts
- Quality Movement
- Software Review
- Software Quality Assurance
- Formal Technical Reviews

UNIT-3. Software Testing

- Software Testing Fundaments
- Test Case Design
- Basic path Testing
- Control Structure Testing

- A Strategic approach to software

UNIT-4. Enterprise Application Integration

- Concepts and challenges of integrating different application
- Different heterogeneous platform
- EAI architecture, EAI approaches data level
- Application / process level, method level

UNIT-5. Messaging concepts and services

- Messaging concepts and various types of messaging services
- Middleware and adapter services, Transaction middle aware
- EAI process methodology

Paper III

ADVANCED NETWORKING AND SECURITY

Paper Code: 01Ite103

UNIT-1 Network Tools and Techniques

- Protocol layering, system design, multiple access, switching, scheduling, naming, addressing, routing, error control; flow control
- Traffic management – data link layer protocols
- Internet: concept, history, network layer, transport protocol UDP, TCP, Ipv4, Ipv6

UNIT-2 Local Area Networks, Socket and Interprocess communication

- Topologies, access techniques, LAN, 802.11G wireless LANs.
- Application layer: DNS, Email, WWW, multimedia.
- TCP sockets, UDP sockets name and address conversion, IPv4 / Ipv6 interoperability - Socket programming.
- Posix IPC, system V IPC, Pipes, FIFO, Posix message queen,
- System V semaphore, RPC in Sun systems. Unix programming using IPe.

UNIT-3 Classical Encryption, Block Cipher and the Data Encryption Standard

- Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Rotor Machines, Steganography.
- Simplified DES, Block Cipher Principles, the Data Encryption Standard
- Block Cipher Design Principles and Modes of Operation
- Advanced Encryption Standard: Evaluation Criteria, the AES Cipher

UNIT-4 Contemporary Symmetric Ciphers and Confidentiality using Symmetric Encryption

- Triple DES, Blowfish, RC5,
- Characteristics of Advanced Symmetric Blick Ciphers RC4 Stream Cipher.
- Placement of Encryption function, Traffic Confidentiality, Key

Distribution, Random Number generation.

UNIT-5 Introduction to Number Theory and Key Management

- Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality,
- The Chainese Remainder Theorem, Discrete Logarithms.
- Key Management, Diffe-Hellman Key Exchange, Ellipric Curve Arithmetic, Elliptic Curve Cryptography.
- Authentication applications – Electronic Mail Security, IP Security– Web Security – System Security : Intruders – Malicious Software – Firewalls

Paper – IV

INFORMATION TECHNOLOGY CONCEPTS& MIS

Unit: I

Introduction to computers:definition, characteristics, evolution, generation, classification. Number system (binary, octal, decimal, hexadecimal). Input and output devices ,computer memory ,CPU,
types of software – Application and system software , Operating system and types.

Unit: II

Telecommunication concepts- data transmission and OSI layers, communication channels, types of communications network, local area network (Ethernet, token bus, token ring), wide area network, TCP/IP fundamentals, internet, intranet, extranet, The world wide web, artificial intelligence, expert systems.

Unit: III

MS-Office, word, excel, power point, access. Database Management System objectives of DBMS, advantages and disadvantages of DBMS,hierarchical model, network
model, relational model, ER model, Normalization process, object oriented database, distributed database, client server systems.

Unit: IV

MIS-definition, nature and scope, MIS characteristics, functions, structure of MIS, role of MIS, MIS as a control system, process of management, applications of MIS, Implementation and evaluation of MIS,Enterprise resource planning (ERP)and its benefits, ERP
market.

Unit: V

Information and System concepts-Introduction, classification of information, methods of data andinformation collection, value of information. System-definition, types of system, system
decomposition, integration of subsystems, elements of a system,Human as an information processing system, Information system as an enabler

SEMESTER II

ADVANCED RESEARCH METHODOLOGY

Unit – I Thesis Writing

Research types – objectives and approaches – Literature Collection: Web browsing – Software tools -Writing review and journal articles - manuscript publication. Planning a thesis - general format – page and chapter format – footnotes –tables and figures – references and appendices.

Unit – II: Analysis of algorithms:

The role of algorithm in computing - Insertion sort – Analyzing and designing algorithms - growth of functions – Introduction to NP –Completeness.

Unit – III: Formal Languages and Finite Automata:

Contextfree grammars – Derivation trees – Simplification of Context Free Grammars – Chomsky normal form – Greiback normal form – The pumping lemma for Context Free Languages. Finite state systems - Basic definitions – Non deterministic finite automata – Finite automata with epsilon moves – Regular expressions – Applications of finite Automata. (Stress on theorem statement and problems only, no proof for theorems)

Unit – IV: Probability and Statistical Analysis:

Probability – Fail time data analysis – Hazard models – Conditional probability – Bayes rule – System reliability

Unit – V: Logics - Relations and Functions:

Propositions – Precedence rules for operators – Law s of equivalence – Natural deduction system: – Developing natural deduction system proof . Relation properties –Matrix and Graph – Graph Notations for relations – Partition and covering - Equivalence relation – Compatibility relations—Partial ordering – Functions – components – Composition of function – Inverse functions –Binary and n – ary operations

Book(s) for Study:

1. Kothari C R, ‖Research Methodology – methods and techniques‖, Wishwa Prakashjan, New Delhi, 2nd Edition, 1999.
2. Berny H. Durston, M. Poole, ―Thesis and Assignment writing‖, Wiley Eastern Ltd, ND, 1970.
3. Misra R P, ―Research Methodology - A Hand Book‖, Concept publishing Company, New Delhi, 1988.
4. Ellis Horowitz and Sartaj Sahni, ―Fundamentals o f Computer algorithms―, Galgotia Publications, New Delhi, 2000.
5. Thomas. H. Cormen, Charles E. Leiserson, Ronald L. Rivest ―Introduction to Algorithms‖, Prentice Hall of India, 1998.
6. John E. Hopcroft, Jeffery D. Ullman, ―Introduction to Automata Theory Language and Computation‖, Narosa Publishing House, 1979.
7. L.S. Srinath, ―Reliability engineering‖, Affliated East. West Press Pvt. Ltd., New Delhi, Third Edition, 2005.
8. E. BalaGurusamy, ―Reliability Engineering‖, Tata McGraw Hill Publishing Ltd, New Delhi, 2003.
9. David Gries, ―The Science of Programming‖, Narosa Publishing House, 1981.
10. Leon S. Levy, ―Discrete Structures of Computer Science‖, Wiley Eastern Ltd., 1980.

PAPER II

SOFT COMPUTING

Unit – I

ARTIFICIAL NEURAL NETWORKS:

Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohnen's self organizing networks - Hopfield network.

Unit – II

FUZZY SYSTEMS: Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

Unit – III

NEURO - FUZZY MODELING:
Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing.

Unit – IV

GENETIC ALGORITHMS:
Evolutionary computation. Survival of the Fittest - Fitness Computations - Crossover - Mutation - Reproduction - Rank method - Rank space method.

Unit – V

SOFT COMPUTING AND CONVENTIONAL AI:
AI search algorithm - Predicate calculus - Rules of inference – Semantic networks - Frames - Objects - Hybrid models - Applications.

Book for Study:

1 Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft Computing", Prentice Hall, 1998.

Book(s) for Reference:

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 1997.
2. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall, 1994.
3. George J. Klir and Bo Yuan, "Fuzzy sets and Fuzzy Logic", Prentice Hall, USA 1995.
4. Nih J. Nelsson, "Artificial Intelligence - A New Synthesis", Harcourt Asia Ltd., 1998.
5. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y, 1989.

PAPER III ADVANCED CONCEPTS IN COMPUTER SCIENCE

Unit – I

Distributed Databases: Introduction - Distributed Database Architecture – Distributed Database Design - Distributed Transaction Management - Concurrency control – Distributed database management systems.

Unit – II

Web Technology - Introduction – Dynamic web pages – Active web page s – User sessions – On line security and payment processing mechanism – Middle ware and component based architectures – EDI – XML

Unit – III

Open System: File System Structure: History-system Structure- user perspective. Internal representation of files: inodes- structure of a regular file – directories-conversion of a path to an inode- super block-inode assignment to a new file-allocation of disk blocks. System calls for the file system: open-read-write-close-

file creation-creation of special files-change directory, root, owner and mode-stat and fstat- pipes-dup-mounting and unmounting file systems-link and unlink.

Unit – IV

Communication Protocols: Overview – Protocols and architecture – Internet protocols – Inter-network operations – Transport protocols.

Unit – V

Network Security: Cryptography - Introduction -Submission Ciphers – Transposition Ciphers - One time pads – Cryptographic Principles – Symmetric Key Algorithms: DES - AES – Cipher Modes -Cryptanalysis –Public Key Algorithms – Digital Signatures: Symmetric Key Signatures – Public Key Signatures - Message Digests - The Birth Day Attack – Management of public keys: Certificates – X 509 - Public Key Infrastructure.

Book(s) for Study:

1. M. Tamer OZ Su and Patrick Valduriez, ―Principl es of Distributed Database Systems‖, 2nd Edition, Prentice Hall International Inc. 1999.

2. Achyut S. Godbole, Atul Kahate, ―Web Technologie s‖ , Tata McGraw Hill publishing Company, New Delhi, 2003.

3. Maurice J. Bach, ―The Design of the UNIX Operating System‖, Prentice Hall of India Pvt. Ltd., New Delhi, 1998.

PAPER IV:DISSERTATION