ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

MCA
SYLLABUS STRUCTURE

5th Semester Subjects

Paper	Subject Name	L	T	P	Credits C
Theory Subjects					
CA132501	Data Warehousing and Data Mining (DWDM)	3	2	0	4
CA132502	Web Technology (WT)	3	2	0	4
CA132503	Artificial Intelligence (AI)	3	2	0	4
CA132504**	Elective-I	3	2	0	4
CA132505**	Elective-II	3	2	0	4
Practical Subjects					
CA132526	Minor Project	0	0	10	5
Total Contact Hrs : 35 **Total Credits : 25**					

Elective – I Subjects		
Sl. No.	**Subject Code**	**Subject**
1	CA13250411	Microprocessor and Embedded Design (MED)
2	CA13250412	Distributed Systems (DS)
3	CA13250413	Expert Systems (ES)
4	CA13250414	Image Processing (IP)
5	CA13250415	Biologically Implied Computing (BIC)
6	CA13250416	Programming Language and Paradigms (PLP)
7	CA13250417	Any other subject offered from time to time with the approval of the University

Elective – II Subjects		
Sl. No.	**Subject Code**	**Subject**
1	CA13250521	Cryptography and Network Security (CNS)
2	CA13250522	Information Storage and Retrieval (ISR)
3	CA13250523	Multimedia Systems (MS)
4	CA13250524	Simulation and Modeling (SM)
5	CA13250525	Remote Sensing and GIS (RSG)
6	CA13250526	Mobile Computing (MC)
7	CA13250527	Any other subject offered from time to time with the approval of the University

MCA 5TH SEMESTER SYLLABUS

Paper : CA132501
Subject Name : DATA WAREHOUSING AND DATA MINING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction to Data Warehousing:** **Basic Concepts:** Characteristics of Data Warehouse, DSS, Differences between Data Warehouse and Database Systems, Data Warehouse architecture and its components, Metadata, Data mart, Warehouse versus Data Mining (OLTP & OLAP), OLAP tools, Data Cubes, Multidimensional Data.	2
2		**Introduction to Data Mining:** **Basic Concepts:** Data Mining, Kinds of data that can be mined, Data Mining versus Database Systems, KDD, Data Preparation, Cleaning and Visualization. **Data Mining Techniques:** **Association Rule:** What is an association rule? Mining association rules, Frequent sets and Border sets, Algorithms for mining association rules- Apriori Algorithm, Pincer-Search Algorithm, Border Algorithm, FP-Tree Growth Algorithm, generalized association rule, association rule with item constraints.	3
3		**Clustering:** Hierarchical versus Partitional clustering, Types of data in clustering, Partitional Algorithms- K-means, K-medoids, PAM, CLARA, CLARANS. Density based clustering algorithm- DBSCAN. Hierarchical Algorithms- BIRCH, CURE. Categorical clustering Algorithms- ROCK, CACTUS.	3
4		**Decision Trees:** Introduction, Tree construction principle, Decision tree generation algorithm- CART, ID3, C4.5	1
5		**Other Techniques for Data Mining:** Concepts of Genetic Algorithms, Artificial Neural Network, Rough Sets and their application in the domain of Data Mining. Introduction to Web Mining, Text Mining and Temporal Data Mining.	2
6		Issues and challenges in Data mining, Data mining application areas (example with practical case studies).	1
Books	1	Data Mining Techniques, By Arun K. Pujari (University Press)	
	2	Data Mining Concepts and Techniques, By Han and Kamber (Morgan Kaufmann and Harcourt India)	
	3	Data Mining, By Peter Adriaans, Dolf Zantinge (Pearson Education Asia)	
	4	Algorithms for Clustering Data, By K. Jain and R. C. Dukes (Prentice Hall)	
	5	Data Warehouse, from Architecture to Implementation.- by Barry Devlin (Addison Wesley language)	
	6	Data Warehousing in the Real World. By Sam Anahory, Dennis Murray (Pearson Education Asia)	

Paper : CA132502
Subject name : WEB TECHNOLOGY
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction to Internet Technology:** Overview of Networking protocols and OSI Model. Internetworking concepts.	2
2		**Internet Protocols and Architecture and Background work:** TCP/IP, IP, IP Addressing & Datagrams, IPv6, ARP, RARP, BOOTP, DHCP, ICMP. TCP, UDP, Ports & Sockets, TCP Connection & properties, TCP Segment format, Active & Passive Open Connections. DNS, DNS Server, Email Architecture, SMTP, POP & IMAP, FTP, TFTP. WWW, web server & web browser, HTTP commands & interaction, Architecture of Web browser, CGI, TELNET.	4
3		**Web Development Technologies:** Client Side Programming: Different client-side scripting: JavaScript, VBScript etc. HTML; CSS, XML, DTD; Server Side Programming: Servlets, JSP, Java beans, EJB, Struts, JSF, ASP.NET; Web Servers: IIS, Apache; RIA, Ajax; Types of web pages, ActiveX Controls, Java Applets, Tiers in web applications; Database connectivity: ODBC, JDBC.	4
4		**Web Security:** Confidentiality, authentication, Integrity, Non-repudiation, Access Control, and Availability. Sniffing, spoofing, phishing, pharming. Web Security: Cryptography, Cipher Text, Digital Signature, Digital Certificates. Network Security: SSL, Firewalls, IP Security, VPN.	2
5		**Web Services & Middleware:** Concept, RPC, CTM, Message Queuing. DCOM & CORBA: basic interface, Architecture; ORB, IDL, IIOP, RMI. Web Services.	2
6		**Wireless Internet:** Mobile IP, addressing and its work. WAP: Architecture, Gateway.	1
Books	1	Achyut S Godbole, Atul Kahate: Wed Technologies – TCP/IP to Internet Architectures, Tata McGraw Hill.	
	2	Deitel & Deitel: Web Technology, Pearson Education	
	3	Raj Kamal: Internet and Web Technologies, Tata McGraw Hill	

Paper : CA132503
Subject name : ARTIFICIAL INTELLIGENCE
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction to the object and goal of artificial intelligence:** Aim and scope of the artificial intelligence, problem space and problem characteristics, state space representation.	1
2		**Problem solving techniques:** Generate and test, hill climbing, search problem reduction techniques, constraint propagation, means-end-analysis; heuristics search techniques and heuristic problem solving.	2
3		**Game playing:** And or graph search, game trees and associated techniques, minimax and alpha beta pruning. Some case studies.	1
4		**Knowledge representation and inferencing:** Procedural and deductive approaches production system formalism, predicate logic (first order and second order), Rule based system, schematics net, conceptual dependencies, conceptual path, frames, scripts associated inferencing mechanism. Resolution in predicate logic, unification, natural deduction theorem proving, forward and backward deduction.	2
5		Different techniques for reasoning under uncertainty, monotics and non monotic reasoning. Constraint satisfaction problem.	2
6		**Rule based system and expert system:** Domain exploration, meta language, expertise, transfer self explaining system case studies(dendral, mycin)	2
7		**Introduction to neural network:** Definition and representation of artificial neuron and its analogy with biological neuron, basic concepts of three layer neural-net and learning by back propagation.	2
8		Basic syntax and semantics of lips and prolog. Programming exercise from ai in lips.	2
Books	1	Artficial Intelligence By Patrick,Henry,Winston , Pearson Education	
	2	Introduction to Artificial Intelligence By Charniak, Mc Dermott, Pearson Education.	
	3	Artificial Intelligence By Nilson	
	4	Artificial Intelligence By Rich and Night	

ELECTIVE-I

Paper : CA13250411
Subject Name : MICROPROCESSOR AND EMBEDDED DESIGN
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction:** Introduction to microprocessors, its evolution, use and application.	1
2		**Microprocessor Architecture:** 8088 MPU, Signal description, memory organization, Instruction processing in 8085/8088 MPU, 80486-SX/DX 32 bit processors architecture, addressing modes of 80386, 80486-SX/DX 32 bit processors, data types, paging and segmentation. Introduction to Pentium Processors, its difference with 80486/80386.	3
3		**Advanced Programming:** Stack and subroutines, Data conversion, BCD arithmetic, Interrupt and Interrupt service routine, Interrupt codes of 8085/8088.	3
4		**Peripheral and Interfacing:** Basic peripherals and their interfacing with 8085/8088, Dynamic RAM interfacing, Interfacing I/O Ports, PIUO 8255 and its operation modes, Interfacing with D/A and A/D Convertors.	3
5		**Embedded Design :** Case study - I : Introduction to Microprocessor based concept, Design of a Aluminium Smelter shell: General process Description, Normal Control electrolysis cell,Cell abnormalities in an aluminium shelter, Brief description of the control laws, salient issues in Design, Result and discussion.	3
6		**Introduction to Micro controllers :** Intel family 8 bit Micro controllers, Architecture of 8051, Signal description of 8051, Register set of 8051, memory and I/O addressing, interrupts, Design of 8051 micro controller based length measurement system for continuity rolling cloth paper.	3
BOOKS	1	Gaonkar : Microprocessor Architecture, Programming and applications with the 8085/8080A : Latest Edition, WILEY EASTERN LIMITED	
	2	Todd D.Morton : Embedded Microcontrollers, PEARSON EDUCATION.	
	3	Mazidi Mazidi : The 8051 Microcontroller & Embedded Systems,PEARSON EDUCATION	

Paper : CA13250412
Subject Name : DISTRIBUTED SYSTEMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction:** Introduction to Distributed systems-examples of distributed systems, challenges-architectural models- fundamental models - Introduction to interprocess communications-external data representation and marshalling- client server communication-group communication – Case study: IPC in UNIX	3
2		**Distributed Object and File System:** Introduction - Communication between distributed objects - Remote procedure call - Events and notifications - Java RMI case Study - Introduction to DFS - File service architecture - Sun network file system - Introduction to Name Services- Name services and DNS - Directory and directory services.	3
3		**Distributed Operating System Support:** The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed debugging – Distributed mutual exclusion.	3
4		**Transaction and Concurrency Control – Distributed Transactions:** Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery.	3
5		**Security and Replication:** Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – Replication - System model and group communications – Fault tolerant services – Highly available services – Transactions with replicated data.	3
Books	1	George Coulouris, Jean Dollimore, Tim Kindberg "Distributed Systems Concepts and Design" Third Edition – 2002- Pearson Education Asia.	
	2	Principle and paradigms, Distributed System by Tanenbaum, PHI	

Paper : CA13250413
Subject Name : EXPERT SYSTEMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction to Expert System**: What are Expert Systems, Features of Expert System, features of good Expert System, Role of human in Expert System, Expert System organization, Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems, Prospector systems-features, working principle.	1
2		**Expert System Tools***:* Knowledge representation in expert systems-using rules semantic nets, frames, Types of tools available for expert system building and how they are used, Stages in the development of expert system tools, Examples of knowledge engineering.	2
3		**Building an Expert Systems:** Necessary requirements for expert systems development, Justification for expert system development, Task in building expert systems, Stages of expert system development, Choosing a tool for building expert system, Acquiring knowledge from the experts, Examples of the expert system building process, examples of expert system used in different areas.	2
4		**Difficulties in Developing an Expert System**: Common pitfalls in-planning an expert system, Scaling with the domain expert during development process.	2
5		**Neural Network Introduction:** Biological neural networks-neuron physiology, eye's neural network, Artificial neuron models, Neural net architecture (Topologies), Learning in ANN, Characteristics of ANN.	1
6		**Supervised Learning:** Single layer networks-perceptrons, Linear separability, Perceptron training algorithm, Modifications multi-layer network-multi-layer discrimination, back propagation algorithm, Classification using back propagation algorithm, Application of back propagation algorithm, Adaptive multiplier networks-algorithm, boosting, prediction network, radial basis functions.	2
7		**Unsupervised Learning:** Winner-take all networks, Learning vector quantiser, Co-inter propagation networks, Adaptive response theory.	1
8		**Associative Networks:** Non-interactive procedures for association, Hopfield networks, Optimization using Hopfield networks, Brain state in a box network, Boltzmann machines, Hetero associates.	2
9		**Fuzzy Logic :** Propositional logic, Membership functions, Fuzzy logic, Fuzzy rule generation, De-fuzzification, Time dependent fuzzy logic, Temporal fuzzy logics, Case study-to use fuzzy logic for processes control problem.	2

Text Book :

1. Stamatios V. Kartalopolous, .Understanding Neural Network and Fuzzy Logic., PHI Pvt Ltd.
2. Kishan Mehrotra, .Elements of ANN., 2nd Editon, Penram International Publishing (I) Pvt. Ltd.

Reference Books:

Donald A. Waterman, .A Guide to Expert Systems., Addison-Wesley Publishing Company.

Paper : CA13250414
Subject Name : IMAGE PROCESSING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		Image digital representation. Elements of visual perception. Sampling and quantization. Image processing system elements.	3
2		Fourier transforms. Extension to 2· D, OCR, Walsh, Hadamard transforms.	3
3		**Enhancement and segmentation:** Histogram modification. Smoothing, sharpening. Thresholding. Edge detection. Segmentation. Point and region dependent techniques.	3
4		**Image encoding:** Fidelity criteria. Transform compression. KL, Fourier, DCT. Spatial compression, Run length coding. Huffman and contour coding.	3
5		**Restoration:** Models. Inverse filtering. Least squares filtering. Recursive filtering.	3
Books	1	Gonslaez, et.a1, "Digital Image Processing", Addison Wesley, Reading, M.A., 1990.	

Paper : CA13250415
Subject Name : BIOLOGICALLY IMPLIED COMPUTING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction:** Sequencing, Molecular Biology and Bioinformatics, Biological sequence/structure, Genomoe Projects, Pattern Recognition and prediction, Folding problem, Sequence Analysis, Homology and Analogy, Bioinformatics Applications, Central Dogma of Molecular Biology.	2
2		**Information Resources:** Biological databases, Primary Sequence databases, Protein sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases DNA sequence databases, specialized genomic resources.	2
3		**DNA Sequence Analysis:** Importance of DNA analysis, Gene Structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene Hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases, The Human Genome Project.	2
4		**Pair Wise Alignment Techniques:** Database Searching, Alphabets and complexity, algorithm and programs, comparing two sequences, sub-sequences, Identity and similarity, The Dot plot, Local and Global similarity, Different alignment techniques, Scoring Matrices, Dynamic Programming, Pair wise database searching.	2
5	5.1	**Multiple sequence alignment:** Definition and goal, The consensus, Computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments, and searching, Applications of Multiple Sequence alignment.	2
	5.2	**Phylogenetic Analysis:** Methods of Phylogenetic Analysis, Tree Evaluation, Problems in Phylogenetic analysis, Tools for Phylogenetic Analysis.	2
6		**Secondary database Searching:** Importance and need of secondary database searches, secondary database structure and building a sequence search protocol.	1
7		**Gene Expression and Microarrays :** Introduction, DNA Microarrays, Clustering Gene Expression Profiles, Data Sources and tools, Applications.	1
8		**Analysis Packages:** Analysis Package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.	1

Text Books:

1. Introduction to Bioinformatics,T K Attwood & D J Parry-Smith, Essex: Addison WesleyLongman, 1999.

Reference Books:

1. Bioinformatics For Dummies Jean-Michel Claveriw, Cerdric Notredame, WILEY DreamTech India Pvt. Ltd, 2/e 2006.
2. Sequence Analysis in A Nutshell, Scott Markel &Darryl Leon, O'REILLY, 1/e, 2003.

Paper : CA13250416
Subject Name : PROGRAMMING LANGUAGE AND PARADIGMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction:** Overview of different programming paradigms e.g. imperative, object oriented, functional, logic and concurrent programming.	2
2		**Syntax and semantics of programming languages:** A quick overview of syntax specification and semiformal semantic specification using attribute grammar.	2
3		**Imperative and OO Languages:** Names, their scope, life and binding. Control-flow, control abstraction; in subprogram and exception handling. Primitive and constructed data types, data abstraction, inheritance, type checking and polymorphism.	2
4		**Functional Languages:** Typed-calculus, higher order functions and types, evaluation strategies, type checking, implementation, case study.	2
5		**Logic Programming Languages:** Computing with relation, first-order logic, SLD-resolution, unification, sequencing of control, negation, implementation, case study.	2
6		**Concurrency:** Communication and synchronization, shared memory and message passing, safety and liveness properties, multithreaded program.	2
7		**Formal Semantics:** Operational, denotational and axiomatic semantics of toy languages, languages with higher order constructs and types, recursive type, subtype, semantics of nondeterminism and concurrency.	3

Text Books :

1. Ravi Sethi, Programming Languages: Concepts and Constructs, Addison-Wesley.
2. T.W. Pratt and M. V. Zelkowitz: Programming Languages: Design and Implementation; PHI.

Reference Books:

1. W. Lloyd, Foundations of Logic Programming, Springer 1984.
2. Carlo Ghezzi, Mehdi Jazayeri, Programming Language Concepts, J. Wiley & sons.
3. E. Horowitz : Fundamentals of Programming Languages; Galgotia Publications Pvt Ltd.
4. K. C. Louden; Programming Languages-Principles and Practice; Thompson (2 nd Indian Edition).

ELECTIVE-II

Paper : CA13250521
Subject Name : CRYPTOGRAPHY AND NETWORK SECURITY
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		Course Introduction and terminology.	1
2		**Conventional Cryptography :** Definitions, Classical Cryptography, Galois Field, Unicity Distance, Entropy, Perfect Secrecy DES, AES and others symmetric cryptography.	3
3		**Asymmetric Cryptography:** Number Theory, public key cryptography, RSA and Elliptic Curve Cryptography, Key management using symmetric and asymmetric key.	3
4		**Authentication:** Message authentications and hash functions, hash algorithms, Digital Signatures and Authentication Protocols.	3
5		**Operating System security:** Computer systems overview, Buffer overflow, Securing UNIX	2
6		**Network and System Security:** Vulnerability, Monitoring/Sniffing, Spoofing b. Firewalls, Intrusion Detection PGP, Kerberos, IPSec, SSL	3
Books	1	W Stallings, "*Cryptography and Network Security: Principles and Practice, 4/e*", Prentice Hall, 2006.	
	2	B. Schneier, A*pplied Cryptography*, 2nd Ed, John Wiley & Sons, Inc., 1996.	
	3	A. Menezes, P. van Oorshot and S. Vanstone, *Handbook of Applied Cryptogrphy*, CRC Press, 1997.	
	4	C. Kauffman, R. Perham and M. Speciner, *Network Security: Private Communication in a Public World*, Prentice-Hall, 1994.	
	5	H. C. A. van Tilborg, *Fundamentals of Cryptology*, Kluwer Academic Publishers, 2000.	

Paper : CA13250522
Subject Name : INFORMATION STORAGE AND RETRIEVAL
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.	2
2		**Information Retrieval System Capabilities:** Search, Browse, Miscellaneous. Cataloguing and Indexing: Objectives, Indexing Process, Automatic Indexing, information Extraction.	3
3		**Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.	3
4		**Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.	2
5		**User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.	3
6		**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.	2
Books	1	Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.	

Paper : CA13250523
Subject Name : MULTIMEDIA SYSTEMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction to Multimedia System:** Architecture and components, Multimedia distributed processing model, Synchronization, Orchestration and Quality of Service (QOS) architecture.	2
2		**Audio and Speech:** Data acquisition, Sampling and Quantization, Human Speech production mechanism, Digital model of speech production, Analysis and synthesis, Psycho-acoustics, low bit rate speech compression, MPEG audio compression.	3
3		**Images and Video:** Image acquisition and representation, Composite video signal NTSC, PAL and SECAM video standards, Bilevel image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG video compression standards.	3
4		**Multimedia Communication:** Fundamentals of data communication and networking, Bandwidth requirements of different media, Real time constraints: Audio latency, Video data rate, multimedia over LAN and WAN, Multimedia conferencing.	2
5		**Hypermedia presentation:** Authoring and Publishing, Linear and non-linear presentation, Structuring Information, Different approaches of authoring hypermedia documents, Hyper-media data models and standards.	2
6		**Multimedia Information Systems:** Operating system support for continuous media applications: limitations is usual OS, New OS support, Media stream protocol, file system support for continuous media, data models for multimedia and hypermedia information, content based retrieval of unstructured data.	3

Books:

1. Ralf Steinmetz and Klara Nahrstedt, Multimedia Systems, Springer.
2. J. D. Gibson, Multimedia Communications: Directions and Innovations, Springer.

Reference:

1. K. Sayood, Introduction to Data Compression, Morgan-Kaufmann.
2. Puri and T. Chen, Multimedia Systems, Standards, and Networks, Marcel Dekker.
3. Iain E.G. Richardson, H.264 and MPEG-4 Video Compression, John Wiley.
4. Borivoje Furht, Handbook of Multimedia Computing, CRC Press.

Paper : CA13250524
Subject Name : SIMULATION AND MODELING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1	1.1	**Introduction to Simulation:** When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment.	1
	1.2	**Components of a system:** Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. Simulation examples: Simulation of queuing systems; Simulation of inventory systems; Other examples of simulation.	2
2		**General principles, simulation software:** Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS.	2
3		**Statistical models in simulation:** Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical.	1
4		**Queuing models:** Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues.	2
5		**Random-number generation, random-variant generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers. Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.	2
6		**Input modeling***:* Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models.	2
7		**Output analysis for a single model:** Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.	2
8		**Model Building:** Model building, verification and validation; Verification of simulation models; Calibration and validation of models. Optimization via Simulation.	1

Text Book :

1. Discrete-Event System Simulation – Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, 4 th Edition, Pearson Education,.
2. Jerry Banks, John Carson, Barry Nelson, David Nicol, .*Discrete Event System Simulation*.
3. Averill Law, W. David Kelton, .*Simulation Modeling and Analysis*., McGRAWHILL

References:

1. Geffery Gordon, .*System Simulation.*, PHI
2. Bernard Zeigler, Herbert Praehofer, Tag Gon Kim, .*Theory of Modeling and*
3. *Simulation*., Academic Press
4. Narsing Deo, .*System Simulation with Digital Computer.*, PHI
5. Donald W. Body, .*System Analysis and Modeling*., Academic Press Harcourt India

Paper : CA13250525
Subject Name : REMOTE SENSING AND GIS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1		**Introduction of Remote Sensing -** Electro Magnetic Spectrum, Physics of Remote Sensing- Effects of Atmosphere- Scattering, Different types of Absorption-Atmospheric window, Energy interaction with surface features of Spectral reflectance of vegetation, soil ,and water –atmospheric influence on spectral response patterns- multi concept in Remote sensing.	2
2		**Data Acquisition :** Types of Platforms – different types of aircrafts-Manned and Unmanned spacecrafts – sun synchronous and geo synchronous satellites – Types and characteristics of different platforms LANDSAT, SPOT, IRS,INSAT,IKONOS,QUICKBIRD etc - Photographic products, B/W, colour, colour IR film and their characteristics – resolving power of lens and film- Opto mechanical electro optical sensors – across track and along track scanners – multi spectral scanners and thermal scanners – geometric characteristics of scanner imagery - calibration of thermal scanners.	2
3		**Microwave scatterometry –** types of RADAR – SLAR – resolution - range and azimuth – real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect - different types of Remote Sensing platforms –airborne and space borne sensors – ERS, JERS, RADARSAT, RISAT - Scatterometer, Altimeter- LiDAR remote sensing, principles, applications.	2
4		**Data Analysis :** Resolution – Spatial, Spectral, Radiometric and temporal resolution- signal to noise ratio- data products and their characteristics - visual and digital interpretation –Basic principles of data processing –*Radiometric* **correction –**Image enhancement – Image classification – Principles of LiDAR, Aerial Laser Terrain Mapping.	2
5		**Introduction to GIS –** definitions, concept and history of developments in the field of information systems, Computer fundamentals for GIS, Hardware and software requirements for GIS, Coordinate System and Projections in GIS – Conic, cylindrical and planner.	2
6	6.1	**GIS Data Structure:** Data structure and formats, Spatial data models – Raster and Vector, Data inputting in GIS, Data base design - editing and topology creation in GIS, Linkage between spatial and non spatial data.	1

	6.2	**Spatial data analysis –** significance and type, Attribute Query, spatial query, Vector based spatial data analysis, Raster based spatial data analysis, Buffer analysis, Data quality and sources of errors, Integration of RS and GIS data, Digital Elevation Model, Network Analysis in GIS.	1
7		**Data analysis and modeling in GIS:** Data analysis and modeling in GIS– types of GIS modeling, Decision support systems, Overview of image processing & GIS Packages – ARC GIS, ERDAS, MAP INFO, ILWIS, GEOMEDIA, IDRISI.	2
8		**Recent Trends in GIS:** AM/FM, Virtual 3D GIS, OLAP, Internet GIS, Open GIS.	1

Text Books:

1. Paul Curran P.J. Principles of Remote Sensing, ELBS; 1995.
2. Lillesand T.M., and Kiefer,R.W. Remote Sensing and Image interpretation, VI edition of John Wiley & Sons-2000.
3. Anji Reddy, M. 2004 : Geoinformatics for environmental management.B.S. Publications
4. Chang.T.K. 2002 : Geographic Information Systems. Tata McGrawHill

Reference Books:

1. Charles Elachi and Jakob J. van Zyl , Introduction To The Physics and Techniques of Remote Sensing, Wiley Series in Remote Sensing and Image Processing, 2006.
2. Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.

Paper : CA13250526
Subject Name : MOBILE COMPUTING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	COURSE CONTENT	WEEKS
1	1.1	**Cellular Concepts:** Cell structure, frequency reuse, cell splitting, channel assignment, handoff, interference, capacity, power control.	1
	1.2	**Wireless Standards:** Overview of 2G and 3G cellular standards. Wireless Standards: Overview of 2G and 3G cellular standards.	1
2		**Signal Propagation:** Propagation mechanism- reflection, refraction, diffraction and scattering, large scale signal propagation and lognormal shadowing.	2
3		**Fading Channels :** Multipath and small scale fading- Doppler shift, statistical multipath channel models, narrowband and wideband fading models, power delay profile, average and rms delay spread, coherence bandwidth and coherence time, flat and frequency selective fading, slow and fast fading, average fade duration and level crossing rate. Capacity of flat and frequency selective channels.	3
4		**Antennas for Mobile Terminal:** monopole antennas, PIFA, base station antennas and arrays.	1
5		**Multiple Access Schemes:** FDMA, TDMA, CDMA and SDMA.	1
6		**Modulation Schemes:** BPSK, QPSK and variants, QAM, MSK and GMSK, multicarrier modulation, OFDM.	1
7		**Receiver and Transmitter Structure:** Receiver structure: diversity receivers-selection and MRC receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity-Alamouti scheme.	2
8		**Time Signal Processing:** MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing tradeoff.	1
9		**Performance Measures:** Outage, average snr, average symbol/bit error rate.	1
10		**System Examples:** GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA.	1

Books :

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. Charles Perkins, Mobile IP, Addison Wesley.

Paper : CA132526
Subject Name : MINOR PROJECT
Marks : Internal Evaluation (as per regulation): 100; External Evaluation: 100
L-T-P:: C : 3-2-0 :: 4

UNIT	PARA	LABORATORY CONTENT	Weeks
1		System development Project (based on data processing requirements in an organisation)	15
2		Seminar on recent state of art of technology on Computer Science	
Books	1	E M Awad, System Analysis and Design, PHI	

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