UNIVERSITY OF MUMBAI

B.E. INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTIONS AND EVALUTION (R- 2001)

B.E. SEMESTER VII

Scheme of instructions				Scheme of evalution					
Subjects	Lect / Week	Pract/ week	Tuto / week	Paper Hours	Paper Marks	T/W	Pract	Oral	Total
Computer Simulation and Modelling	4	2	-	3	100	25	-	25	150
Mobile Computing	4	2	-	3	100	25	-	25	150
Image Processing	4	2	-	3	100	25	-	25	150
Management Information Systems	4	2	-	3	100	25	-	25	150
Elective-I	4	2	-	3	100	25	-	25	150
Project-A	-	-	2	-	-	25	-	25	500
	20	10	2	-	500	150	-	150	800

B.E. INFORMATIOM TECHNOLOGY
FOURTH YEAR SEMISTER VII

SUBJECT: COMPUTER SIMULATION AND MODELING

Lectures: 4 Hrs per week **Theory: 100 Marks**
Practical: 2 Hrs per week **Term work: 25 Marks**
Oral: 25 marks

Objective : In the last five decades digital computer simulation has developed from infancy to a full-fledged discipline. The field of modeling and simulation is as diverse as of man. The application of simulation continues to expand, both in terms of extent to which simulation is used and the range lf applications. This course gives a comprehensive and state of art treatment of all the important aspects of a simulation study, including modeling, simulation software ,model verification and validation input Modeling.

Pre-Requisite : Probability and Statistics.

DETAILED SYLLABUS

1. **Introduction to Simulation : System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.**

2. **Simulation examples : Simulation of Queueing systems, other examples of simulation.**

3. **General Principles : Concept6s of discrete event simulation, List processing.**

4 **Simulation Software : History of simulation software, Desirable software features, General-purpose simulation packages, Object oriented simulation, Trends in simulation software.**

5 **Statistical Models in Simulation : Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution.**

6. **Queueing Models : Characteristics of Queueing systems, Queueing notations ,Long run measures of performance of Queueing systems, Steady state behavior of infinite population Markovian models, Steady state behavior of infinite population Markovian models, Steady state behavior finite population model, network of Queues.**

7. **Random Number Generation: Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers. Tests for random numbers.**

8. **Random Variate Generation : Inverse transform technique, Convolution method. Acceptance rejection techniques.**

9. **Input Modelling : Data Collection, Identifying the Distribution of data Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input models.**
10. **Verification and Validation of Simulation Model : Model building, Verification, Validation, Verification of simulation models, Calibration and Validation of models.**
11. **Output Analysis for a Single Model: Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation.**
12. **Comparison and Evaluation of Alternative Systems Design : Comparison of two system design , Comparison of several systems design, Meta modeling, Optimization via simulation.**
13. **Case Studies : Simulation of manufacturing systems, Simulation of computer systems, Simulation of super market, Simulation of pert network.**

TEXT BOOK

1. **Jerry Bank, John Carson, Barry Nelson, David Nicol, "Discrete Event System Simulation"**
2. **Averill Law, W. David Kelton, "Simulation Modeling and Analysis", McGRAW-HILL**

REFERANCE

1. **Geffery Gordon, "System Simulation", PHI**
2. **Bemard Zeigler, Herbert Praehofer, Tag Gon Kim "Theory of Modeling and Simulation", Academic press**
3. **Narsing Deo, "System Simulation with Digital Computer", PHI**
4. **Donald W. Body "System Analysis and Modeling", Academic Pres Harcourt India**
5. **W David Kelton, Randall Sadowski, Deborah Sadowski, "Simulation with Arena", McGRAW-HILL.**

TERM WORK

1. **Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus**

ORAL EAXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E INFORMATION TECHNOLOGY
Fourth Year Semester VII

Subject: Mobile Computing

Lectures: 4 hrs per week marks **Practical: 2 hrs per week**	**Theory: 100** **Term work: 25 marks** **Oral: 25 marks**

Objective: Recent developments in deviced and high bandwidth ubiquitous wireless networks have made mobile computing a reality. Indeed, it is widely predicted that within the next few years access to Internet services will be primarily from wireless devices, with desktop browsing the exception. Such predictions are based on the huge growth in the wireless phone market and the success of wireless data services. This course will help in understanding fundamental concepts, current developments in mobile communication systems and wireless computer networks.

Pre-requisites: Computer Networks

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DETAILED SYLLABUS

1. Introduction: Applications, A short history of wireless communication

2. Wireless Transmission: Frequency for radio transmission, signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular systems.

3. Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminal; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

4. Telecommunication systems: GSM: Mobile services, System architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture, TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.

5. Satellite Systems: History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples.

6. Broadcast Systems: Overview, cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting.

7. Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium Access control Sublayer, Information bases and

Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.

8. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of Handover, Handover scenarios, Backward Handover, Forward Handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol.

9. Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.

10. Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.

11. Support for Mobility: File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, some approaches that might help wireless access, System architectures; wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script, Wireless telephony application, Examples Stacks with Wap, Mobile databases, Mobile agents

BOOKS

1. Jochen Schiller, "Mobile communications", Addison wisely, Pearson Education

2. William Stallings, "Wireless Communications and Networks'

References:

1. Rappaort, "Wireless Communications Principles and Practices"

2. YI Bing Lin, "Wireless And Mobile Network Architectures", John Wiley

3. P.Nicopolitidis, "Wireless Networks", John Wiley

4. K Pahlavan, P.Krishnamurthy, "Principles of Wireless Networks"

5. M.Richharia, "Mobile Satellite Communication: Principles and Trends", Pearson Education.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An Oral examination is to be conducted based on the above syllabus.

B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT: IMAGE PROCESSING	**THEORY: 100 MARKS** **TERM WORK:25 MARKS**
LECTURES: 4 HRS PER WEEK **PRACTICAL: 2HRS PER WEEK**	**ORAL: 25 MARKS**

Objective: Digital Image Processing is a rapidly evolving field with growing applications in science and engineering. Image processing holds the possibility of developing the ultimate machine that could perform the visual functions of all living beings. There is an abundance of image processing applications that can serve mankind with the available and anticipated technology in the near future.

Prerequisites: Digital Signal Processing & Computer Graphics

DETAILED SYLLABUS

1. Introduction to Computer Graphics: Geometry & Lying generation Graphics Primitives, Transformations.

2. Digital Image Processing Systems: Introduction, Structure of human eye, Image formation in the human eye, Brightness adoption and discrimination ,Image sensing and acquisition, Storage, Processing, communication, display. Image sampling and quantization, basic relationship between pixels.

3.Image Transforms (Implementation):Introduction to Fourier Transform, DFT and 2D DFT, properties of 2D DFT, FFT, IFFT, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Slant Transform, Optimum Transform: Karhunen- Loeve (Hotelling) Transform

4. Image Enhancement in Spatial Domain: Gray-Level Transformation, Histogram Processing, Arithmetic and Logic Operation, Spatial filtering: Introduction, smoothing and sharpening filters.

5. Image Enhancement in the frequency domain: Frequency-domain filters: smoothing and sharpening filters, homomorphic filtering

6. Wavelets and multiresolution processing: Image pyramids, subband coding, Haar Transform, Series expansion, scaling functions, Wavelet functions, Discrete Wavelet Transform in 1Dimension, Fast Wavelet Transform, Wavelet Transform in 2Dimension.

7. Image Data Compression: Fundamentals, redundancies: coding, inter-pixel, psycho-visual, fidelity criteria, image compression models, error-free compression, lossy compression, image compression standards: binary image and continuous-tone still image compression standards, video compression standards.

8.Morphological image processing: Introduction, dilation, erosion, opening, closing, hit-or-miss transformation, morphological algorithm operations on

binary images, morphological algorithm operations on gray-scale images.

9. Image segmentation: Detections of discontinuities, edge-linking and boundary detection, thres holding, region-based segmentation
10. Image representation and description: Representation schemes, boundary descriptors, regional descriptors.

BOOKS
1.R. C.Gonsales R.E.Woods, "Digital Image Processing",Second edition, Pearson Education **2. Anil K.jain, 'Fundamentals of Image Processing', PHI**
References: **1. William Pratt,'Digital Image Processing', John Wiley** **2. Milan Sonka,Vaclav Hlavac, Roger Boyle,' Image Processing, Analysis and Machine Vision', Thompson Learning** **3. N. Ahmed and K. R. Rao, 'Orthogonal Transforms for Digital Signal Processing', Springer** **4. B.Chanda ,D. Datta, Mujumdar, 'Digital Image Processing and Analysis', PHI**
TERM WORK
1.Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.

B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT: MANAGEMENT INFORMATION SYSTEM

Lectures: 4 Hrs per week **Theory: 100 Marks**
Practical: 2 Hrs per week **Term work: 25 Marks**
Oral Exam: 25 Marks

Objectives: to enable students to understand the role and importance of information system

Pre-requisites: Computer fundamentals, DBMS

DETAILED SYLLABUS

1. **Foundation of Information System: Introduction to Information System and MIS, Decision support and decision making systems, system approach, the system view of business, MIS organization within company, Management information and the systems approach.**
2. **Information Technology: A manager's, overview, managerial overviews, computer hardware & software, DBMS,RDBMS and Telecommunication.**
3. **Conceptual System Design: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, and prepare the conceptual design report.**
4. **Detailed system Design : Inform & involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform, and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose and organization to operate the system, document the detailed design revisit the manager user.**
5. **implementation Evaluation and Maintenance of the MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the**

operating personal, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development.

6. **Advanced Concept in Information Systems: Enterprise Resources Management (ERP), Supply Chain Management, C R M, Procurement Management System.**
7. **Applications: Applications of MIS in Manufacturing sector, Service sector**

BOOK:

Text Books:

1. **W.S.jawadekar, "C", TMH.**
2. **Gordon B. Davis and M.H.Olson, "Management Information System", McGraw Hill.**

References:

1. **J.A. O'Brien, "Management Information System" THM.**
2. **K.C.Laudon, J.P.Laudon," Management Information System"**
3. **Turban, Rainer, potter," Introduction to Information System", John Wiley**
4. **D.P. Goyal, "Management Information System", Macmillan**
5. **G.V.Post, D.L.Anderson," Management Information System", THM.**
6. **Steven Alter, "Information System", Pearson Education.**

Term Work

Term Work should consist of case studies/ practical's and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examinination is to be conducted based on the above syllabus.

B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMISTER VII

SUBJECT: ADVANCED DATABASE SYSTEMS (ELECTIVE-I)

Lectures :- 4 Hrs Per Week	**Theory : 100 Marks**
Practical :- 2 Hrs Per Week	**Term work: 100 Marks**
	Oral :- 100 Marks

OBJECTIVES: To study the further database techniques beyond which covered in the second year and thus to acquaint the students with some relatively advanced issues. At the end of the course students should be able to: gain an awareness of the basis issues in objected oriented data models learn about the Web-DBMS integration technology and XML for internet database applications, familiarize with the data warehousing and data mining techniques and other advanced topics. Apply the knowledge acquired to solve simple problems.

Pre-requisites: Database Systems, OOAD

DETAILD SYLLABUS

1. **The Extended Entity Relationship Model and Object Model: The ER model revisited, motivation for complex data types, User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Relationship types of degree higher than two.**
2. **Object-Oriented Databases: Overview of Object-Oriented concepts, Object identity, Object structure, and type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects; Database schema design for OODBMS; OQL; Persistent programming languages; OODBMS architecture and storage issues; Transactions and Concurrency control, Example of ODBMS.**
3. **Object Relational and Extended Relational Databases.: Database design for an ORDBMS-Nested relations and collections Storage and access methods, Query processing and Optimization; An overview of SQL3, Implementation issues for extended type; Systems comparison of RDBMS, OODBMS ORDBMS.**
4. **Parallel and Distributed Databases and Client-Server Architecture: Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operation, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication and allocation techniques for distributed database design, Query processing in**

distributed databases, Concurrency control and Recovery in distributed databases. An overview of Client-Server architecture.

5. Databases on the Web and Semi structured data: Web interfaces to the Web, Over view of XML Structure of xml data, Document schema, Querying XML data Storage of XML data XML applications, The semi structured data model, Implementation issues, Indexes for text data.
6. Enhanced Data Models for Advanced Applications: Active database concepts. Temporal database concepts. Spatial databases, Concepts and architecture, Deductive databases and Query processing, Mobile databases, Geographic information systems.

BOOKS

TEXT BOOKS;

1. Elmasri and Navathe, "Fundamentals of Database Systems," Pearson Education
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems," McGraw-Hill

References

1. Korth, Silberchatz, Sudarshan, "Database System Concepts," McGraw-Hill
2. Peter Rob and Coronel, "Database system, Design, Implementation and Management," Thomson Learning.
3. C.J. Date, Longman, "Introduction To Database Systems," Pearson Education

Term Work

7. Term work should consist of at least 10 Term work should consist of at least 10 practical experiments and tow assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT : PROJECT - A

Tutorial: 2 Hrs per week	**Term work : 25 Marks** **Oral : 25 Marks**

GUIDELINES

1. **project-A exam be conducted by two examiners appointed by university. Student have to give demonstration and seminar no the Project-A for them work marks. All the students of the class must attend all the seminars. Seminar should be conducted continuously for couple of days.**
2. **Project A should preferably contain abstract, existing system, problem definition, scope, proposed system, its design, introduction to programming tools, hardware and software platforms requirements etc.**
3. **Out of the total projects 35 percent may be allowed as to be industry projects, 65 percent projects must be in house. Head of dept and senior taff in the department will take decision regarding projects.**
4. **Every student must prepare hand written synopsis in the normal journal format.**
5. **Internal guide has to interact at least once in fortnight and maintain the progress and attendance report during both the terms.**
6. **Two research projects may be allowed only for outstanding students with research aptitude.**
7. **In case of industry projects, visit by internal guide will be preferred. Industry project will attract demos either at site or in college.**
8. **Make sure that external project guides are BE graduates.**
9. **Number of students for a project should be preferably 2 to 4 Only one student should be avoided and up to 6 may be allowed only for exceptional and complex projects.**