University of Mumbai

Syllabus Structure(R-2007)

At

B.E. (Computer Engineering)

Semester-VII

Sr. No.	Subject	Scheme of Instructions Periods per Week Each Period of 60 Min.		Scheme of Evaluation				
		Theory	Practical	Paper		TW	Oral/ practical	Total
				Hours	Marks			
1.	Digital Signal & Image Processing	4	2	3	100	25	25	150
2.	Robotics and AI	4	2	3	100	25	25	150
3.	Mobile Computing	4	2	3	100	25	25	150
4.	System Security	4	2	3	100	25	25	150
5.	Elective-I	4	2	3	100	25	25	150
6.	Project-I	--	2	--	--	25	25	50
		20	12		500	150	150	800

Elective- I

1) Computer Simulation and Modeling
2) E-commerce
3) Project Management
4) Soft Computing

University of Mumbai			
Class : B.E .	**Branch** : Computer Engineering	**Semester** : VII	
Subject :**:DIGITAL SIGNAL & IMAGE PROCESSING(Abbreviated as DSIP)**			
Periods per Week(Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	---	25
	Term Work	---	25
	Total	---	150

DETAILED SYLLABUS			
Module	Content	Lect	Weit -age
Chapter 1	**Discrete Time Signal and System :** Introduction:Signals, Systems and Signal processing, classification of signals, system, LTI system,Freqency domain representation of DTS & Signals. Convolution , Correlation.	06 L	10%
Chapter 2	**Z-Transforms:** Introduction, Z-transforms , Inverse Z-Transforms, properties,System Function , Application of Z-Transform, Unilateral Z-Transform	06L	10%
Chapter 3	**Discrete Fourier Transform:** Introduction , DFT and its properties, FFT algorithms – direct, divide and conquer approach, radix-2 algorithm(Decimination In Time), 2-D DFT & FFT .	05 L	15%
Chapter 4	**Introduction to Digital Image Processing Systems**: Introduction, Brightness adoption and discrimination , Image sampling and quantization, basic relationship between pixels.	02L	5%
Chapter 5	**Image Transforms :** Introduction to Fourier Transform, properties of Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Slant Transform, Optimum Transform: Karhunen- Loeve (Hotelling) Transform , Radon , Comparison of Transform. Introduction to wavelet transform	08L	15%

Chapter 6	**Image Enhancement:** Image Enhancement in the Spatial domain : Spatial domain point operation and Neighbourhood Operation , Gray-Level Transformation,Median Filter , Bit plane slicing , Histogram Processing, Arithmetic and Logic Operation, Spatial filtering: Introduction, smoothing and sharpening filters., Image Enhancement in the frequency domain: Frequency-domain filters: smoothing and sharpening filters, homomorphic filtering	08L	15%
Chapter 7	**Image Restoration and Denoising :** Introduction,Image Degradation, Types of Image Blur , Classification of image restoration Techniques , Image Restoration Model , Linear and non-Linear image restoration Technique, Blind deconvolution , Image Denoising , Classification of Noise in Image, Trimmed Average Filter, Applications of Image restoration.	5L	10%
Chapter 8	**Image segmentation:** Detections of discontinuities, edge-linking and boundary detection, thresholding, region-based segmentation, Hough's transform	4L	10%
Chapter 9	**Image Data Compression:** Fundamentals, redundancies: coding, inter-pixel, psychovisual, fidelity criteria, image compression models, error-free compression, lossy Compression	4L	10%
	BOOKS		
1	Introduction to Digital signal processing – John G. Proakis, D.G. Manolakis (Maxwell Macmillan Int.)		
2	R. C.Gonsales R.E.Woods, "Digital Image Processing",Second edition, Pearson Education		
	REFERANCE :		
1	S.Salivahanan " Digital Signal processing " TMH		
2	Anil K.jain, 'Fundamentals of Image Processing', PHI		
3	s.Jayaraman , S Esakkirajan , T Veerakumar " Digital Image Processing " Mc Graw Hill.		
4	TAMAL BOSE " Digital Signal and Image Processing " John Wiley & Sons , Inc.		

TERM WORK 1.Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus (15 marks) A term Work test of 10 marks must be conducted .	
List of Practicals	
1.	Write Matlab Program for generation and Manipulation of signal.
2	Write Matlab Program for convolution and correlation.
3	Write C/C++ Program for Discrete Fourier Transform.
4	Write Matlab Program for Image negative , Gray level Slicing
5	Write Matlab Program for Dynamic range compression &Bit plane slicing
6	Write Matlab Program for Histogram Processing
7	Write Matlab Program for Image smoothing.
8	Write Matlab Program for Image sharpening.
9	Write Matlab Program for Edge detection.
10	Write Matlab Program for Trimmed Average Filter.
11	Write Matlab Program for lossless Image Compression.
12	Write Matlab Program for lossy Image Compression.

Robotics and AI (Abbriviated as RAI)				
CLASS B.E. (COMPUTER ENGINEERING)			SEMESTER VII	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
			HOURS	**MARKS**
EVALUATION SYSTEM:	THEORY		3	100
	PRACTICAL		--	
	ORAL		--	25
	TERM WORK		--	25

Prerequisite: Exposure to linear algebra and matrix operations. Exposure to programming in a high level language.

Objective: The field of robotics is in a state of rapid development. Early robots were nothing more than mechanical devices. As computer technology improved, robots become more sophisticated. Computer engineer plays a very crucial role in converting such mechanical devices into intelligent machines through a branch of computer science called artificial intelligence (AI).

The goal of this course is to familiarize the students with the basic concepts of robotics, artificial intelligence and intelligent machines. It will help students to understand and apply principles, methodology and techniques of intelligent systems to robotics.

Module	Contents	Hrs
1	**Intelligent Robotics:** Automation and Robots, Robot Classification, Robot Specifications, Sensory perception, Robot control and Intelligence.	4
2	**Direct Kinematics:** Coordinate Frames, Rotations, Homogeneous Coordinates, The arm Equation, (DK analysis of - 2 Axis and 3 Axis Planar robot, Four axis SCARA Robot, Five axis Articulated robot).	12
3	**Inverse Kinematics:** General Properties of Solutions, Tool Configuration, (IK analysis of - 2 Axis and 3 Axis Planar robot, Four axis SCARA Robot, Five axis Articulated robot).	10
4	**Workspace Analysis and Trajectory Planning:** Workspace analysis, Work envelope of 4-axis SCARA Robot, Work envelope of 5-axis articulated Robot, Workspace Fixtures, The pick-and-place operation, Continuous-Path Motion, Interpolated Motion, Straight-Line Motion.	8
5	**Basic Concepts of Artificial Intelligence:** Intelligence, Problem representation in Artificial Intelligence, Problem-solution Techniques used in Artificial Intelligence.	4
6	**Elements of Knowledge Representation:** Logic, Production Systems, Semantic Networks, Expert Systems.	6
7	**Task Planning:** Task-Level Programming, Uncertainty, Configuration Space, Gross-Motion Planning, Grasp Planning, Fine-Motion Planning, Task Planning Problem.	4

Text Book

1. "Robotics and AI", Andrew Staugaard, PHI
2. "Fundamentals of Robotics- Analysis and Control", Robert Schilling, Pearson Education

References:

1. "Introduction to Robotics", J. J. Craig, Pearson Education.
2. "Robotics", Fu, Gonzales and Lee, McGraw Hill.
3. "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", George F. Luger, Pearson Education.
4. "Industrial Robotics- Technology, programming, and applications", Groover, Weiss, Nagel and Odrey, McGraw Hill
5. Elaine Rich and Kevin Knight, "Artificial Intelligence", TMH

List of Practicals

These experiments can be performed using

1) Use of Control-X simulation Control of X-Y Position Table manually and thru Programming.

2) Use of Control-X simulation Control of Conveyor manually and thru Programming. Programming using sensors and conveyor.

3) Use of Control-X simulation Program for bottling plant experiment using Conveyer and Pneumatics

4) Use of P-Simulator design a pneumatic circuit using a double acting cylinder and 5/2 Air Spring Valve to open the main gate of a factory which can be controlled by a security personnel from the security room.

Term Work:

Term work shall consist of at least 05 experiments and 03 assignments covering all topics and one written test.

Distribution of marks for term work shall be as follows:

1. Laboratory work (Experiments and Journal) 15 Marks
2. Test (at least one) 10 Marks

The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

University of Mumbai			
Class : B.E .	**Branch** : Computer Engineering	**Semester** : VII	
Subject :: MOBILE COMPUTING (Abbreviated as MC)			
Periods per Week(Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	---	25
	Term Work	---	25
	Total	---	150

Objective: Recent developments in portable devices and high-bandwidth, ubiquitous wireless networks has 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.

	Topic to be covered	Hrs
1.	**Introduction**: Short history of wireless communication, Applications, Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread Spectrum, Cellular systems (DSSS & FHSS). **Motivation for a specialized MAC**: Hidden and Exposed terminals. Near and Far terminals; Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access	05
2.	**Telecommunication Systems I:** PCS Architecture, **Cellular Telephony**: Advanced Mobile Phone Service(AMPS); Global System for Mobile Communication (GSM); EIA/TIA IS-136 Digital Cellular System; EIA/TIA IS-95 Digital Cellular System, **Cordless Telephony and Low-Tier PCS**: Cordless Telephone, Second Generation (CT2); Digital European Cordless Telephone (DECT); UMTS, Personal Handy Phone System (PHS); Personal Access Communications System (PACS) ; Unlicensed Systems, 3G Wireless systems. **Mobility Management**: Handoff (Inter-BS, Intersystem), Roaming Management, Handoff Management - Detection and Assignment: Strategies for Handoff Detection, Channel Assignment, Handoff Management – Radio Link Transfer: Hard and Soft Handoff, Network Signaling : Signaling System No.7, Interconnection and Message Routing, Mobility Management.	05

3.	**Telecommunication Systems II: GSM:** Mobile services, System Architecture, Radio interface, Protocols, Localization and Calling, Handover, Security, New data services, GSM Short Message Service, VOIP service for Mobile Networks : GSM on the Net, The iGSM Wireless VoIP Solution, The H.323 Network, iGSM Architecture, iGSM Procedures and Message Flows: Registration, Deregistration, Call Delivery to the IP Network: Implementation Issues; International Roaming for GSM, GSM Operations, Administration, & Maintenance, Mobile Number Portability. **GPRS**: Functional Groups, GPRS Architecture, GPRS Network Nodes:18.3.1 Mobile Station; Base Station System; GPRS Support Node; HLR and VLR, GPRS Interfaces: Um Interface; EDGE;Gb Interface; Gn and Gp Interfaces; Gs Interface; Gi Interface, GPRS Procedures. **Third-Generation Systems** :W-CDMA and cdma2000; Improvements on Core Network; Quality of Service in 3G, Wireless Local Loop: Wireless Local Loop Architecture; Deployment Issues; TR-45 Service Description; Wireless Local Loop Technologies. TETRA, UMTS, and IMT-2000: UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode.	09
4	**Satellite Systems:** History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples.	01
5	**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, Enterprise PCS: Office Level , Local Area Wireless: An Example of WPBX, Capacity Planning for WPBX, IrDA ZigBee, RFID, Wireless Broadband (WiMax)	08
6	**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	05
7.	**Mobile Network and Transport 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 MANET: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics**.** 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. **Wireless Sensor Networks**: Applications, Mobile Internet Connectivity, and Personal Area Network	06

8.	**Support for Mobility:** **Mobile Computing Architecture**: Three Tier Architecture for mobile computing, Design considerations, Mobile Computing through Internet. **File systems:** Consistency, Examples; World Wide Web: Hypertext transfer protocol, Mobile File System, Mobile databases. **Language Support:** Hypertext markup language (XHTML)-MP, Wireless markup language; WML script,Mobile Application Languages-XML, Voice XML. Java, J2ME and JavaCard. **Wireless application protocol:** Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, WAP UAProf and Caching , User Agent Profile , Caching Model , Wireless Bearers for WAP , WAP Developer Toolkits and application environment, Wireless telephony application, Mobile agents, Application Server, Gateways, Portals, Service Discovery, Device Management **Wireless devices and their Operating System :** PalmOS; Windows CE; EPOC; Symbian OS; Linux for Mobile Devices. Mobile Agents **Synchronization :** Synchronization Software for Mobile Devices , Synchronization Protocols, SyncML-Synchronization Language for Mobile Computing, Sync4J (Funambol) Synchronized Multimedia Markup Language (SMIL), Security, m-commerce. **Threats and Security Issues in Mobile Computing:**	09

Books

Text Books:

1. Jochen Schiller, *"Mobile communications",* Addison wisely, Pearson Education
2. Wireless and Mobile Network Architecture : Yi Bang Lin and Imrich Chlamtech (Wiley).
3. Mobile Computing by RajKamal (Oxford).

References :

1. Rappaort, *"Wireless Communications Principals 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. Introduction to Wireless Telecommunication System and Networks by Mullett (Cengage Learning)
6. Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, " *Principles of Mobile Computing*, Springer

Term work

Term work should consist of least 10 practical experiments and two assignments covering the topic of the syllabus.

Suggested Laboratory Exercises of Mobile Computing:

1. Setup & Configuration of Wireless Access Point (AP)
2. Study of WLAN : Ad Hoc & Infrastructure Mode
3. Study of Bluetooth Protocol and Applications
4. GSM modem study (Nokia 30) and SMS client-server application
5. Implementation of Mobile Network using Network Simulator (NS2)
6. Mobile Internet and WML
7. J2ME Program for Mobile Node Discovery
8. Mobile protocol study using omnet++
9. Design and Program Income Tax and Loan EMI Calculator for Mobile Phones.
10. Wireless Network Security : kismet and Netstumbler

Distribution of marks for term work shall be as follows:
Laboratory work (Experiments and Journal) 15 Marks
Test (at least one) 10 Marks
The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

Orals

Oral examination is to be conducted based on the above syllabus

University of Mumbai			
Class: B.E .	**Branch** : Computer Engineering	**Semester** : VII	
Subject :: SYSTEM SECURITY (Abbreviated as SS)			
Periods per Week(Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	---	25
	Term Work	---	25
	Total	---	150

Module	Content	Hours
Chapter 1	**Introduction to Information Security:** Security Goals	03
Chapter 2	**Cryptography:** i. Crypto Basic, Classic Cryptography ii. Symmetric Key Cryptography: Stream Ciphers, A5/1, RC4, Block Ciphers, Feistel Cipher, DES, Triple DES, AES iii. Public Key Cryptography: Kanpsack, RSA, Defiie-Hellman, use of public key crypto- Signature and Non-repudiation, Confidentiality and Non-repudiation, Public Key Infrastructure. iv. Hash Function: The Birthday Problem, MD5, SHA-1, Tiger Hash, Use of Hash Function	10
Chapter 3	**Access control - Authentication and Authorization:** i. Authentication Methods, Passwords, Biometric, Single –sign on, Authentication Protocol, Kerberos. ii. Access control Matrix, ACLs, Multiple level security model, Multilateral security, Covert channel, CAPTCHA	08
Chapter 4	**Software security:** i. Software Flaws, Buffer Overflow, Incomplete Mediation, Race conditions ii. Malware, Salami attack, Linearization Attacks, Trusting Software iii. Software reverse engineering, Digital Rights management. iv. Operating System and Security	10
Chapter 5	**Network Security:** i. Network security basics ii. TCP/IP Model and Port No., Protocol flaws iii. Enterprise wide network Design and Vulnerabilities. iv. Reconnaissance of network v. Packet sniffing, Session Hijacking, ARP Spoofing vi. Web site and web server vulnerabilities vii. Denial of Service viii. SSL and IPSec protocol ix. Firewall. Intrusion Detection System, and Honey pots	15

Text Books

1) Cryptography and Network Security by Behrouz A. Forouzan, TATA McGraw hill.
2) Security in Computing by Charles P. Pfleeger , Pearson Education

Reference Books

1) Information security Principles and Practice by Mark Stamp, Wiley publication
2) Cryptography and Network Security, William Stalling, Prentice hall
3) Principles of Information Security, Michael E., cengage learning
4) Information Systems Security, Nina Godbole, Wiley
5) Network security bible 2nd edition, Eric Cole

TERM WORK

i. Term work should consist of at least 8 practical experiments and two assignments covering the topics of the syllabus.

ii. A term Work test of 10 marks must be conducted.

Distribution of marks for term work shall be as follows:

Laboratory work (Experiments and Journal) 15 Marks

Test (at least one) 10 Marks

The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

ORAL

Oral / Practical Examination must be based upon the syllabus of 25 marks.

University of Mumbai			
Class: B.E.	Branch: Computer Engineering	Semester: VII	
Subject: COMPUTER SIMULATION AND MODELING(**Abbreviated CSM**)			
Periods per Week (each 60 min)	Lecture Practical Tutorial	04 02 --	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	--	25
	Term Work	--	25
	Total	03	150

Objectives of the course: The objective of this course is to teach students methods for modeling of systems using discrete event simulation. Emphasis of the course will be on modeling and on the use of simulation software. The students are expected to understand the importance of simulation in IT sector, manufacturing, telecommunication, and service industries etc. By the end of the course students will be able to formulate simulation model for a given problem, implement the model in software and perform simulation analysis of the system.

Pre-requisites: Probability and Statistics

1. **Introduction to Simulation and Modeling:** Simulation – introduction, appropriate and not appropriate, advantages and disadvantage, application areas, history of simulation software, an evaluation and selection technique for simulation software, general – purpose simulation packages. System and system environment, components of system, type of systems, model of a system, types of models and steps in simulation study.

2. **Manual Simulation of Systems:** Simulation of Queuing Systems such as single channel and multi channel queue, lead time demand, inventory system, reliability problem, time-shared computer model, job-shop model.

3. **Discrete Event Formalisms:** Concepts of discrete event simulation, model components, a discrete event system simulation, simulation world views or formalisms, simulation of single channel queue, multi channel queue, inventory system and dump truck problem using event scheduling approach.

4. **Statistical Models in Simulation:** Overview of probability and statistics, useful statistical model, discrete distribution, continuous distribution, empirical distribution and Poisson process.

5. **Queueing Models:** Characteristics of queueing systems, queueing notations, long run measures of performance of queueing systems, Steady state behavior of Markovian models (M/G/1, M/M/1, M/M/c) overview of finite capacity and finite calling population models, Network of Queues.

6. **Random Number Generation:** Properties of random numbers, generation of true and pseudo random numbers, techniques for generating random numbers, hypothesis testing, various tests for uniformity (Kolmogorov-Smirnov and chi-Square) and independence (runs, autocorrelation, gap, poker).

7. **Random Variate Generation:** Introduction, different techniques to generate random variate:- inverse transform technique, direct transformation technique, convolution method and acceptance rejection techniques.

8. **Input Modeling:** Introduction, steps to build a useful model of input data, data collection, identifying the distribution with data, parameter estimation, suggested estimators, goodness of fit tests, selection input model without data, covariance and correlation, multivariate and time series input models.

9. **Verification and Validation of Simulation Model:** Introduction, model building, verification of simulation models, calibration and validation of models:- validation process, face validity, validation of model, validating input-output transformation, t-test, power of test, input output validation using historical data and Turing test.

10. **Output Analysis:** 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.

11. **Case Studies:** Simulation of manufacturing systems, Simulation of Material Handling system, Simulation of computer systems, Simulation of super market, Cobweb model, and any service sectors.

Text Book:

Banks J., Carson J. S., Nelson B. L., and Nicol D. M., "Discrete Event System Simulation", 3rd edition, Pearson Education, 2001.

Reference Books:

1. Gordon Geoffrey, "System Simulation", 2nd edition, PHI, 1978.
2. Law A. M., and Kelton, W. D., "Simulation Modeling and Analysis", 3rd edition, McGraw-Hill, 2000.
3. Narsing Deo, "System Simulation with Digital Computer", PHI.
4. Frank L. Severance, "System Modeling and Simulation"
5. Trivedi K. S., "Probability and Statistics with Reliability, Queueing, and Computer Science Applications", PHI,
1982.
6. Wadsworth G. P., and Bryan, J. G., "Introduction to Probability and Random Variables", McGraw-Hill, 1960.
7. Donald W. Body, "System Analysis and Modeling", Academic Press Harcourt India.
8. Bernard, "Theory Of Modeling and Simulation"
9. Levin & Ruben, "Statistics for Management".
10. Aczel & Sounderpandian, "Business Statistics".

Term Work:

Term work shall consist of at least 10 experiments covering all topics and one written test. Distribution of marks for term work shall be as follows:

Laboratory work (Experiments and Journal)	15 Marks
Test (at least one)	10 Marks

The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

Suggested Experiment list

The experiments should be implemented using Excel, simulation language like GPSS and/or any simulation packages. Case studies from the reference book can be used for experiment.

1. Single Server System
2. Multi serve system like Able – Baker
3. (M, N) - Inventory System
4. Dump Truck Problem
5. Job-Shop Model
6. Manufacturing System
7. Cafeteria
8. Telecommunication System
9. Uniformity Testing
10. Independence Testing

University of Mumbai			
Class: B.E.	**Branch** : Computer Engineering	**Semester** : VII	
Subject: E-Commerce (Abbreviated as e-com.) Elective-I			
Periods per Week (Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	--	25
	Term Work	--	25
	Total	--	150

Objectives of the course:

- To understand Technical aspect of E-commerce and E-Business
- To describe the process of E-commerce and E-business
- To understand Infrastructure design issues of E-commerce

Contents of the Course

Part 1: E-commerce

1. **Introduction:** Electronic commerce and Physical Commerce, different type of e-commerce, some e-commerce scenario, Advantages of e-commerce
2. **Basic technologies of Ecommerce:** Client side Programming, Server Side Programming, Database connectivity, session tracking techniques.
3. **Advance technologies of E-commerce**: Mobile Agent, WAP, XML, Data Mining, Rich Internet Application, Web 2.0, REST Web Services, Web Mashup, Working of Search Engines, Internet Security.
4. **Internet Payment System**: Characteristics of payment system, SET Protocol for credit card payment, E-cash, E-check, Micropayment system
5. **E-commerce strategies:** Strategies for marketing, Sales and Promotions, Strategies for Purchasing and support activities, Strategies for Web Auctions, Virtual Communities, and web portals

6. **E-Business -Introduction:** E-Business vs E-commerce,, Characteristics of e-Business, e-Business role and their challenges, e-business Requirements, impacts of e-business
7. **E-business strategies**: Strategic positioning, Levels of e-business strategies, Strategic planning process, Strategic alignment, the consequences of e-Business, Success factors for implementation of e-business strategies. Business models, Business process and collaborations

8. **Integration of Application**: Approaches to Middleware, RPC and RMI, Enterprise Application Integration, e-business Integration, loosely Coupled e-Business solutions for integration, Service Oriented Architecture, EAI and web Services,WS-security.

9. **E-commerce Infrastructure** Cluster of Servers, Virtualization Techniques, Cloud computing, Server consolidation using cloud, Introduction to Hadoop, HDFS, Google Apps engine

TEXT BOOKS:

1. E-Commerce Fundamentals and application (Henry Chan) Wiley publication
2. Electronics Commerce (Gary Schneider) Thomson Course technology
3. E-Business Organizational and technical foundation (Michael P) Wiley Publication

REFERENCES:

1. E- Commerce Strategies, Technology and applications (David) Tata McGrawHill
2. Introduction to E-commerce (jeffrey) Tata- Mcgrawhill
3. E-Business and Commerce- Strategic Thinking and Practice (Brahm) biztantra
4. Using Google Aps engine (Severance) O'reilly
5. Hadoop : The Definitive Guide (White) O'reilly

Term Work

Term work shall consist of at least 6 assignments/programming assignments and one written test.

Marks

1. Laboratory work (Experiments and Journal) 15 Marks

2. Test (at least one) 10 Marks

The final certification and acceptance of TW ensures the satisfactory

performance of laboratory Work and Minimum Passing in the term work.

Suggested List of Experiments

Exp 1: All experiments should be part of final e-commerce portal development

1. Home page design
2. Form validation (Ajax enabled)
3. Catalog design and Search techniques (Web mining , and Ajax enabled)
4. Access control mechanism (session management)
5. Creating Web Site to integrate at least five REST web Services (Web Mashups)
6. Server side using Web Services

Exp 2: Creating Hadoop clusters on Ubuntu

Project Management (Elective-II)				
CLASS B.E. (Computer Engineering) Elective			SEMESTER VIII	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
			HOURS	**MARKS**
EVALUATION SYSTEM:	THEORY		3	100
	ORAL		-	25
	TERM WORK		-	25

Objectives of the course:

- To understand Much of the unique knowledge needed to manage projects.
- To understand the Life cycle and phases of project management.
- To understand knowledge areas and tools-techniques for efficient project management focusing IT projects.

Contents of the Course

1. Introduction to Project Management
   - 1.1 What is project
   - 1.2 The triple constraint
   - 1.3 What is project management
     - 1.3.1 Stakeholders
     - 1.3.2 Project Management Knowledge Area
     - 1.3.3 Project Management tools and techniques
   - 1.4 Role of a Project Manager
     - 1.4.1 Project Manager's job description
     - 1.4.2 Suggested Skills for Project Manager
     - 1.4.3 Importance of people and leadership skills

2. Project Management and IT context
   - 2.1 Organizational Structure
   - 2.2 Project Life Cycle and Phases
   - 2.3 Nature of IT projects
   - 2.4 Characteristics of IT project Team members
   - 2.5 Trends affecting IT Project Management
     - 2.5.1 Globalization
     - 2.5.2 Outsourcing
     - 2.5.3 Virtual Teams

3. Project Integration Management
   - 3.1 Project Selection
   - 3.1 Developing Project Charter
   - 3.3 Developing Project Management Plan

4. Project Scope Management
   - 4.1 Collecting Requirements
   - 4.2 Defining Scope
   - 4.3 Creating Work Breakdown Structure
   - 4.4 Controlling Scope

5. Project Time Management
   - 5.1 Defining and Sequencing Project Activities and Dependencies
   - 5.2 Developing Schedule
     - 5.2.1 Gantt Chart
     - 5.2.2 Critical Path Method
     - 5.2.3 Incorporating Project Uncertainty - PERT
     - 5.2.4 Critical Chain Method
     - 5.3 Resource loading and Resource Leveling
     - 5.4 Schedule Controlling

6. Project Cost Management
   - 6.1 Estimating Techniques
   - 6.2 Earned Value Management

7. Project Quality Management
   - 7.1 Planning Quality
   - 7.2 Performing Quality Assurance
   - 7.3 Quality Control – Tools and Techniques

8. Project Resource Management
   - 8.1 Development of Human Resource Plan
   - 8.2 Project Organizational Chart and Responsibility Assignment
   - 8.3 Multi project Scheduling and Resource Allocation

9. Project Communication Management
   - 9.1 Identifying Stakeholders
   - 9.2 Planning Communication

10. Project Risk Management
    - 10.1 Identifying Risks ;Common Sources of Risk in IT Projects
    - 10.2 Qualitative Risk Analysis : Probability and Impact Matrix
    - 10.3 Quantitative Risk Analysis : Decision Trees
    - 10.4 Planning Risk Response

11. Project Procurement Management
    - 11.1 Planning and conducting procurement

TEXT BOOKS:

1. PMP Project Management Professional Study Guide, Third Edition by Joseph Phillips
2. Project Management – Core Text Book ; Samuel J. Mantel et.al. With M.R. Gopalan; Wiley

India Edition.

3. Project Management Handbook by Uddesh Kohli, K. K. Chitkara

University of Mumbai			
Class : B.E .	**Branch** : Computer Engineering	**Semester** : VII	
Subject : **SOFT COMPUTING (Abbreviated as SC) (Elective-I)**			
Periods per Week(Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	---	25
	Term Work	---	25
	Total	03	150

Term Work

Term work shall consist of at least 6 assignments/1 project which will contain detailed documentation of each of the project management phases and one written test.

Marks

1. Laboratory work (Experiments and Journal) 15 Marks

2. Test (at least one) 10 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

DETAILED SYLLABUS		
Sr. No	**Topics**	**Hours**
1.	FUZZY SET THEORY: Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.	10

AIM :
To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

Objectives :

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

2.	OPTIMIZATION Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search	08
3.	NEURAL NETWORKS Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.	10
4.	NEURO FUZZY MODELING Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.	09

5.	APPLICATIONS OF COMPUTATIONAL INTELLIGENCE Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.	08

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

TERM WORK

iii. Term work should consist of at least 8 practical experiments and two assignments covering the topics of the syllabus.

iv. A term Work test of 10 marks must be conducted.

Distribution of marks for term work shall be as follows:

Laboratory work (Experiments and Journal)	15 Marks
Test (at least one)	10 Marks

The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

Oral Examination must be based upon the syllabus of 25 marks.

PROJECT – I				
CLASS B.E. (COMPUTER ENGINEERING)			SEMESTER VII	
HOURS PER WEEK	LECTURES	:	--	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
			HOURS	**MARKS**
EVALUATION SYSTEM:	THEORY		--	--
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25
Objective: The Project work enables students to develop further skills and knowledge gained during the programme by applying them to the analysis of a specific problem or issue, via a substantial piece of work carried out over an extended period. For students to demonstrate proficiency in the design of a research project, application of appropriate research methods, collection and analysis of data and presentation of results.				

Guidelines:

1. **Project Topic:**
   - To proceed with the project work it is very important to select a right topic. Project can be undertaken on any subject addressing IT programme. Research and development projects on problems of practical and theoretical interest should be encouraged.
   - Project work must be carried out by the group of at least two students and maximum three and must be original.
   - Students can certainly take ideas from anywhere, but be sure that they should evolve them in the unique way to suit their project requirements.
   - The project work can be undertaken in a research institute or organization/company/any business establishment.
   - Student must consult internal guide along with external guide (if any) in selection of topic. Out of the total projects 35 percent may be allowed as to be industry projects, 65 percent projects must be in house.
   - Head of department and senior staff in the department will take decision regarding projects.
   - Student has to submit weekly progress report to the internal guide and where as internal guide has to keep track on the progress of the project and also has to maintain attendance report. This progress report can be used for awarding term work marks.
   - In case of industry projects, visit by internal guide will be preferred.
   - Make sure that external project guides are BE graduates.

2. **Project Report Format:**
   At the end of semester a project report should preferably contain at least following details:-
   - Abstract
   - Introduction
   - Aims and objectives
   - Literature Surveyed
   - Existing system (if any)
   - Problem Statement
   - Scope
   - Proposed System
   - Methodology (your approach to solve the problem)
   - Analysis
   - Details of Hardware & Software
   - Design details
   - Implementation Plan for next semester

3. **Term Work:**
   Distribution of marks for term work shall be as follows:

   1. Project Report 15 Marks
   2. Term End Presentation (Internal) 10 Marks

   The final certification and acceptance of TW ensures the satisfactory performance on the above three aspects.

4. **Final Assessment:**
Project – I examination should be conducted by two examiners appointed by university. Students have to give demonstration and seminar on the Project – I.

University of Mumbai
Syllabus Structure(R-2007)
At
B.E. (Computer Engineering)
Semester-VII

Sr. No.	Subject	Scheme of Instructions Periods per Week Each Period of 60 Min.		Scheme of Evaluation				
		Theory	Practical	Paper Hours	Paper Marks	TW	Oral/ practical	Total
1.	Digital Signal & Image Processing	4	2	3	100	25	25	150
2.	Robotics and AI	4	2	3	100	25	25	150
3.	Mobile Computing	4	2	3	100	25	25	150
4.	System Security	4	2	3	100	25	25	150
5.	Elective-I	4	2	3	100	25	25	150
6.	Project-I	--	2	--	--	25	25	50
		20	12		500	150	150	800

Elective- I

1) Computer Simulation and Modeling
2) E-commerce
3) Project Management
4) Soft Computing