

UNIVERSITY OF MUMBAI

No.UG / 257 of 2009

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Engineering degree courses vide this office Circular No.UG/461 of 2003, dated 19th September, 2003 and the Principals of the affiliated colleges in Engineering are hereby informed that the recommendation made by the Faculty of Technology at its meeting held on 1st April, 2009 has been accepted by the Academic Council at its meeting held on 27th May, 2009 vide Item No.4.19 and that, in accordance therewith, the syllabus for the Third Year Information Technology (Sem. V and VI) of the B.E. degree course is revised as per Appendix and that the same has been brought into force with effect from the academic year 2009-2010.

MUMBAI-400 032
7th July, 2009

PRIN K VENKATARAMANT
REGISTRAR

To,
The Principals of the affiliated colleges in Engineering.

A.C./4.19/27.05.2009

No.UG/257- A of 2009, MUMBAI-400 032 7th July, 2009

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Technology.
- 2) The Chairman, Board of Studies in Information Technology.
- 3) The Controller of Examinations,
- 4) The Co-ordinator, University Computerization Centre.

(D.H. KATE)

DEPUTY REGISTRAR
(U.G./P.G SECTION)

Copy to: -

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyavanari (copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education, (10 copies), the Director University Computer Center (IDE Building), Vidyavanari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO), the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that, no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT



UNIVERSITY OF MUMBAI



Revised Syllabus for the Third Year Information Technology (Semester V & VI)

(With effect from the academic year 2009-2010)

University of Mumbai
Board of studies in IT

Information Technology Syllabus Revision

Preamble

It is the opportune time for revamping the “content” of the course Titled Information Technology. It is all about finding the right stimulus to develop a different set of core competency to enable the market to accept and acknowledge the same. Academicians can not be ignorant of prevailing market forces. The requirement of the time is to design course curriculums which instill confidence in students and industrial entrepreneurs. Reorient the process of education to the need of the society by imparting skill sets rather than motivating the students to pursue academic excellence which is non existent.

It is right time to subject ourselves to unlearning process so that we will be in a position to comprehend the Industrial, technological and social dynamics. This is the time to hold the entire act together. Innovation and value addition should be the center theme in the process of syllabus design.

Try to minimize the process of reinventing the wheel every time. Statistics shows that investment in research in the realm of middleware, implementation and customization of technology product by world bodies is in a state of up swing which is an indication of core competence to be developed by graduates.

Our mission should be creation of intellectual capital and design newer product, which the market itself failed to recognize at this juncture.

University of Mumbai
B.E Information Technology
Scheme of Instruction and Evaluation

Third Year -Semester V

Scheme of Instructions				Scheme of Examinations					
Subjects	Lect/ Week	Pract/ Week	Tut/ Week	Theory		T/W Marks	Practical Marks	Oral Marks	Total Marks
				Hours	Marks				
Operating System for Computational Devices	4	2	--	3	100	25	--	25	150
Computer Graphics and Virtual Reality Systems	4	2	--	3	100	25	25	25	175
Convergence of Technologies and Networking in Communication	4	2	--	3	100	25	--	25	150
Manufacturing processes, Planning and Systems	4	--	2	3	100	25	--	25	150
Object Oriented Analysis and Design	4	2	--	3	100	25	25	--	150
Environmental Studies	2	--	1 [#]	2	50	25	--	--	75
Open Source Software Laboratory	--	2	--	--	--	25	25	--	50
TOTAL	22	10	3	--	550	175	75	100	900

classwise Tutorial

University of Mumbai
B.E Information Technology
Scheme of Instruction and Evaluation

Third Year -Semester VI

Sl. No.	Scheme of Instructions				Scheme of Examinations					
	Subjects	Lect/ Week	Pract/ Week	Tu/ Week	Theory		T/W Marks	Practical Marks	Oral Marks	Total Marks
					Hours	Marks				
1	Information and Network Security	4	2	--	3	100	25	--	25	150
2	Middleware and Enterprise Integration Technologies	4	2	--	3	100	25	--	25	150
3	Software Engineering	4	2	--	3	100	25	--	25	150
4	Data Base Technologies	4	2	--	3	100	25	--	25	150
5	Programming for Mobile and Remote Computers	4	2	--	3	100	25	25	--	150
6	Information Technology for Management of Enterprise	4	-	1	3	100	25	--	25	150
	TOTAL	24	10	1	--	600	150	25	125	900

OPERATING SYSTEM FOR COMPUTATIONAL DEVICES				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER V	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

1. Introduction and Overview of OS

Operating systems: Definition, objective and function of OS, the history and evolution of OS, characteristics of modern OS, application scenarios, organization of a computer system, operational view of a computing system with resources like processor, memory, input and output, issues in resource management, a bare-bone operating system, introduction to the issues in communication with devices, kernel and shell of an operating system, processes, file and system calls, layered Vs monolithic OS. Kernel architecture: User and kernel mode of operation, System calls, process states, kernel operations, design of a scheduler.

2. File Systems and Management

File systems: What is a file, user view of files, file types and file operations, file types in Unix/Linux and Microsoft, file operation commands, file access rights, file storage management, Inode or FAT structure, file control blocks, root file system, directory and file paths, blocks, impact of block size selection, contiguous allocation, chained and indexed allocations, Impact of allocation policy on fragmentation, anatomy of disk address translation, mapping file blocks on the disk platter, cylinder, file related system services, disk access control and scheduling

3. Process Management

Process, threads, task, Implicit and explicit tasking, processor utilization, multi-processing and time sharing. response time., process relationship, process state, process state transitions, process scheduling, short-term and long term schedules, non-pre-emptive and pre-emptive scheduling policies, time slice, CPU scheduling policies like FCFS, SJF etc. Gantt charts and parameters to compare policy performance, context switching of process state information.

4. Memory Management

Motivation, when and where primary and secondary memory management is needed, compiled code and memory relocation. linking and loading, processes and primary memory management, static and dynamic partitioned using MFT and MVT algorithms, memory allocation policies. critique of various policies like first fit, best fit, internal and external fragmentation. secondary memory management, fixed and variable partitions, virtual memory concept, paging and page replacement policies, page faults, thrashing, hardware support for paging, segmentation. segmentation with paging

5. Input Output Management

Issues in human centric, device centric and computer centric IO management, input output modes, programmed IO, polling, interrupt mode of IO, various types of interrupts, interrupt servicing, priority interrupts, interrupt vectors, direct memory access (DMA) mode of transfer, setting up DMAs, device drivers, interrupt handling using device drivers, buffer management, device scheduling, disk scheduling algorithms and policies.

6. Resource Sharing and Management

Shared resources, resource allocation and scheduling, resource graph models, deadlocks, deadlock detection, deadlock recovery, deadlock avoidance, deadlock prevention algorithms, mutual exclusion, semaphores, wait and signal procedures.

7. Interprocess Communication

Spawning a new process, parent and child processes, assigning a task to child processes, need for communication between processes, modes of communication, pipes, shared files, shared memory, message based IPC, signals as IPC, the distributed computing environment.

8. Real Time Operating Systems

Introduction to Real time systems and Real Time Operating Systems, characteristics of real-time operating systems, classification of real time operating systems, services, goals, structure, features of RTOS, architectures of real-time operating systems, micro kernels and monolithic kernels, tasks in RTOS, performance measures, estimating program runtimes, task assignment, scheduling in RTOS, rate monotonic scheduling, priority inversion, task management, race condition, inter-task communication, applications of real time systems, overview and comparison of various RTOS – LIKE Vx works, QNX, RT Linux, Monta Vista, Nucleus Window CE, Symbian, Psos, Introduction to Mobile and Embedded Operating Systems, RTOS for hand-held devices.

9. Case Study

Comparative study of NOS and DOS

References

1. Applied Operating System Concepts, 1st ed. Silberschatz, Galvin and Gagne, John Wiley Publishers.
2. Operating System Concepts, 2nd Edition, Milenekovic, McGraw Hill.
3. An introduction to Operating System, Dietel, Addison Wesley.
4. Modern Operating Systems, Tanenbaum., PHI
5. Operating System, 4th Edition, William Stallings, Pearson.
6. Real Time Operating System, Barr M.
7. Real-Time Systems, Jane Liu, Pearson Ed. Asia
8. Real -Time Systems, Krishna and Shin, McGraw Hill International.

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:

- | | |
|---|---------------------|
| 1. Attendance (Theory and Practical) | 05 Marks |
| 1. Laboratory work (Experiments and Journal) | 10 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 Experiment list

1. System Calls
2. CPU Scheduling Policies
3. Page Replacement Algorithm
4. IPC (Producer – Consumer)
5. Multithreading
6. Remote Procedure Calls
7. Deadlock Avoidance
8. Simulation using RTOS like Symbian/Vx works/ QNX/RT Linux/Monta Vista/Nucleus Window CE

COMPUTER GRAPHICS AND VIRTUAL REALITY SYSTEMS			
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER V
HOURS PER WEEK	LECTURES	:	04
	TUTORIALS	:	--
	PRACTICALS	:	02
EVALUATION SYSTEM:		HOURS	MARKS
	THEORY	3	100
	PRACTICAL	--	25
	ORAL	--	25
	TERM WORK	--	25

1. Introduction to Computer graphics and Image Analysis

Introduction, Image and Object, Image Representation, The basic graphics pipeline, Bitmap vs Vector based Graphics, Applications of Computer Graphics, Various Display Devices and Input Technology Overview of Coordinate System. Scan Conversion algorithm: Scan Conversion of a point, Scan conversion of lines, Digital differential analyzer algorithm, Bresenham's line drawing algorithm

2. Two and Three Dimensional Transformations

Introduction, Transformation Matrix, Types of transformation, Translation, Rotation, Scaling, Reflection, Shear, Composite transformations, and Transformation function.

3. Viewing and Clipping

Introduction, Viewing transformation in two-dimensions, Introduction to clipping, 2D clipping, Point clipping, Line clipping, Cohen Sutherland line clipping, Midpoint subdivision algorithm, Cyrus Beck line clipping, Liang Barsky line clipping, Introduction to Polygon clipping, Sutherland Hodgeman polygon clipping, Weller Atherton algorithm, Viewing and clipping in 3D, Viewing transformation, Text clipping, Projection, Parallel projection, Orthographic projection, Oblique projection, Perspective projection, One point perspective, Two point perspective, Three point perspective.

4. Solid Area Scan Conversion

Introduction, Inside Outside test, Winding number method, Coherence, Polygon filling, Seed fill algorithm, Boundary fill algorithm, Flood fill algorithm, Scan line algorithm, Priority algorithm, Scan conversion of characters, Anti aliasing, Types of anti aliasing, Haftoning, thresholding and dithering

5. Curve Design :

Introduction, Curve continuity, Conic curves, Piecewise curve design, LeGrange interpolated curves, Spline curve representation, Bezier Curves, B Spline Curves, Non Uniform Rational B Spline curves, Introduction to fractal and introduction color models.

6. Computer Animation

Introduction, Key Frame Animation, Construction of an animation sequence, Motion control methods, Methods based on geometric and kinematics information, Methods based on physical information, Methods based on Behavioral Information, Procedural Animation, Introduction to Morphing, Intermediate Images, Mapping orders, Warping techniques, Mesh warping, Feature based image warping, Thin plate Spline, TPS based image warping, 3D morphing.

7. Introduction to Virtual Reality

A short history of early virtual reality, early commercial VR Technology, The five classical components of VR Systems, Design of Virtual reality systems, Important factors in VR systems, Types of VR systems, Advantages of virtual reality .

8. Input and Output Devices

Three Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces, Graphical Display, Sound displays, and Haptic Feedback.

9. Computing Architectures for Virtual Reality

The Rendering Pipeline: The graphical rendering pipeline, The haptics rendering pipeline, PC Graphics Architectures: Pc Graphics Accelerators, Graphics Benchmarks, Work Station Based Architectures: the Sun Blade 1000 Architecture, the SGI Infinite Reality Architecture, Distributed VR Architectures: Multipipeline Synchronization, Collocated rendering Pipelines, Distributed Virtual Environments.

10. Modeling

Geometric Modeling: Virtual Object Shape, Object Visual Appearance.

Kinematics Modeling: Homogeneous Transformation Matrices, Object Position, Transformation Invariants, Object Hierarchies, viewing the three dimensional words.

Physical Modeling: Collision Detection, Surface Deformation, Force Computation, Force Smoothing and Mapping, Haptic Texturing.

Behavior Modeling and Model Management: Level of Detail Management, Cell Segmentation.

11. Virtual Reality Programming

Toolkits and Scene Graphs. World Toolkit: Model Geometry and Appearance, the WTK Scene Graph, Sensors and Action Functions, WTK Networking,

JAVA 3D: Model Geometry and Appearance, Java 3D Scene graph, Sensors and Behaviors, Java 3D Networking, WTK and Java 3D Performance Comparison.

General Haptics Open Software Toolkit: GHOST Integration with the Graphics Pipeline, The GHOST Haptic Scene Graph, Collision Detection and response, Graphics and PHANToM Calibration.

12. Application areas of Virtual Reality

Medical, Education, Arts and Entertainment, Military, Manufacturing, Robotics, Information Visualization.

Text Books

1. R. K Maurya, "Computer Graphics", Wiley India.
2. Donal Hearn and M. Pauline Baker, "Computer Graphics", Pearson Education.
3. Newman and Sproll, "Principles of Interactive Computer Graphics", McGraw Hill.
4. Harrington, "Computer Graphics", McGraw Hill.
5. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill.
6. Vince, "Virtual Reality Systems", Pearson Education.
7. Grigore Burdea, Philippe Coiffet, "Virtual Reality Technology", 2nd edition. Wiley.

Term Work

Term work shall consist of at least 10 practical experiments covering all topics and one written test.

Marks

Distribution of marks for term work shall be as follows:

~~1. Attendance (Theory and Practical)~~ ~~05 Marks~~

2. Laboratory work (Experiments and Journal) 15 Marks

3. Test (at least one) 10 Marks

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

Suggested Experiment List

1. Bresenham line drawing algorithm
2. 2D Transformation
3. 3D Transformation
4. Line Clipping Algorithm (Cohen - Sutherland & Liang - Barsky)
5. Polygon Clipping Algorithms
6. Projections
7. Polygon Filling Algorithms
8. Generation of 2D Curves
9. Fractals
10. Various Operations on Image such Morphing, Mapping, Warping etc.
11. Study of VR Architectures
12. Designing a Virtual Model (Geometric, Kinematics etc.)
13. VR Programming using toolkits

CONVERGENCE OF TECHNOLOGIES AND NETWORKING IN COMMUNICATION				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER V	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

1. Introduction:

Communication model, Data Communication, Data representation transmission, modes of data transmission, synchronous and asynchronous communication. Network and services. Introduction to 2G, 3G and 4G Wireless communication system.

2. Convergence Technology

The blending or integration of voice, video, data and image into one flexible network, overview of network topology.

3. Modem

Digital modulation methods, ASK, PSK, FSK. Modem and standards. Data multiplexers, Multiplexing techniques, Comparison of data multiplexing techniques ADSL, RADSL, HDSL, SDSL.

4. Bandpass Modulation

Binary phase shift keying, Probability of error for Binary phase shift keying Differentially encoded phase shift keying, Probability of error for DEPSK, QPSK, M-ary PSK, Quadrature amplitude shift keying. Binary frequency Shift keying. M-ary FSK Minimum shift keying (MSK). Error performance for binary systems, Probability of error for coherently detected Binary orthogonal FSK, GMSK.

5. Network Services and Protocol Layering

Connection oriented & connectionless services, their comparison layered architecture, services Interface, primitives and service access points. Ad-hoc wireless networks, Handoff Algorithms, Bluetooth Technology and Infrared Technology.

6. Transmission and Multiple Accesses

Transfer Modes circuit switching, routing, virtual circuit switching comparison of transfer modes Asynchronous transfer mode. Multiple access concepts FDMA/TDMA in GSM networks, CDMA in UMTS Networks.

7. Data Transmission Functions

Probability of error for coherently detected BPSK, Data link control, Data link line configurations, data link layer functions, services offered to network Layer DLC protocol layering logical link control (LLC) Media access control (MAC). Flow control protocols Error detection and correction mechanisms e.g. HDLC Bridging

Transparent source route bridging in ETHERNET LANS, switching components of typical switch performance measures in switch design switching, switching issues, switching architectures shared-memory architecture, shared-medium architectures space division architecture switching in ATM and its examples.

8. Communication Network Functions

Addressing techniques, classification of addressing techniques, addressing structure in INTERNET addressing structure in Telecom Networks, signaling complexity in Different Networks, Classification of signaling techniques signaling issues, Signaling models, point to multipoint signaling, ISDN signaling, Routing protocols/techniques, core routing concepts, core routing concepts.

9. Traffic Management

Concept of traffic, concept of service, Network capabilities, Types of traffic, Traffic Management, Traffic contract management, traffic policing, priority control, priority control Flow control versus congestion control, Traffic Management in ATM.

10. Network Management

Goals of Network Management, Functional Areas of Network Management Telecommunications management Network (TMN).

11. Security Management

Security Management, symmetric (secret key) Encryption Techniques, Asymmetric encryption techniques, Key management, Hash functions, Digital signatures and certificates, Firewalls, Security management in Third generation UMTS network.

12. Convergence Technologies for 3G Networks

Operation and integration of GSM, GPRS, EDGE, UMTS, CDMA2000, IP, and ATM, practical examples of 3G connection scenarios. Signaling flows and protocol stacks, IP and ATM as used in a 3G context. issues of QoS and real-time application support IP/SS7 internetworking and IP soft switching. the architecture of the IP Multimedia Subsystem (IMS) for UMTS

Text Books:

1. Sumit Kaseria, Nishit Narang, Sumita Narang. "Communication Networks Principles and Practice" Tata McGraw-Hill Publishing company Limited New Delhi
2. Jeffrey Bannister, Paul Mather, Sebastian Coope "Convergence Technologies for 3G Networks: IP, UMTS, EGPRS and ATM", Wiley india
3. Skalar, "Digital communications", Pearson education, 2001 2nd Edition.
4. William Stallings, "Data and Computer Communication", Pearson Education, 6th Edition.
5. Lean Garcia, Widjaja, "Communication Networks", Tata McGraw Hill, 2nd Edition.
6. T. S. Rappaport, "Wireless Communication", Pearson Education, 2nd Edition.

Reference Books:

1. Forouzan, Data Communication & Networking, Tata McGraw Hill, 3rd Edition.
2. Andrew Tanenbaum, Computer Networks. Prentice Hall of India.

3. Raj Pandya, Mobile & Personal Communication system & services, Prentice Hall of India.

Term Work:

Term work shall consist of at least 10 practical experiments covering all topics and one written test.

Marks

Distribution of marks for term work shall be as follows:

4. Attendance (Theory and Practical)	05 Marks
1. Laboratory work (Experiments and Journal)	15 Marks
2. Test (at least one)	10 Marks

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

Suggested Experiment List

1. To study PC to PC Communication.
2. To study ASK, PSK, FSK techniques.
3. To study Hand off algorithm for Ad-hoc wireless networks.
4. To study Belmann Ford Algorithm.
5. To study Dijkstra's Algorithm.
6. To study OFDM (Orthogonal Frequency Davison Multiplexing) technique.
7. To study Static channel allocation scheme.
8. To study Dynamic channel allocation scheme.
9. To study various types of signaling techniques.
10. To study various types of Encryption techniques.
11. Simulation of routing protocols using Network Simulators like NS2, Nistnet etc.
12. Study of M/M/1 Queuing Model

MANUFACTURING PROCESSES, PLANNING AND SYSTEMS				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER V	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	02	
	PRACTICALS	:	--	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

1. Introduction to Production and Operations Management

Products and services, the product/ process Continuum, the transformation process, product design, process design, automation

2. Manufacturing Processes

Elementary treatment on various manufacturing process like turning, milling, shaping and drilling- machine tools, tooling and set up for each processes. Basic concepts on cold and hot working with metals – examples. Welding brazing and soldering: Differences, elementary treatment on important welding process, brazing and soldering techniques, soldering techniques for manufacturing/electrical/electronic components – cleaning. Solder, flux materials, process and preventions of dry soldering.

3. Polymeric Materials

Classification – examples, properties and application areas, processing of plastics – elementary treatment on compression/transfer moulding, injection moulding and extrusion (film, pipes, sheets and cable/wire coursing)

4. Operations Planning

Business Objectives, Systems Analysis, Operations Sheet preparation, Information, Sequence of Operations, pinion operations Sheet, welded Steel Assembly operations Sheet, Trends.

5. Quality Systems

Definition of quality, TQM concept, SQC tools like bar and pie charts, scatter diagram, cause effect diagram, Pareto analysis, Quality systems and Process Improvement, Process Variation, Control Charts for Variable Data, Control charts for Attribute Data, Process Capability Analysis, Statistical Design of Experiments, reliability Theory

6. Computer Numerical Control Systems:

Types of CNC Systems, Evolution of CNC Machine tools, types of Controllers, CNC Operational Sequence, rectangular Coordinates, Program Formatting and Coding.

7. Process Automation

Simulation, Automation, Robots, Group technology Flexible, Manufacturing Systems.

Other Production Systems, Economic Considerations, lean current and re-engineering, lean manufacturing.

8. Operator- Machine Systems

Operator-Machine Systems Structure, Ergonomics, Designing Ergonomic Tools, Redesigning Workstations, Job Analysis, Systems to measure Injury Frequency, Impact of Intelligent Systems.

9. Facility capacity and layout planning

Capacity planning, Decision tree analysis in Facility Capacity planning, facility layout planning, assignment model in layout planning, load-distance analysis in process layouts

10. Demand Management

The make –to –stock , the Assemble-to-order, make to order environment, sales and operations planning, master production scheduling , dealing with customers on a day –to-day basis, Information use in Demand Management make –to-knowledge data capture and monitoring customer relationship management, outbound product flow, CANBAN.

11. Materials requirement planning (MRP) & Just-in-time (JIT) practices

Material requirement planning in manufacturing, MRP-JIT production systems, Sales and operations planning, Enterprise Resource Planning, Forecasting for Strategic business planning, sales and operations planning, master production scheduling,

Text book

1. Phillip F. Ostwald and Jairo Munoz, "Manufacturing Processes and Systems" Wiley India Edition ISBN No: 978-8126-518937
2. Vollmaan , Bertr, Whybark, Jacobs "Manufacturing planning and control for supply chain Management" Tata McGraw Hill

Reference

1. Mikell P. Groover, "Fundamental of Modern Manufacturing" Wiley India Edition
2. Kanishka Bedi, "Production and operations management", OXFORD university press
3. E. S. Buffa, "Modern Production and Operation Management", Wiley.
4. H. G. Menon, "Total Quality Mngament in Product Manufacturing",
5. D. H. Bester Field, " Total Quality Management", PHI
6. Raghuvanshi, "Production Technology".
7. Garmo, "Materials and Manufacturing Processes".

Term Work

Term work shall consist of at least 10 assignments/ demonstration of workshop practice / documentation of industry visit and one written test.

Marks

- | | |
|--|----------|
| 1. Attendance (Theory and Practical) | 05 Marks |
| 2. Laboratory work (Experiments and Journal) | 10 Marks |
| 3. Test (at least one) | 10 Marks |

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

OBJECT ORIENTED ANALYSIS AND DESIGN				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER V	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	25
	ORAL		--	--
	TERM WORK		--	25

1. Review of Object Orientation

Class and objects, effect of inheritance on polymorphism and variable declarations, concepts that define object orientation.

2. Requirements

Developing requirements, reviewing requirements, managing requirements, Difficulties and risks in domain and requirement analysis, requirement documents, Case studies and discussion on the above topics.

3. Unified Modeling Language

Visual modeling with UML, Use case model- use case, actor, and roles, Modeling with classes – association, multiplicity, generalization, process of creating class diagram – difficulties and risks in creating class diagram.

Modeling interaction and behavior – interaction diagrams, state diagram and activity diagram, implementing classes based on interaction and state diagram- difficulties and risks in modeling interactions and behavior.

4. Architecting and Designing Software

The process of design, design principles, architectural patterns, design document, difficulties and risks in design.

Frameworks: reusable subsystem. Design patterns – Singleton, observer, adapter, Façade, proxy with examples

5. Implementation

Mapping models to Code, Mapping Object Model to Database Schema

6. Usability, Testing and Quality

Usability Principles- user interface design evaluating user interfaces

Testing and Quality – strategies, defects, test cases and test plan, inspections, quality assurance.

Text Books

1. Timothy C. Lethbridge, Robert Laganier “ Object-Oriented Software Engineering – A practical software development using UML and Java”, Tata McGraw-Hill, New Delhi.
2. Mike O'Docherty “Object-Oriented Analysis & design – understanding system development with UML 2.0”, John Wiley.

3. Bernd Bruegge, "Object oriented software engineering", Second Edition, Pearson Education.
4. Stephan R. Schach, "Object oriented software engineering", Tata McGraw Hill.
5. Booch, Jacobson, Rumbaugh, "The UML user Guide", Pearson Education.
6. Ali Bahrami, "Object Oriented System Development", McGraw Hill.
7. David William Brown, "An Introduction to Object Oriented Analysis Objects and UML in Plain English", 2nd Edition, Wiley.

Term Work

Term work shall consist of at least 10 assignments/programming assignments and one written test.

Marks

- | | |
|--|----------|
| 1. Attendance (Theory and Practical) | 05 Marks |
| 2. Laboratory work (Experiments and Journal) | 10 Marks |
| 3. 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

1. At least one or two review assignments covering object oriented concepts.
2. A full-fledged mini project in which a student will design an application using OOAD case tool.
3. Assignments for the UML diagrams not used in the case study.
4. Hands on any one good Framework.

University of Mumbai

CLASS: T.E.

Information Technology

Semester - V

SUBJECT: Environmental Studies

Periods per week
(each of 60 min.)

Lecture

2

Practical

-

Tutorial

1*

Evaluation System

Theory Examination

Hours

2

Marks

50

Practical examination

-

-

Oral Examination

-

-

Term Work

-

25

Total

-

75

* Class wise Tutorial

Objective: This course is to create environmental awareness, of variety of environmental concerns.

Module	Contents	Hours
1	The Multidisciplinary nature of environmental studies Definition, scope and importance Need for public awareness	1
2	Natural resources Renewable and non-renewable resources Natural resources & associated problem. a. Forest resources: Use and over-exploitation deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. b. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d. Food resources: World food problems overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	4
3	- Ecosystems - Concepts of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem.	3

	• Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)	
4	Biodiversity and its conservation • Introduction-Definition: genetic species and ecosystem diversity • Bio-geographical classification of India • Value of biodiversity : Consumptive use, productive use, social, ethical, aesthetic and option values • Bio-diversity at global, national, local levels • India as a mega diversity nation • Hot spots of bio-diversity • Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts • Endangered and endemic species of India • Conservation of biodiversity: In- situ and Ex-situ conservation of biodiversity	4
5	Environmental Pollution Definition – • Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear Hazards • Solid waste management: Causes, effect and control measures of urban and industrial wastes • Role of an individual in prevention of pollution • Pollution case studies • Disaster management: floods, earthquake, cyclone and land slides	4
6	Social issues and environment • From unsustainable to sustainable development • Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Re-settlement and rehabilitation of people: Its problems and concerns. Case studies. • Environmental ethics: issues and possible solution • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. • Wasteland reclamation • Consumerism and waste products • Environment protection act • Air(Prevention and control of pollution) act • Water (Prevention and control of pollution) act • Wildlife protection act	4

	• Forest conservation act • Issues involved in enforcement of environmental legislation • Public awareness	
7	Human population and the environment • Population growth, variation among nations • Population Explosion- family welfare program • Environment and human health • Human rights • Value education • HIV/AIDS • Women and child welfare • Role of information technology in environment and human health • Case studies	4
8	Understanding Existence and Co-existence Interrelation and Cyclicity between Material order, Bio-order, Animal order and Human order Understanding the human conduct: Relationship in Family, Justice in Relationship, Relationship of Human with Nature (Environment), Human Behavior, Human Values, Nature and Morality Understanding the human society Dimensions of Human Endeavor and Objectives, Interrelationship in Society, Mutual Fulfillment and Cyclicity in Nature.	6

Theory Examination:

1. Question paper will be comprising of total 7 questions, each of 10 marks.
2. Only 5 questions need to be solved.
3. Question number 1 will be compulsory and covering the all modules.
4. Remaining questions will be mixed in nature. (e.g.- suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term work:

Term work shall consist of minimum five projects (PROJECTS SHALL BE DESIGNED ON THE SAME GUIDE- LINE OF GIVEN TEXT BOOK) and a written test.

The distribution of marks for term work shall be as follows,

Laboratory work (Tutorial/Project and Journal)

: 15 marks.

Test (at least one)

: 10 marks.

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Recommended Books:

1. Erach Bharucha, text book of environmental studies, Universities Press/Orient Blackswan
2. Jagdish Krishnaswami, R J Ranjit Daniels, 'Environmental Studies', Wiley India Private Ltd. New delhi
3. Anindita Basak, 'Environmental Studies', Pearson
4. Deeksha Dave, "Text book of , 'Environmental Studies", Cengage learning, Thomason India edition
5. Benny Joseph , 'Environmental Studies", Tata McGRAW HILL
6. D L Manjunath, , 'Environmental Studies", Pearson
7. R Rajgopalan, , 'Environmental Studies", Oxford
8. Alok Debi, 'Environmental science and Engineering", University press
9. A. Nagraj, Jeevan Vidya- A Primer.

Open Source Software Laboratory				
CLASS T.E. (INFORMATION TECHNOLOGY,			SEMESTER V	
HOURS PER WEEK	LECTURES	:	--	
	TUTORIALS	:	00	
	PRACTICALS	:	02	
			HOURS	MARKS
EVALUATION SYSTEM:	THEORY		--	--
	PRACTICAL		--	25
	ORAL		--	--
	TERM WORK		--	25

1. Introduction To Linux

An Introduction to UNIX, Linux, and GNU What Is UNIX, What Is Linux, The GNU Project and the Free Software Foundation

2. Installation of Linux

Basic Installation, network based installation

3. Linux System Administration

Process Management with Linux, Memory Management, File System management, User Administration, Linux Startup and Shutdown, Software package Management

4. Shell Programming

Shells, Scripting Rationale Creating a bash Script, bash Startup Files, A Script's Environment, Exporting Variables, Exit Status, Programming the Shell, Parameter Passing, Operators, looping, Input and Output ,Interrupts

5. Software Tools

C Language and Linux, MySQL Database, Network Simulator, SciLAB configuration, Multimedia, etc.

6. Kernel Configuration

Overview of the Linux Kernel, Configuring the Linux Kernel, Configuration Options, Building and Installing the Kernel, Building the Kernel, Installing a New Kernel, Configuring your Boot Manager

7. Network Administration

LAN Card configuration, DHCP, DNS, FTP, Telnet, SSH, NFS, Web Server, SQUID Proxy configuration

Text Books

1. Terry Collings, Kurt Wall, "Red Hat Linux Network and System Administration" 3rd edition Wiley.
2. Nemeth, "Linux Administration Handbook", 2e, Pearson Education,
3. Neil Mathews, "Beginning Linux Programming" 4th edition, Wrox Press.
4. Best, "Linux Debugging and Performance Tuning : Tips and Techniques", Pearson Education
5. Habraken, "Novell Linux Desktop 9 User's Handbook", Pearson Education.

Term Work

Term work shall consist of at least 10 practical experiments covering all topics and one written test.

Marks

Distribution of marks for term work shall be as follows:

- | | |
|---|---------------------|
| 1. Attendance (Theory and Practical) | 05 Marks |
| 1. Laboratory work (Experiments and Journal) | 15 Marks |
| 2. Test (at least one) | 10 Marks |

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

Suggested Experiment List

1. Linux OS Installation
2. System Accounting and Logging
3. File Systems
4. Shell Scripts
5. Logic Development
6. Command Line Argument Handling
7. Loops Using while and for statement
8. Arithmetic in shell scripting
9. File handling
10. Screen handling/echo command with escape sequence code
11. Background process implementation
12. User interface and functions in shell script
13. Application development using tools like network simulators, MySQL Databases.

INFORMATION AND NETWORK SECURITY			
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER VI
HOURS PER WEEK	LECTURES	04	
	TUTORIALS	--	
	PRACTICALS	02	
EVALUATION SYSTEM:		HOURS	MARKS
	THEORY	3	100
	PRACTICAL	--	-
	ORAL	--	25
	TERM WORK	--	25

1. Introduction

What is Information Security? Security Goals.

2. Cryptography

Crypto Basic, Classic Cryptography, Symmetric Key Cryptography: Stream Ciphers, A5/1, RC4, Block Ciphers, Feistel Cipher, DES, Triple DES, AES, Public Key Cryptography: Knapsack, RSA, Diffie-Hellman, use of public key crypto- Signature and Non-repudiation, Confidentiality and Non-repudiation, Public Key Infrastructure, Hash Function: The Birthday Problem, MD5, SHA-1, Tiger Hash, Use of Hash Function.

3. Access control - Authentication and Authorization

Authentication Methods, Passwords, Biometric, Single – sign on. Authentication Protocol, Kerberos, Access control Matrix, ACLs, Multiple level security model. Multilateral security, Covert channel, CAPTCHA.

4. Software Security

Software Flaws, Buffer Overflow, Incomplete Mediation, Race conditions, Malware. Salami attack, Linearization Attacks, Trusting Software, Software reverse engineering, Digital Rights management, Operating System and Security

5. Network Security

Network security basics, TCP/IP Model and Port No., Protocol flaws, Enterprise wide network Design and Vulnerabilities, Reconnaissance of network, Packet sniffing, Session Hijacking, ARP Spoofing, Web site and web server vulnerabilities, Denial of Service, SSL and IPSec protocol, Firewall. Intrusion Detection System, and Honey pots, Email Security.

6. Administered Security

Planning, Risk Analysis, Organizational Policies, Physical Security

Text Books

1. Mark Stamp, "Information security Principles and Practice" Wiley
2. Charles P. Pfleeger, "Security in Computing", Pearson Education

References

1. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw Hill
2. William Stallings, "Cryptography and Network Security", Prentice Hall
3. Nina Godbole, "Information Systems Security", Wiley
4. Matt Bishop, "Computer Security: Art and Science", Pearson Education
5. Kaufman, Perlman, Speciner, "Network Security"
6. Mark Merkow, Jim Breithaupt, "IS Principles and Practices", Person Education

Term Work

Term work shall consist of at least 10 assignments/programming assignments and one written test.

Marks

~~1. Attendance (Theory and Practical)~~

~~05 Marks~~

1. Laboratory work (Experiments and Journal)

15 Marks

2. Test (at least one)

10 Marks

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

Suggested Experiment List

1. Block Cipher such as Feistel, DES or AES
2. Public Key Cryptography (RSA)
3. Conventional Cryptography
4. Authentication Methods such as passwords or Kerberos
5. Software Flaw Fraudging tools such as flaw finders, ITS, PScan, RATS
6. Analysis of Network port scanner tool such as NMAP
7. Analysis of Sniffer program such as Ethernet
8. Transport Security using firewall
9. Application level security such as email by using PHP
10. Implementation of IDS

MIDDLEWARE AND ENTERPRISE INTEGRATION TECHNOLOGIES				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER VI	
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		-	-
	ORAL		-	25
	TERM WORK		-	25

Objectives of the Course:

- IT systems are more and more integrated with other software systems.
- The knowledge of integrating these systems by using middleware technologies can be a key competence for IT engineers. Middleware is commonly understood as an intermediary software layer between the application and the operating system, which encapsulates the heterogeneity of the underlying communication network, operating system or hardware platform.
- This course provides details about the modern component platforms. Based on practical examples, details about modern middleware technologies are studied. Students get the chance to gain in-depth knowledge popular middleware platforms.

1. Introduction to Object Oriented Systems

Preview of Object-orientation, Concept of distributed object systems, Reasons to distribute for centralized objects. Client-server system architecture, Multi tier system architectures. File Server, Database Server, Group Server, Object Server, Web Server.

2. Introduction to Middleware Technologies

General Middleware, Service Specific Middleware, Client/Server Building blocks – RPC - Messaging – Peer – to – Peer, Java RMI.

3. Introduction to Distributed Objects

Computing standards, OMG, Overview of CORBA, Overview of COM/DCOM, and Overview of EJB.

4. EJB Architecture

Overview of EJB software architecture, View of EJB Conversation, Building and Deploying EJBs, Roles in EJB.

5. EJB Applications

EJB Session Beans, EJB entity beans, Lifecycle of Beans, EJB clients, Steps in developing an application with EJB, EJB Deployment.

6. CORBA

Introduction and concepts, distributed objects in CORBA, CORBA components, architectural features, method invocations, static and dynamic: IDL (Interface Definition Language) models and interfaces. Structure of CORBA IDL, CORBA's self-describing data; CORBA interface repository. Building an application using CORBA.

7. CORBA Services and CORBA Component Model

Overview of CORBA Services, Object location Services, Messaging Services, CORBA Component Model.

8. COM and .NET

Evolution of DCOM, Introduction to COM, COM clients and servers, COM IDL, COM Interfaces, COM Threading Models, Marshalling, Custom and standard marshalling, Comparison COM and CORBA, Introduction to .NET, Overview of .NET architecture, Remoting.

9. Service Oriented architecture(SAO) Fundamentals

Defining SOA, Business value of SOA, SOA characteristics, Concept of a service, Basic SOA , Enterprise Service Bus (ESB), SOA enterprise Software Models.

10. Web Services Technologies

XML Technologies - XML, DTD, XSD, XSLT< XQUERY, XPATH, Web Services and SOA, WSDL, SOAP, UDDI, WS Standards (WS-*), Web Services and Service Oriented Enterprise (SOE), WS _ Coordination and Transaction, Business Process Execution Language for Web Services (BPEL4WS)

Text Books

1. G. Sudha Sadasivam "Distributed Component Architecture", Wiley India edition.
2. Thomas Erl "Service Oriented Architecture: Concepts , Technology & Design". Prentice Hall
3. G. Brose, A Vogel and K. Duddy, "Java programming with CORBA", 3rd Edition, Wiley-dreamtech, India John Wiley and sons

References

1. Robert Orfali, Dan Harkey, "Client/server Programming with Java & Corba W/cd", Wiley India Pvt. Ltd.
2. Clemens Szyperski, "Component Software: Beyond Object-Oriented Programming", Pearson Education.
3. A. Tanenbaum, M. Van Steen: Distributed Systems (II Edition), Pearson Education, 2007
4. Bill Burke, "Enterprise JavaBeans 3.0", 5th Edition, O'Reilly Publications.
5. Sudha Sadasivam "Component Based technology", Wiley India
6. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc.,
7. Mowbray, "Inside CORBA", Pearson Education.
8. Jason Pritchard, "COM and CORBA side by side", Pearson Education
9. Introduction to C# Using .NET Pearson Education
10. C# How to program, Pearson Education
11. Andrew Troelsen, "C# and the .NET Platform", Apress Wiley-dreamtech, India Pvt. Ltd.
12. Den Box, "Essential COM", Pearson Education.

13. Tom, Valesky, "Enterprise Java Beans", Pearson Education

Term Work

Term work shall consist of at least 10 assignments/programming assignments and one written test.

Marks

~~1. Attendance (Theory and Practical)~~

~~05 Marks~~

2. Laboratory work (Experiments and Journal)

15 Marks

3. 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 Topics for Experiment

1. RPC Messaging
2. Creating a distributed Object Application using RMI (DNS, distributed game, some business application etc)
3. Concept addressing COM/DCOM
4. Component framework
5. Mini projects, one business application each to be programmed using CORBA, EJB, COM, .NET
6. One mini project for creating a web service

SOFTWARE ENGINEERING			
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER VI
HOURS PER WEEK	LECTURES	04	
	TUTORIALS	--	
	PRACTICALS	02	
EVALUATION SYSTEM:		HOURS	MARKS
	THEORY	3	100
	PRACTICAL	--	--
	ORAL	--	25
	TERM WORK	--	25

1. Introduction

Software Engineering Process Paradigms – Process Models – Incremental and Evolutionary models, Agile methodology – Process and Project Metrics – Software estimation – Empirical estimation models – Cost/Effort estimation – Planning – Risk analysis – Software project scheduling, Control & Monitoring.

2. Requirements Analysis and Engineering

Prototyping – Specification – Analysis Modeling – Various Techniques in Software requirement analysis and system specification

3. Software Design

Software Design – Abstraction – Modularity – Software Architecture – Effective modular design – Cohesion and Coupling – Architectural design - Distributed system Architectures and Application Architectures, Procedural design – Data flow/Control flow oriented design – Reuse based design – case studies from different domains. User Interface Design – Human Factors – Interface standards – Design Issues – User Interface Design Process – Evaluation.

4. Software Configuration Management

Software Configuration items – SCM process – Identification of objects in software configuration – version and change control – configuration audit – status reporting, SCM standards and SCM issues.

5. Software Quality and Testing

Software Quality Assurance – Quality metrics
Software Reliability – Software testing – Path Testing – Control Structures Testing – Black Box Testing – Integration, Validation and system testing – Software Maintenance – Reverse Engineering.

6. Web Engineering

For web based applications – attributes, analysis, design and testing. Security Engineering, Service-Oriented Software Engineering, Aspect-Oriented Software Development and Test Driven Development.

References:

1. Roger Pressman, Software Engineering: A Practitioners Approach, (6th Edition), McGraw Hill, 1997.

2. I. Sommerville, Software Engineering, 7th edition, Addison Wesley, 1996.
3. Watts Humphrey, Managing software process, Pearson education, 2003.
4. James F. Peters and Witold Pedrycz, "Software Engineering – An Engineering Approach", Wiley.
5. Mouratidis and Giorgini, "Integrating Security and Software Engineering – Advances and Future", IGP, ISBN – 1-59904-148-0

Term Work

Term work shall consist of at least 10 Laboratory assignments and one written test.

Marks

1. Attendance (Theory and Practical)	05 Marks
1. Laboratory work (Experiments and Journal)	15 Marks
2. Test (at least one)	10 Marks

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

Suggested List of Experiments

1. SRS in IEEE format for any case study.
2. Use project management tool to schedule project plan.
3. Use analysis and design tools and draw DFD / CFD.
4. Develop test cases for white box testing.
5. Assignment / code for stubs and drivers.
6. Change specifications and make different versions using any SCM tool.
7. Test Driven Development

DATABASE TECHNOLOGIES				
CLASS T.E. (INFORMATION TECHNOLOGY)				SEMESTER VI
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

Objectives of the course:

- This course aims to provide continuum to where the first course of databases left off. Design aspects of relational databases are covered.
- Complex data models like OO OR parallel and distributed are introduced.
- The course provides students a good overview of the ideas and the techniques, which are behind recent developments in the fields of data warehousing and Online Analytical Processing (OLAP).

1. Overview

Review of relational database systems, ER diagram, SQL.

2. Integrity and Security

Domain constraints; referential integrity, assertions; triggers; triggers and Assertions in SQL. Security and Authorization; Authorization in SQL.

3. Relational Database Design

First Normal form; pitfalls in relational database design, functional dependencies; decomposition. Desirable properties of decomposition. Boyce – Code normal form; 3rd and 4th normal form. Mention of other normal forms.

4. 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.

5. Object-Oriented & Object relational databases

Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Database Design For An ORDBMS - Nested Relations and Collections; Storage And Access methods, Overview of SQL3.

6. Parallel and Distributed Databases

Parallel Query Evaluation; Parallelizing Individual Operations, 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.

7. **Enhanced Data Models for Advanced Applications.**
(Overview and Design issues)
Temporal Databases; Spatial Databases & Geographic Information Systems, Mobile Databases.
8. **Data Warehousing and OLAP.**
 - a) **Data Warehouse Basics:** Data Warehouse (DW) Introduction & Overview; Data Marts, DW components; Data warehouse architecture; ETL - Data Transformation – Extracting, Conditioning, cleansing, Scrubbing, Merging, etc.,
 - b) **OLAP:** Multi-dimensional modeling - Fact table, dimensions, measures, examples; Schema Design – Star and Snowflake; OLAP - OLAP Vs OLTP, ROLAP, MOLAP, HOLAP; tools. OLAP Operations – Rollup, Drill-down, Dice slice, pivot.

Text Books:

1. Elmasri and Navathe, "Fundamentals of Database Systems", Pearson Education
2. Raghu Ramakrishnan, Johannes Gerhke, "Database Management Systems" McGraw Hill
3. Kimball, Ralph; Reeves, Laura et al Data warehouse Lifecycle Toolkit: expert methods for designing, developing, and deploying data warehouses - Wiley publications.

References:

1. Korth, Silberchatz, Sudarshan, "Database System Concepts" McGraw Hill
2. C.J.Date, Longman, "Introduction to Database Systems", Pearson Education
3. Paulraj Ponnian, "Data Warehousing Fundamentals", John Wiley.

Term Work

Term work shall consist of at least 10 assignments/programming assignments and one written test.

Marks

1. Attendance (Theory and Practical)	05 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 Experiment List

1. At least one or two review SQL assignments covering triggers, assertions and authorizations.
2. Object Oriented Queries
3. Case study assignments for OO and OR database.
4. Two mini projects in distributed and parallel databases.
5. Hands on any one good warehousing tool (Oracle/SQL server Analysis tool etc.)
6. A full fledged mini project in which a student will design and implement a data warehouse. The data warehouse must be populated and OLAP queries and operations to be demonstrated for the warehouse.

PROGRAMMING FOR MOBILE AND REMOTE COMPUTERS				
CLASS T.E. (INFORMATION TECHNOLOGY)			SEMESTER VI	
HOURS PER WEEK	LECTURES		04	
	TUTORIALS		--	
	PRACTICALS		02	
EVALUATION SYSTEM:	THEORY		HOURS	MARKS
	PRACTICAL		3	100
	ORAL		--	25
	TERM WORK		--	--
			--	25

1. Java EE 5: An Overview

Enterprise Architecture Types, Goals of Enterprise Applications. Introducing the Java EE Platform, Features of Java EE 5. The Runtime Infrastructure, Java EE 5 APIs, Architecture of Java EE 5, Describing Java EE Containers, Developing Java EE 5 Applications, Exploring Probable Java EE Application Architectures, Application Development and Deployment Roles

2. Java EE Related Technologies

Java Database Connectivity, Servlets, JavaServer Pages, Java Server Faces, JavaMail, Enterprise JavaBeans, Hibernate, Seam, Java EE Connector Architecture, Web Services, Struts, Spring, JAAS, AJAX

3. Web Applications and Java EE 5

Exploring the HTTP Protocol, Components of a Web Application, Structure /Modules of Web Applications, Describing Web Containers, Types of Web Containers, Building Web Applications, Applications with Basic HTML pages, Applications with Basic JSP Pages and Servlets, Applications with Modular Components, EJB-Centric Applications

4. Understanding J2ME

Configurations, Connected Device Configuration, Connected Limited Device Configuration, Profiles, Current Profiles, Mobile Information Device Profile, Platform Standardization, Anatomy of MIDP Applications, Advantages of MIDP, Portability, Security, MIDP Vendors, Fragmentation

5. Building MIDlets

Tooling Up, Debugging Your MIDlets, Creating Source Code, Compiling a Midlet, Preverifying Class Files, Sun's J2ME Wireless Toolkit Devices, Running MIDlets Using the Emulator Controls, Tour of MIDP Features, It's Java MIDlet Life Cycle, Generalized User Interface, The Likelihood of Server -Side Components, Packaging your Application, Manifest Information, Creating a MIDlet Descriptor, Using an Obfuscator, Using Ant, Running on a Real Device

6. MIDlets

The MIDlet Life Cycle, Requesting A Wakeup Call, A Bridge to the Outside World, Packaging MIDlets, MIDlet Manifest Information, Application Descriptor, MIDlet Properties, MIDlet Suite Security, Permissions, Protection Domains, Permission Types, Permissions in MIDlet Suite Descriptors, No Floating Point In CLDC 1.0, Java Lang, No Object Finalization, No Reflection, No Native Methods, No User Classloading, Multithreading, String and String Buffer, Math, Runtime and System, Streams In Java io

7. Creating User Interface

The View from the Top, Using Display, Event Handling with Commands Creating Command, Responding to Commands Lists And Forms: Using Lists, Understanding List Types, Event Handling for IMPLICIT Lists, Creating List, about Image, Editing a List, Working with List Selection Custom Items: Introducing Custom items, Custom item Painting, Showing, Hiding and Sizing Handling Events

8. Wireless Messaging Api

Bluetooth and Obex, Programming a Custom User Interface, the Game API, 3d Graphic, Sound, Music, and Video: MMAPi

1. Sing Li Jonathan Knudsen, "Beginning J2me From Novice to Professional", 3rd edition, Apress, Isbn No: 978-81-8128-292-7
2. Kogent Solutions Inc, J2EE 1.4 PROJECTS
3. James Keogh, "The Complete Reference J2ME", Tata McGraw Hill. ISBN -10: 0-07-053415-2
4. Jim Keogh, "The Complete Reference J2EE", Tata McGraw Hill. ISBN -10: 0-07-052912-4

References

1. Asoke Talukder, "Mobile Computing Technology, Application and Services Concepts", Tata McGraw Hill.
2. Riggs, "Programming Wireless Devices with Java 2 platform", 2nd Edition, Pearson Education.
3. Yaun, "Enterprise J2ME: Developing Mobile Java Application", Pearson.

Term Work

Term work shall consist of at least 10 experiments covering all topics and at least one written test.

Marks

~~1. Attendance (Theory and Practical)~~

~~05 Marks~~

2. Laboratory work (Experiments and Journal)

15 Marks

3. Test (at least one)

10 Marks

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

Suggested List of Experiments

J2EE

1. Editing, debugging and execution of any one of the project incorporated in the text book J2EE 1.4 PROJECTS preferably- **project III: online shopping site**

J2ME

1. Creation of simple J2ME Midlet
2. Illustration of low level API using Canvas
3. Use of keypresses
4. Use of high level components
5. Use of RMS
6. Creating custom items and performing various operations like painting, showing, hiding and sizing.
7. Mixing 3D graphics, sound, music, video as applicable

INFORMATION TECHNOLOGY FOR MANAGEMENT OF ENTERPRISES				
CLASS T.E. (INFORMATION TECHNOLOGY)				
HOURS PER WEEK	LECTURES		SEMESTER VI	
		:		04
	TUTORIALS		:	01
	PRACTICALS		:	--
EVALUATION SYSTEM:			HOURS	MARKS
	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

1. Organizational Performance: IT support and Applications.

Doing Business in the Digital Economy, Business pressures, organizational performance and responses and IT support, Information Systems and Information Technology, the adaptive, Agile, Real time Enterprise, Information Technology Development and Trends.

2. IT Support Systems: Concepts and Management

Information Systems Concepts and Definitions, Classifications and Types of Information Systems, How IT supports People and Organizational Activities, How It supports Supply Chains and Enterprise Systems, Information Systems Infrastructure and Architecture, Emerging Computing Environments: SaaS, SOA and more, Managerial issues.

3. E Commerce and E Business:

Overview of E Business and E commerce, Major EC Mechanisms, Business to Consumer applications, B2B Applications, Major models of E Business : From E-Government to C2C, e Commerce Support Services : Advertising Payments and order Fulfillment, Ethical and legal issues in E Business, Managerial Issues.

4. IT Compliance: Functional Applications and Transaction Processing

Functional informational Systems, transaction processing Information systems, Managing Production / Operations and Logistics, Managing Marketing and Sales Systems, Managing the accounting and Finance Systems, Managing human Resource Systems, Integrating Functional Information Systems, How IT supports compliance, Managerial Issues.

5. Understanding Enterprise Systems: Supply Chain

Essentials of Enterprise systems and supply chains, supply chain challenges, supply chain opportunities, Business value of Enterprise systems, Enterprise resource planning systems, Business Process Management, Product life cycle Management, Customer Relationship Management, Managerial Issues

6. Global and Interorganizational Information Systems:

Interorganizational Activities and order fulfillment, Interorganizational information Systems and Virtual Corporations, Global Information Systems, Facilitating IOS and Global Systems from Demand driven Networks to RFID, Interorganizational

Information Integration, Partner relationship Management and collaborative commerce, Managerial issues.

7. Managing Knowledge

Introduction to Knowledge Management, Organizational Learning and Memory, knowledge management activities, Approaches to Knowledge management, Information Technology in Knowledge Management, knowledge Management Systems implementation, Roles of people in knowledge management, Ensuring Success of KM Efforts, Managerial Issues.

8. Corporate Performance Management and Business Intelligence:

A framework of Business Intelligence: concepts and Benefits, Business Analytics: Online analytical processing reporting and querying, Data Text Web mining and Predictive Analytics, Data Visualization, Geographical Information Systems and virtual reality, real time business intelligence, and competitive Intelligence, Business Performance Management Scorecards and Dashboards, Managerial Issues.

9. Managerial Decision making and IT support systems

Managers and Decision making, Decision support systems, for Individuals groups and Enterprise. Intelligent Support Systems : The basics, Expert Systems, Other intelligent systems, Automated Decision Support (ADS), Managerial Issues.

10. IT: Strategic objectives and Planning

IT Strategic Alignment, Competitive Forces Model, Value Chain Model, Strategic Resources and Capabilities, IT Planning, Interorganizational and international IT planning, Managing the IS department, Managerial issues.

14. Economics of IT

Financial and Economic Trends and the productivity paradox, Evaluating IT investment: Benefits Costs and Issues, Methods for evaluating and justifying IT Investment. IT Economics strategies: Chargeback and Outsourcing, Economic aspects of IT and Web Based Systems, Managerial Issues.

11. IT Application Acquisitions and Options

The landscape and framework of IT Application Acquisition, Identifying Justifying and planning IT systems applications, Acquiring IT applications: available options, Outsourcing, application service providers and utility computing, selecting an acquisition approach and other implementation issues, Connecting to Databases, Enterprise systems and Business Partners, Business Process Redesign, Managerial Issues.

12. IT Infrastructure

Overview of Databases, Warehouses, Network Computing, Wireless Devices and application. Case study on the above topics.

Text Book

1. Efrain Turban, Dorothy Leidner, Ephraim McLean, James Wetherbe "Information Technology for Management: Transforming Organizations in the Digital Economy", 6th edition. ISBN: 978-8126-514410

2. Kenneth C. Laudon & Jane P. Laudon, "Management Information Systems: Managing the Digital Firm" 7th Ed.; Prentice Hall, Publisher. ISBN: 0-13-033066-3.
3. V. K. Narayanan, "Managing Technology and Innovation for Competitive Advantage", 1/e, Pearson Education.
4. Rainer, Turban, "Introduction to Information Systems: Supporting and Transforming Business", 2nd Edition
5. David M. Kroenke, "Using MIS", Prentice Hall.
6. William Stallings, "Business Data Communications", 5e

Term Work

Term work shall consist of at least 10 practical experiments covering all topics and one written test.

Marks

Distribution of marks for term work shall be as follows:

4. Attendance (Theory and Practical)	-05 Marks-
1. Laboratory work (Experiments and Journal)	10 Marks
2. Test (at least one)	10 Marks

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

Suggested tutorial exercises

1. UML for modeling scenarios in Microsoft Visio or similar to model a solution to business model.
2. Workflow management in CRM, Procurement process.
3. Basic IT project management such as cost and schedule management.
4. Case studies in access. Design various schema and tables and generate reports as applicable.
5. Using Excel solver as decision support tool.
6. Data communications and technology.
 - LAN
 - ETHERNET
 - How wiFi works.
 - How routers work.
 - Web hosting.
7. Data base processing.
 - Oracle.
 - SQL.
 - IBM DB2.
8. E-Commerce and supply chain
 - HTML tutorial.
 - XHTML tutorial.
 - Study B2B, C2C, B2C business.
 - M-commerce
9. Business intelligence and knowledge management.
 - Decision Support System (EXCEL solver for model driven DSS ,scenario manager for Knowledge driven DSS, Microsoft Netmeeting for communication driven DSS)

- Integrating EXCEL with WWW for web based and inter organizational DSS
 - Using EXCEL macros.
 - Data warehouse support in MS SQL
 - Data mining and OLAP.
10. ERP, CRM development using open source frameworks like OF biz /JBseam, EBI neutrino for distribution, inventory, Ecommerce and workflow support
 11. Information Security Management.

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