University of Mumbai

Syllabus Structure(R-2007)

At

B.E. (Computer Engineering)

Semester-VIII

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.	Distributed Computing	4	2	3	100	25	25	150
2.	Multimedia System Design	4	2	3	100	25	25	150
3.	Software Architecture	4	2	3	100	25	25	150
4.	Elective-II	4	2	3	100	25	25	150
5.	Project-II	--	4	--	--	50	50	100
		16	12		400	150	150	700

Elective-II

1) Human Computing Interaction

2) Advanced Internet Technology

3) Computer Vision

4) Embedded System

University of Mumbai			
Class: B. E.	**Branch** : Computer Engineering	**Semester** : VIII	
Subject :: Distributed System (Abbreviated as DS)			
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

Objective: This course aims to build concepts regarding the fundamental principles of distributed systems. The design issues and distributed system concepts are covered

Pre-requites: Operating Systems and Computer network

DETAILED SYLLABUS

1. Fundamentals: Distributed computing, system model, distributed operating system, designing operating system, Introduction to DCE

2. Message Passing : Desirable features message passing system, Issues in message passing, synchronization, buffering, multidatagram messages , Encoding and decoding of message data, Process addressing, Failure handling, Group communication.

3. Remote procedure call: RPC model, Transparency of RPC, implementing RPC mechanism, Stub generation, Marshaling arguments and Results, Server Management, Parameter-passing Semantics , call Semantics, Communication protocols for RPCs, Complicated RPC Client server binding, Exception Handling , Security, special types of RPCs, RPCs in Heterogeneous Environments, Lightweight RPC, Optimizations for better performance.

4. Distributed Shared Memory: General architecture of DSM systems, Design and implementation of DSM, Granularity, structure of shared memory space, consistency models, Replacement Strategy, Thrashing, other approaches to DSM, Heterogeneous DSM, and Advantages of DSM

5. Synchronization: clock synchronization, event ordering, mutual exclusion, Deadlock, Election Algorithm

6. Resource and Process Management: Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing

approach, load sharing approach, Introduction to process management, process migration, Threads

7. Distributed File Systems: Introduction, good features of DFS, File models, File Accessing models, File sharing Semantics, File-Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and design principles.

8. Naming : Introduction, Desirable features of Naming system, Fundamental concepts, System oriented Names, Object locating mechanisms, human oriented Names, Name Caches and Naming and Security

BOOKS

Text Books:

1. Pradeep K Sinha " Distributed Operating Systems : Concepts and design" IEEE computer society press
2. A. Tanuenbaum "Distributed Operating System" Pearson Edition
3. PUDER, ROMER "Distributed Systems Architecture : Middleware approach" ELSEVIER publication

References:

1. G. Coulouris, J. Dollimore and T. Kindberg "Distributed Systems : Concepts and design" Pearson Edition
2. M. Singhal, N. Shivaratri " Advanced Concepts in Operating Systems" TMH

TERM WORK

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

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

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

List of assignment (Minimum 10)

1. Implementation of Election Algorithm
2. Implementation of Deadlock
3. Java socket programming.
4. Client-server implementation using RPC/RMI.
5. Client server implementation using CORBA architecture.
6. Implementation of Clock synchronization

7. Study of data centric & client centric consistency model.
8. Case study/implementation of DCOM
9. Study project on Java Beans
10. R.S. A. for Distributed System
11. Study experiment on Network operating system and Distributed operating system with example
12. Implementation name resolution
13. Study/ implementation of stateful server and stateless server

University of Mumbai			
Class : B.E .	**Branch** : Computer Engineering	**Semester** : VIII	
Subject :**: Multimedia System Design (Abbreviated as MSD)**			
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

Module	Content	Lect
Chapter 1	**Introduction:** What is multimedia, Properties of multimedia systems: Independency, computer support, communication systems, Global structure, Multimedia system Architecture:- IMA, workstation , network architecture Evolving Technologies, Applications of multimedia	06
Chapter 2	**Multimedia data and interactions** Data Streams:-Elements of multimedia systems, Objects of multimedia systems, Types: Traditional Vs Continuous, Medium**:** perception, representation, presentation, storage, transmission, information exchange Multimedia communication system Model:- Interpersonal communication, Interactive application over internet, Entertainment and application Requirements : User, network Architectural Issues Multimedia communication subsystems :- Application subsystem, Transport subsystem, QoS and resource management, basic concepts establishing and closing multimedia call ,Managing resources during multimedia transmission	06
Chapter 3	**Compression & Decompression** Introduction to digitization principle -text ,image, audio, video, File formats – RTF, TIFF,RIFF, Need , types of data compression , Binary (Text) compression scheme, Packbit encoding (RLE), CCITT group 3 1D,3 21D and 4 2D compression, Color Image,JPEG methodology, JPEG 2000 standard, Performance comparison of JPEG and JPEG2000	05
Chapter 4	**Video** Introduction to digital video: Types – Chromasub sampling, CCIR , HDTV Computer Video format, Video compression: Based on motion compression Motion vector search technique : Sequential, 2D logarithmic, Hierarchal search, Standards used – H.261,Comparison of MPEG and H.264 , MPEG 1,2,4,7 and File formats – DVI	05
Chapter 5	Audio/Sound Basic sound concepts :Computer representation of sound, Audio formats-MIDI,WAV	05

	Music: MIDI concepts, MIDI Devices, MIDI Messages, MIDI SMPTE timing standard MIDI Software:Speech, Speech Generation, Speech Analysis, Speech Transmission Audio Compression: ADPCM in speech coding, MPEG audio	
Chapter 6	**Storage Requirements** Basic technology: Video disk :Audio data rate – SNR wrt VCD player , CD player, DVD, Juke box, Peripherals and databases required for multimedia Input devices :- Electronic pen, Scanner, digital camera Output devices :- Printers (Inkjet, laser) , plotters Multimedia database system :Characteristics, Data structures Operations, Models : Object oriented, relational databases	07
Chapter 7	Distributed Multimedia Systems Components of distributed MM system, MM object server , managing distributed objects, Distributed C.S operations, synchronization, Real time multimedia, Requirement, Designing, Streaming protocols	07
Chapter 8	**Multimedia presentation and Authoring** Multimedia system design & its Issues, Authoring Systems, Design Issues Approaches, Types, User Interface Issues, Architecture, Information characteristics for presentation, Presentation design knowledge, Effective HCI	04
Chapter 9	**Applications** Copyright Act for multimedia and method of licensing Applications:-Multimedia animation, Virtual Reality, Knowledge based multimedia systems	04

Textbooks :-

1) " Multimedia: Computing, Communications and Applications", Steinmetz Ralf and Nahrstedt
   Klara, Pearson Education
2) " Multimedia System design ", Prabhat K. Andheigh, Kiran Thakrar
3) " Multimedia Systems", Koegel Buford, Pearson Education
3) " Fundamentals of Multimedia , Ze-Nian Li, Mark.S.Drew
4) " Multimedia Communication Systems: Techniques, standards and networks, K.R.Rao,D.Milovanovic

References:-

1) Multimedia database systems :- Subramanian,M.Kaufman
2) Computer Networking :- J.F.Kurose , Pearson Edu
3) Multimedia communications, Halshall, Pearson,Edu
4) Multimedia Systems – Koegel Buford, Pearson Edu.

List of Experiments (reference) :-

At least 10 experiments to clear the concepts behind multimedia system design needs to be performed.

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.

Sr.No.	List of Practical Experiments
1	Study of MAYA software
2	Study of FLASH software
3	Creating a banner
4	Creating a ghost (unshaped) 2D object
5	Create animation using (expt 3,4)
6	Add sound to above expt (with play button)
7	Create moving objects (using expt 5)
8	Create a game using action script
9	Create a flash based presentation (4/5 frames) with UI controls
10	Study of VLC player, its setting, streaming and non streaming techniques.
11	Study of streaming audio/video for distributed network
12	Study of VRML
13	Create a 3D object using 2D and show special effects for the same

Oral / Practical Examination must be based upon the syllabus

University of Mumbai			
Class: B.E.	Branch: Computer Engineering	Semester: VIII	
Subject: Software Architecture (Abbreviated as SA)			
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: Software architecture is foundational to the development of large, practical software-intensive applications. Critically, this course focuses on supporting creation of real implemented systems. Hence the course details not only modeling techniques, but design, implementation, deployment, and system adaptation -- as well as a host of other topics -- putting the elements in context and comparing and contrasting them with one another. Rather than focusing on one method, notation, tool, or process, this new course widely surveys software architecture techniques, enabling us to choose the right tool for the job at hand.

Pre-requisites: Object Oriented Software Engineering

Module	Contents	Hours
1	**Basic Concepts** 1.1 Concepts of Software Architecture 1.2 Models. 1.3 Processes. 1.4 Stakeholders.	**03**
2	**Designing Architectures** 2.1 The Design Process. 2.2 Architectural Conception. 2.3 Refined Experience in Action: Styles and Architectural Patterns. 2.4 Architectural Conception in Absence of Experience.	**02**
3	**Connectors** 3.1 Connectors in Action: A Motivating Example. 3.2 Connector Foundations. 3.3 Connector Roles. 3.4 Connector Types and Their Variation Dimensions. 3.5 Example Connectors.	**06**
4	**Modeling** 4.1 Modeling Concepts. 4.2 Ambiguity, Accuracy, and Precision. 4.3 Complex Modeling: Mixed Content and Multiple Views. 4.4 Evaluating Modeling Techniques. 4.5 Specific Modeling Techniques.	**04**
5	**Analysis** 5.1 Analysis Goals. 5.2 Scope of Analysis. 5.3 Architectural Concern being Analyzed. 5.4 Level of Formality of Architectural Models. 5.5 Type of Analysis. 5.6 Analysis Techniques.	**08**
6	**Implementation and Deployment** 6.1 Concepts. 6.2 Existing Frameworks. 6.3 Software Architecture and Deployment. 6.4 Software Architecture and Mobility.	**04**
7	**Conventional Architectural styles** 7.1 Pipes and Filters 7.2 Event- based, Implicit Invocation 7.3 Layered systems 7.4 Repositories 7.5 Interpreters 7.6 Process control	**05**
8	**Applied Architectures and Styles** 8.1 Distributed and Networked Architectures. 8.2 Architectures for Network-Based Applications. 8.3 Decentralized Architectures. 8.4 Service-Oriented Architectures and Web Services.	**08**

9	**Designing for Non-Functional Properties** 9.1 Efficiency. 9.2 Complexity. 9.3 Scalability and Heterogeneity. 9.4 Adaptability. 9.5 Dependability.	**04**
10	**Domain-Specific Software Engineering** 10.1 Domain-Specific Software Engineering in a Nutshell. 10.2 Domain-Specific Software Architecture. 10.3 DSSAs, Product Lines, and Architectural Styles.	**04**

TOPICS FOR EXPERIMENT

1. Modeling using xADL
2. Analysis – Case study
3. Visualization using xADL 2.0
4. Integrate software components using a middleware
5. Use middleware to implement connectors
6. Wrapper to connect two applications with different architectures
7. Creating web service
8. Architecture for any specific domain

BOOKS

Text Books:

1. "Software Architecture: Foundations, Theory, and Practice" by Richard N. Taylor, Nenad Medvidovic, Eric Dashofy , ISBN: 978-0-470-16774-8

2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.

3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

References:

1. "Pattern Oriented Software Architecture" by Frank Buchnan etal, Wiley India.
2. "The Art of Software Architecture" by Stephen T. Albin

TERM WORK

Term work should be based on the Lab experiments (15 Marks)
and at least one term test must be conducted with a weightage of (10 Marks).

PRACTICAL/ORAL EXAMINATION

A Practical/Oral examination is to be conducted based on the above syllabus.

University of Mumbai			
Class : B.E .	**Branch** : Computer Engineering	**Semester** : VIII	
Subject : **HUMAN COMPUTER INTERACTION (Abbreviated as HCI) (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

- To facilitate communication between students of psychology, design, and computer science on user interface development projects.
- To provide the future user interface designer with concepts and strategies for making design decisions.
- To expose the future user interface designer to tools, techniques, and ideas for interface design.
- To introduce the student to the literature of human-computer interaction.
- To stress the importance of good user interface design

DETAILED SYLLABUS		
Sr. No	**Topics**	**Hours**
1.	Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,	04
2.	The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.	06
3.	Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions.	05
4.	Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information	10

	retrieval on web – statistical graphics – Technological consideration in interface design.	
5	Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.	04
6	Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.	04
7	Software tools – Specification methods, interface – Building Tools.	03
8	Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.	06

TEXT BOOKS :

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

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 Examination must be based upon the syllabus of 25 marks.

Advanced Internet Technology (Elective-II) Abbreviated as (AINT)				
Class: B.E. (Computer Engineering)			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 Technical aspect of Internet Technology
- To learn Advanced web programming

Contents of the Course

Section 1: Advanced Internet Protocols
DNS, Working of DNS, DNS Header, Type of Records in DNS, forward and Reverse lookup, Configuration of Open Source (OS) DNS, working of DDNS - DHCP, DHCP header, Working of DHCP, Configuration of OS DHCP - FTP, Working of FTP, Configuration of OS Public FTP server and Private FTP server
Understanding IPv6, CIDR, Hierarchical Routing, and Routing Protocol over internet.
Multimedia over Internet, Voice over IP, Virtual Private network

Section 2: Internet as a Distributed computing platform
1) Understanding Web Services technology, REST based web services (Resource Oriented Architecture) and Service oriented Architecture.
2) Introduction to cloud computing, case study and working of Google App engine and Amazon cloud.
3) Working of Peer to Peer over internet with case study of Bittorent ,

Section 3; Advanced Internet programming
1) HTML 5.0, Rich Internet Technology, AJAX, FLEX , Integrating PHP and AJAX, Consuming Web Service with AJAX, Resource Syndication (RSS), Working principle of search engines

Section 4: Internet Security
Public Key Infrastructure, Client side Vulnerabilities, Server Side Vulnerabilities, Database Vulnerabilities, Secure Payment Mechanism, Security issues in cloud

TEXT BOOKS /REFERENCE BOOKS:

Section1:

1) **TCP/IP Protocol Suite : By Behrouz A. Forouzan : Tata McGraw-Hill**

Section 2:

1) **Cloud Computing : A practical Approach: By Anthony T. Velte : Tata McGraw-Hill**
2) **Using Google App Engine: By Charles : O'reilly Press**
3) **Cloud Application Architecture: By George: O'reilly Press**
4) **RESTful web services: By Leonard: O'Reilly Press**
5) **Web Services Essentials:By Ethan: O'Reilly**

Section 3:

1) **Rich Internet Application AJAX and Beyond: B y Dana moore : Wrox press**
2) **Web 2.0 Programming : By Eric : Wrox Press**
3) **HTML 5.0: By Mark: O'reilly Press**
4) **Web Technologies NEW :Black Book : Dreamtech**

Section 4:

1) **Information Security :By Mark Stamp : Wiley Publication**
2) **Cloud Security and Privacy: By Tim : O'Reilly**

Marks

1. Laboratory work (Mini Projects 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

Students need to perform three Mini projects based on the syllabus. Time duration for each project will be three weeks.

Suggested List of Mini Projects

1) **Configuration of Private cloud using open source technology**
2) **Development of DMZ for the college**
3) **Creating RIA web Site**
4) **Working with SOA and REST based Web Services**
5) **Working With Goggles APP engine (In Python)**

University of Mumbai			
Class: B.E.	Branch: Computer Engineering	Semester: VIII	
Subject: Computer Vision(Elective-II)			
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: To introduce the student to computer vision algorithms, methods and concepts
which will enable the student to implement computer vision systems with emphasis on applications and problem solving

Pre-requisites: Introduction to Image Processing.

Module	Contents	Hours
1	Recognition Methodology: Conditioning, Labeling, Grouping, Extracting, Matching.	**02**
2	Morphological Image Processing: Introduction, Dilation, Erosion, Opening, Closing,Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images, Thinning, Thickining , Region growing, region shrinking.	**04**
3	Image Representation and Description: Representation schemes, Boundary descriptors, Region descriptors	**04**
4	Binary Machine Vision: Thresholding, Segmentation, Connected component labeling, Hierarchal segmentation, Spatial clustering, Split & merge, Rule-based Segmentation, Motion-based segmentation.	**06**
5	Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting (Least-square fitting).	**05**
6	Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers.	**05**
7	Facet Model Recognition: Labeling lines, Understanding line drawings, Classification of shapes by labeling of edges, Recognition of shapes, Consisting labeling problem, Back-tracking Algorithm	**04**
8	Perspective Projective geometry, Inverse perspective Projection, Photogrammetry - from 2D to 3D, Image matching : Intensity matching of ID signals, Matching of 2D image, Hierarchical image matching.	**04**
9	Object Models And Matching: 2D representation, Global vs. Local features	**02**
10	General Frame Works For Matching: Distance relational approach, Orderedstructural matching, View class matching, Models database organization.	**03**
11	General Frame Works: Distance -relational approach, Ordered - Structural matching, View class matching, Models database organization.	**03**
12	Knowledge Based Vision: Knowledge representation, Control-	**03**

	strategies, Information Integration.	
13	**Object recognition** • Hough transforms and other simple object recognition methods • Shape correspondence and shape matching • Principal component analysis • Shape priors for recognition	**02**

BOOKS

Text Books:

1.Robert Haralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison-Wesley, 1993.
2. David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach"

References:

3. 1. Milan Sonka,Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

TERM WORK

Term work should be based on the Lab experiments (15 Marks) ,
and at least one term test must be conducted with a weightage of (10 Marks).

Elective – II: EMBEDDED SYSTEMS			
CLASS: B.E. (COMPUTERS)		SEMESTER – VIII (Elective)	
HOURS PER WEEK	LECTURES	04	
	TUTORIALS	--	
	PRACTICALS	02	
		Hours	Marks
EVALUATION SYSTEM	THEORY	03	100
	PRACTICAL		
	ORAL	-	25
	TERM WORK	-	25

1. **Introduction to Embedded Systems**

Review of microcontrollers and Digital Signal Processors (DSP), architecture, peripheral modules. Embedded micro controller cores (ARM, RISC, CISC, SOC), addressing modes, interrupts structure, hardware multiplier, pipelining. Hardware/Software co-design. Architecture of embedded systems.

2. **Embedded Software Development**

Assemblers, linkers and loaders. Binary file formats for processor executable files. Typical structure of timer-interrupt driven programs. GNU-GCC compiler introduction, programming with Linux environment and gnu debugging, gnu insight with step level trace debugging, make file interaction, building and execution.

3. **Design with ARM Processor**

Introduction to ARM instruction set, addressing modes, operating modes with ARM core, ARMTDMI modes, ADC, Timers, Interrupt structure. Byte ordering (LE, BE), Thumb mode normal mode instructions changes, Pipeline utilization with all register allocations. Compare with ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.

4. **Input / Output Interfacing**

Interfacing with switches, keyboards, LED's, LCD's, transistors used for digital-controlled current switches, digital-controlled relays, solenoids, DC, AC and stepper motors, analog interfacing and data acquisition systems.

5. **Real-time Operating System**

Real Time Operating System Concepts, Kernel Structure, Critical Sections, Multitasking, Task Management, Time Management, Schedulers, Event Control Blocks, Priorities, Deadlocks, Synchronization, Semaphore Management, Mutual Exclusion, Message Mailbox Management, Message Queue Management, Memory Management, RTOS implementation. Examples of OSs for embedded systems - RT Linux, uC/OS.

6. **Applications of Embedded Systems**

Database applications; Image processing, Process-control, Robotics, Automation, Security and communication.

Text Books:

1. Embedded / Real-Time Systems: Concepts, Design & Programming – Dr. K. V. K. K. Prasad – dreamtech Press, India.
2. An Embedded Software Primer – David E. Simon – Pearson Education South Asia.
3. Embedded Microcomputer Systems Real Time Interfacing - Jonathan W. Valvano – Thomson Asia Pte Ltd.
4. ARM System Developer's Guide Designing and Optimizing System Software – Andrew N. Sloss, Dominic Sysmes and Chris Wright – Elsevier Inc.

Reference Books:

1. Embedded Systems, Architecture, Programming and Design – Raj Kamal – Tata McGraw Hill.
2. Embedded Linux – Hollabaugh, Pearson Education.
3. Embedded Realtime Systems Programming - Sriram V Iyer, Pankaj Gupta – Tata McGraw Hill.
4. Fundamentals of Microcontrollers and Applications in Embedded Systems – Ramesh Gaonkar – Penram International Publishing (India) Pvt. Ltd.

Term Work:

Term work should consist of at least 8 practicals and one mini project. Objective type term work test shall be conducted with a weightage of 10 marks.

Marks:

Distribution of marks for term work shall be as follows:

- Laboratory work (Experiments and Project) 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 term work.

List of Experiments:

Topic-1: Troubleshooting Tools [Any Two]

1. In-Circuit Emulator (ICE) and In-Circuit Debugger (ICD)
2. Logic Analyzer
3. Spectrum Analyzer
4. Pattern generator and Digital Storage Oscilloscope

Topic -2: ARM Processors & Interfaces [Any Two]

1. LEDs and Keyboard Interface
2. 16x2 LCD Interface
3. Counting external events with on chip counters
4. DC Motor Control
5. Relay and Buzzer Control for alarm events
6. Unipolar and Bipolar Stepper Motor Control
7. On chip ADC
8. SPI / I2C / CAN Interface
9. Blue tooth/Zig-bee interface

Topic-3: Device Driver Development [Any Two]

1. Drivers for RS-232
2. Drivers for USB2.0
3. Drivers for Ethernet
4. Drivers for Graphics LCD/Touch Screen

Topic-4: Real Time Operating System (RTOS) [Any Two]

1. RTLinux porting to x86 Architecture
2. uCLinux porting to ARM Architecture
3. GCC porting to RISC Architecture

PROJECT – II				
CLASS B.E. (COMPUTER ENGINEERING)			SEMESTER VIII	
HOURS PER WEEK	LECTURES	:	--	
	TUTORIALS	:	--	
	PRACTICALS	:	04	
			HOURS	**MARKS**
EVALUATION SYSTEM:	THEORY		--	--
	PRACTICAL		--	--
	ORAL		--	50
	TERM WORK		--	50
Objective: The primary objective is to meet the milestones formed in the overall project plan decided in Project - I. The idea presented in Project – I should be implemented in Project – B with results, conclusion and future work. The project will culminate in the production of a thesis by each individual student.				

Guidelines:

1. **Project Report Format:**
   At the end of semester a student need to prepare a project report which should preferably contain at least following details:-
   Abstract, Project overview, Introduction and Motivation, Problem Statement, Requirement Analysis, Project design, Implementation Details, Technologies used , Test cases, Project time line, Task Distribution, conclusion & future work, references, and Appendix consisting of user Manuals. Every student must prepare well formatted, printed and hard bound report. Along with project report a CD containing: project documentation, Implementation code, required utilities, Software's and user Manuals need to be attached.

2. **Term Work:**
   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 to get the status of project.

   Distribution of marks for term work shall be as follows:
   1. Project Report (Hard Bound) 25 Marks
   2. Term End Presentation (Internal) 25 Marks
   The final certification and acceptance of TW ensures the satisfactory performance on the above three aspects.

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

Computer Engineering

Equivalent subjects

Semester VIII 2001	**Semester VIII R 2007**
i) System Security	i) System security (Sem VII R 2007)
ii) Multimedia system	ii) Multimedia system design (R 2007)
iii) Distributed Computing	iii) Distributed Computing (R2007)
iv) **Elective –II**	iv) **Elective –II**
a) Data ware housing and Mining	a) Data ware housing and Mining (R2001)
b) Computer Vision	b) Computer vision (R2007)
c) Software testing	c) Software Testing (R2001)
d)Neural network & fuzzy system	d) Neural network & fuzzy system (R 2001)
e) Parallel Processing	e) Parallel Processing (R2001)
v) Project B	v) Project B