B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: SYSTEMS PROGRAMMING

Lectures: 3 Hrs per week **Practical:** 2 Hrs per week	Theory: **100 Marks** Term work: **25 Marks** Oral Examination: **25 Marks**

Objectives of the course: **This course is an introduction to the design and implementation of various types of system software. It is intended that the student should be able to design a working assembler, loader and macro-processor on completion of this course.**

Pre-requisites: Course in computer organization, data structures and C/C++.

DETAILED SYLLABUS

1. **Language Processors:**

   Fundamentals of Language Processing and Language Specification. Classification of Programming Language Grammars. Static and Dynamic Binding. Language Processor Development Tools.

2. **System Software And Machine Architecture:**

   Introduction to Systems Programs. Introduction to Data Formats. Registers and Addressing Modes for Traditional CISC Machines and RISC Machines.

3. **Assemblers:**

   Basic Assembler Functions. Assembler Algorithm and Data Structures. Design of Single Pass Assembler. Design of Multi-pass Assemblers. Implementation Examples: MASM Assembler and SPARC Assembler.

4. **Macros And Macro Processors:**

   Macro Definition and Expansion. Conditional Macro Expansion. Macro Parameters. Recursive Macro Expansion. Nested Macro Calls. Design of Macro Preprocessors. Implementation Examples: MASM Macro Processor; ANSI C Macro Language.

5. **Loaders And Linkers:**

   Basic Loader Functions. Design of an Absolute Loader. Relocation and Linking Concepts. Linkage Editors. Dynamic Linking. Bootstrap Loaders. Design of a Linker. Implementation Examples: A Linker for MS-DOS.

6. **Scanning And Parsing:**

   Introduction to Regular Expressions and Finite State Automata. Optimization of DFA Based Pattern Matchers. Top-down and Bottom-up Parsing Techniques. Recursive Descent Parsing.
   LL (1) Parsing. LALR Parsing and Operator Precedence Parsing. LEX and YACC. Syntax Directed Translation.

7. Compilers And Interpreters:

Aspects of Compilation. Memory Allocation: Run time storage organization, Static, Dynamic, Heap Storage and Garbage Compaction. Phases of Compilation: Lexical Analysis; Syntax Analysis; Intermediate Code Generation; Machine Independent and Machine Independent Code Optimization. Compilation of Expressions and Control Structures. Interpreters. Java Compiler and Environment. YACC Compiler-Compiler.

8. Software Tools:

Software Tools for Program Development. Editors. Debug Monitors. Programming Environments. User Interfaces.

BOOKS

TEXT BOOKS

1. D.M. Dhamdhere "Systems Programming And Operating Systems", Tata McGraw Hill, 2nd Revised Edition, 2002.
2. Leland L. Beck, "Systems Software", Addison Wesley.
3. A.V. Aho, Ravi Sethi & J.D. Ullman, "Compilers Principles and Techniques", Pearson Education.

References:

1. J.J Donovan, "Systems Programming", TMH

TERM WORK

1. Term work should be based on above listed practical

2. A term work test of 10 marks must be conducted.

B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: OPERATING SYSTEMS WITH UNIX

Lectures: **3 Hrs per week**	Theory: **100 Marks**
Practical: **3 Hrs per week**	Term work: **25 Marks**
	Oral Exam.: **25 Marks**

DETAILED SYLLABUS

1. **Operating System Overview.**
   Operating System Objectives and Functions. The history and evolution of Operating Systems; Characteristics of Modern Operating Systems; Windows 2000 Overview; Traditional UNIX Systems; Modern UNIX Systems.
   Basic concepts. Processes; files; system calls; shell;, layered structure v/s monolithic structure of O.S.

2. **Processes:**
   Process Model; Process states; Process Description; Process Control; PCB; creation of processes; context switching; exit of processes; UNIX SVR4 Process Management.
   Threads, SMP. Processes and Threads; Symmetric Multiprocessing; Windows 2000 Thread and SMP Management; Linux Process and Thread Management.

3. **Process Scheduling:**
   Objectives; preemptive v/s non-preemptive scheduling; Multiprocessor Scheduling; Real-Time Scheduling; Linux Scheduling; UNIX SVR4 Scheduling; Windows 2000 Scheduling; comparative assessment of different scheduling algorithms. Concurrency. Mutual Exclusion and Synchronization; Principles of Concurrency; Mutual Exclusion; Software Approaches; Mutual Exclusion; Hardware Support; Semaphores; Monitors; Message Passing; Readers/Writers Problem. Concurrency. Deadlock and Starvation; Principles of Deadlock; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection; An Integrated Deadlock Strategy; Dining Philosophers Problem; UNIX Concurrency Mechanisms; Windows 2000 Concurrency Mechanisms.

4. **Memory**

   Memory Management Requirements. Memory Partitioning; Virtual memory; Paging; Segmentation; Design and implementation issues in paging and segmentation; page replacement algorithms; page fault handling; working set model; UNIX and. Linux Memory Management; Windows 2000 Memory Management.

5. **I/O Management and Disk Scheduling.**
   I/O Devices. Organization of the I/O Function; Operating System Design Issues; I/O Buffering; Disk Scheduling; RAID; Disk Cache; UNIX SVR4 I/O; Windows 2000 I/O;

6. **File Management.**
   Overview; File Organization; File Directories; File Sharing; Record Blocking; Secondary Storage Management; UNIX File Management; Windows 2000 File System.

7. **Case Studies:**
   Unix. Internal representation of files; system calls for the file system; implementation of processes; process scheduling; memory management policies .Windows NT; Layered

structure; interpretability

BOOKS

TEXT BOOKS

1.William Stallings, “Operating Systems”
2.Silbershatz, A., Peterson, J., Galvin, P., “Operating System Concepts”, Addison Wesley.
3.Maurice J Bach, “The Design of the Unix Operating system”, Prentice Hall.

References:

1. Tannenbaum, “Modern Operating Systems”
2. Milan Milenkovic, “Operating System”, Mc Graw Hill
3. Tannenbaum, A., “Operating Systems: Design and Implentation”, Prentice Hall

TERM WORK

1. Term work shall consist of at least 9 programs based on the above topics.
2. It should also include Small routines, involving implantation of small utilities in shell programming for Unix system administration.
3. Programs that would give good exposure to Unix system calls for process control, memory management and file management.
4. Test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: WEB TECHNOLOGY

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

Objectives of the course: **The objective of the course is to provide an understanding of technology used for building WEB. This course gives knowledge right from building of Web to making business on Web. It also gives a comprehensive coverage of HTML, JavaScript, CGI/Perl, Java Servlets, ASP for Building Secure E-commerce applications.**

DETAILED SYLLABUS

1. **Introduction:**
   Introduction to WEB Technology, TCP/IP, Protocols, Telnet, Electronic Mail (Email) File Transfer Protocol (FTP), Word Wide Web, Domain Name System (DNS), Uniform Resource Locator (URL),
2. **HTML:**
   Introduction to Hypertext Markup Language, Tags, Anchors, Backgrounds, Images, Web page structure, Hyper linking, Lists, Character Formatting, Color Control, Images, Tables, Frames, Multimedia, Cascading style sheet, Application with layers.
3. **Dynamic Web Pages:**
   HTML/DHTML**:** Introduction to DHTML, Forms, Client-side Forms, JavaScript, Incorporating JavaScript in HTML, JavaScript expressions, Control flow and functions, String and Arrays, JavaScript objects. JavaScript Forms, Cookies, history, location. XML, CGI Scripting with Perl.
4. **Active Server Pages & Servlets:**
   ASP Objects: Application, Request, Response, Server, Session, Forms, Query Strings, Cookies, Connectivity with databases, Using ActiveX Objects, JSP, Java Servlets.
5. **Applications:**
   Electronics Commerce: An Introduction, Types, Solution, e-shop, Online Payment , Internet Banking

TEXT BOOKS

1. Kriss Jamsa, Konrad King,"HTML & Web Design", TMH
2. **Achyut Godbole ,"Web Technologies", TMH**

References

1. Box ,"Essential XML"
2. David Whiteley,"E-Commerce", TMH .
3. Douglas E Comer,"Internetworking with TCP/IP", Volume I, Pearson education
4. Steven Holzner, "HTML Black Book", Dreamtech.
5. Vivek Sharma, Rajiv Sharma,"Developing e-commerce Site",Addison Wesley.
6. Microsoft Commerce Solutions ,Web technology, PHI
7. Jason Hunter & William Crawford,"Java Servlet Programming",O'REILY.
8. Tom Negrino and Dori Smith,"JavaScript for The World Wide Web",3rd Edition,

TERM WORK

1. At least 10 Programs based on above syllabus
2. Build an e-commerce site

3. Study of ISP, Installation of WEB Server
4. A test must be conducted with a weightage of 10 Marks.

B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: OBJECT ORIENTED ANALYSIS & DESIGN

Lectures: **3 Hrs per week**	Theory**: 100 Marks**
Practical: **3 Hrs per week**	Term work: **25 Marks**
	Practical Exam: **25 Marks**

DETAILED SYLLABUS

1. **Introduction:**
   Overview Of OOL; Object Classes; Meta Types. Object Oriented Methodologies; The Unified Approach Modeling; Why Modeling? Static And Dynamic Models; Functional Models.
2. **Object Modeling:**
   Object. Links. Association. Inheritance. Grouping Constructs; Problems On Object Modeling; Advantages Of Object Modeling.
3. **Analysis:**
   Problem Analysis. Problem Domain Classes. Identify Classes And Objects Of Real World Problems. Using Use Case Analysis; Recording Analysis.
4. **Basic Object Modeling:**
   Multiplicity. Constraints. Aggregation. Component.
5. **Sequence Diagram:**
   Modeling Scenarios. Mapping Events To Object. Interfaces. Discovering Attributes. Modeling Simple Collaboration Modeling. Logical Database Schema. Activity Diagram. Modeling Workflow.
6. **Class Diagram:**
   Test Scenarios. Interfaces. Classes. Methods. Stress Testing. System Testing. Scalability Testing. Regression Testing. Behavioral Modeling. State Chart Diagram.
7. **Design:**
   Architectural Design. Refining The Model. Refactoring. Coupling And Cohesion .Who Should Own The Attribute? Who Should Own The Operations? Process And Threads.
8. **Design Classes:**
   Classes Visibility; User Interface. Subsystem Interface.
9. **Deponent Diagram:**
   Modeling Source Codes. Physical Databases.
10. **Deployment Diagram:**
    Modeling In A C/S System. Distributed System And Embedded Systems.

TOPICS FOR EXPERIMENT

Use any UML/OOAD tool and do the following:

1. Use case diagram.
2. Sequence diagram.
3. Collaboration diagram.
4. Activity diagram.
5. Use case realization.
6. Class diagram.
7. Testing, Debugging, Porting.
8. Component diagram.
9. Change management using MAKE/SCCS utility.

BOOKS

TEXT BOOKS

1. Ali Bahrami, "Object Oriented System Development ", McGraw Hill.
2. Grady Booch, J. Rambaugh, Ivar Jacobson, "The UML Users guide", Pearson Education.
3. J. Rambaugh, *eta*l,, "Object Oriented Modeling and Design"
4. Andrew Haigh, "Object Oriented Analysis and Design", Tata McGrawHill

References:

1. Simon Benett, Steve McRobb, Ray Farmer, "Object Oriented System Analysis and Design Using UML" McGrawHill.
2. Timothy C. Lethbridge, Robert Laganiere, "Object Oriented Software Engineering" McGrawHill.
3. Stephen R. Schach, "Object Oriented and Classical Software Engineering"

TERM WORK

1. Term work should consist of at least 8 experiments covering all the topics.
2. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: COMPUTER GRAPHICS

Lectures: **3 Hrs per week**	Theory: **100 Marks**
Practical: **3 Hrs per week**	Term work: **25 Marks**
	Practical Exam: **25 Marks**

Pre-requisites: **Knowledge of C language is needed.**

DETAILED SYLLABUS

1. **Introduction:**
   Application Areas. Input and Output Devices. Video Display Devices: Refresh CRT; Raster scan display; Color CRT monitor; Flat panel display; Co-ordinate representation.
2. **Basic Raster Graphics Algorithm for drawing 2-D primitives:**
   Output Characteristics: Aspect ratio; Aliasing and Anti-Aliasing. Line Drawing Algorithms: DDA algorithm; Bresenham's algorithm. Circle Generation Algorithm: Midpoint circle algorithm.
   Ellipse Generation Algorithm: Mid-point ellipse algorithm. Area filling: Scan line polygon filling algorithm; Inside-outside test; Boundary fill algorithm; Flood-fill algorithm.
3. **2-D Geometric Transformation:**
   Window and View port: Window and View port relationship; World co-ordinates; Normalized device co-ordinates and Homogenous co-ordinates. Basic Transformations: Translation; Rotation and Scaling. Other Transformation: Reflection and Shear. Composite Transformation.
4. **2-D Viewing and Clipping:**
   Window to Viewport Co-ordinate Transformation. Clipping: Point clipping; Line: Cohen-Sutherland algorithm, Liang Barsky clipping, Mid-point Subdivision; Polygon: Sutherland Hodgman algorithm.
5. **3-D Concepts:**
   3-D Display Methods: Parallel and Perspective projections; Depth Cueing. 3-D Transformation: Basic Transformations: translation, rotation and scaling; Other Transformation: reflection and shear; Composite Transformation. 3-D Viewing and Clipping.
6. **Hidden Surface Elimination Methods:**
   Backface Detection, Depth or Z-buffer Method, Scan Line Method, Area Subdivision Method.
7. **Curves:**
   Spline Representation, Bezier Curves, B-spline.
8. **Light Shading:**
   Illumination Model. Shading: Constant Intensity shading; Gouraud shading; Phong shading. Half toning. Ray Tracing.

BOOKS

TEXT BOOKS

1. Donald Hearn and M. Pauline Baker, "Computer Graphics with C version ", Low Price Edition,

2nd Edition, 2002.

2. **Newman and Sproll, "Principles of Interactive Computer Graphics", Tata McGraw Hill, 2nd Edition, 2002.**

References:

1. Rogers and Adams, "Mathematical Elements for Computer Graphics ", TMH
3. Xiang and Plastok, "Schaum's Outlines Computer Graphics", TMH, 2nd Edition, 2002.
4. Harrington, "Computer Graphics", McGraw Hill
5. Rogers, "Procedural Elements for Computer Graphics", TMH

TERM WORK

1. Term work should consist of at least 10 practical experiments covering all the topics of the syllabus.
2. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

THIRD YEAR SEMESTER VI

SUBJECT: ADVANCED DATABASES

Lectures: **3 Hrs per week**	Theory: **100 Marks**
Practical: **2 Hrs per week**	Term work: **25 Marks**
	Oral Exam.: **25 Marks**

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

Pre-requisites: **A basic course in "Database Systems" and knowledge of OOAD.**

DETAILED SYLLABUS

1. The Extended Entity Relationship Model And Object Model:

The ER model revisited, Motivation for complex data types, User Defined Abstract Data Types And Structured Types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization.
Relationship Types of Degree Higher Than Two.

2. Object-Oriented Databases:

Overview of Object-Oriented Concepts. Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Complex Objects; Database Schema Design for OODBMS; OQL, Persistent Programming Languages; OODBMS Architecture And Storage Issues; Transactions and Concurrency control
Example of ODBMSs, - O2

3. Object Relational and Extended Relational Databases:

Database Design For An ORDBMS - Nested Relations and Collections; Storage And Access methods, Query processing and Optimization; An Overview of SQL3, Implementation Issues for Extended Type ;Systems. Comparison Of RDBMS, OODBMS, ORDBMS

4. Parallel and Distributed Databases and Client-Server Architecture:

Architectures For Parallel Databases, Parallel Query Evaluation; Parallelizing Individual 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.
An Overview of Client-Server Architecture

5. Databases On The Web And Semi structured Data

Web Interfaces To The Web, Overview Of XML; Structure Of XML Data, Document Schema, Querying XML Data; Storage Of XML Data, XML Applications; The Semi structured Data Model, Implementation Issues, Indexes For Text Data

6. Data Warehousing and Data Mining.

Introduction To Data Warehousing, Star Schemas; Multidimensional Data Model and OLAP,
Introduction To Data Mining; Mining For Rules, Tree Methods, Clustering Approaches To Data Mining;

Applications Of Data Warehousing and Data Mining

7. Enhanced Data Models for Advanced Applications.

Active Database Concepts. Temporal Database Concepts.; Spatial Databases, Concepts and architecture; Deductive Databases and Query processing; Mobile Databases, Geographic Information Systems.

BOOKS

TEXT BOOKS

1. Elmasri and Navathe, "fundamentals of database systems " , 4th Edition , Pearson Education
2. Raghu Ramakrishnan, Johannes Gehrke ," database management systems", Second Edition, McGraw-Hill

References:

1. Korth, Silberchatz, Sudarshan ,"Database System Concepts", 4th Edition, McGraw-Hill.
2. Peter Rob and Coronel,"Database systems, Design, Implementation and Management, Fifth Edition,Thomson Learning.
3. C.J.Date, Longman, "Introduction To Database Systems", 7th Edition, Addison Wesley

TERM WORK

1. The term work should include 6 small projects that would cover the different data models dealt with in the subject.
2. Two Assignments on current topics should also be included.
3. A Term Work test must be conducted with a weightage of 10 Marks.