Shivaji University, Kolhapur

SYLLIBUS/ STRUCTURE (REVISED from June- 2009)
T.E. Computer Science & Engg. (Semester – V & VI)

Semester - V

Sr. No.	Subject	L	T	P	Theory Marks		TW	POE	Oral	Total Marks
					Written	Online				
1	Computer Graphics	3	-	2	50	50	25	-	-	125
2	System Programming	3	-	2	100	-	25	-	25	150
3	Operating System - I	3	-	-	100	-	-	-	-	100
4	Computer Algorithms	4	1	-	100	-	25	-	-	125
5	Network Technologies	4	1	-	50	50	25	-	-	125
6	Programming Lab - III	2	-	4	-	-	50	50	-	100
7	Mini Project - II	-	-	2	-	-	25	-	50	75
	Total	**19**	**2**	**10**	**400**	**100**	**175**	**50**	**75**	**800**

Semester – VI

Sr. No.	Subject	L	T	P	Theory Marks		TW	POE	Oral	Total Marks
					Written	Online				
1	Compiler Construction	3	-	2	50	50	25	-	-	125
2	Operating System - II	3	-	2	100	-	25	-	-	125
3	Database Engineering	4	-	2	100	-	25	50	-	175
4	Object Oriented Modeling and Design	3	1	-	50	50	25	-	-	125
5	Information Security	3	1	-	100	-	25	-	-	125
6	Programming Lab - IV	2	-	2	-	-	25	50	-	75
7	Soft Skills	-	2	2	-	-	25	-	25	50
	Total	**18**	**4**	**10**	**400**	**100**	**175**	**100**	**25**	**800**

Note:

1. The term work as prescribed in the syllabus is to be periodically and jointly assessed by a team of teachers from the concerned department.
2. In case of tutorials, students of different batches be assigned problems of different types and be guided for the solution of the problem during tutorial session. Problems thus solved be translated into computer programs wherever applicable and executed by respective batches during practical session.
3. The assignments of tutorials and practicals need to be submitted in the form of soft copy and / or written journal.
4. Breakup of term work marks shall be as follows:
    a. For subjects having term work marks 25 -
        - Mid-semester test – 5 marks.
        - End-semester test – 5 marks.
        - Tutorial assignments and / or practical performance – 15 marks.
    b. For subjects having term work marks 50 –

- Mid-semester test – 10 marks.
- End-semester test – 10 marks.
- Tutorial assignments and / or practical performance – 30 marks.

5. The theory exam scheme is as under:
   - 5.1 : For online exam the scheme to be followed is as under –

   a. As mentioned in the structure above, **Two** theory papers of TE (CSE) Sem-V and Sem-VI of 100 marks will be divided into two parts.
      - **Part-A**: 50 marks theory paper similar to the existing theory paper exam. The nature of the questions will be descriptive, analytical and problem solving.
      - **Part-B:** 50 marks computer based exam with multiple choice questions (MCQs) .
   b. The marks obtained in the individual heads should be added and considered as marks of the respective theory paper out of 100 marks.
   c. The questions of part-A and part-B will be based on the entire syllabus of the respective subjects.
   d. The theory paper for part-A will consist of two sections carrying 25 marks each.
   e. The questions in part-B will be of 1 or 2 marks only.
   f. Duration of part-A exam will of 2 hours and that of part-B will be of 1 hour.
   g. No separate passing head for part-A and part-B.
   h. The scheme of moderation / revaluation is not applicable for part-B, however is applicable for part-A

   - 5.2 : For theory exam of 100 marks the scheme to be followed is as under–

   a. The theory paper of 100 marks will consist of two sections carrying 50 marks each.
   b. The scheme of moderation / revaluation is applicable.

6. Passing scheme is as under -

   a. The passing scheme for the subjects will be similar to existing scheme.
   b. All the existing ordinances will be applicable for passing criteria.

T.E. (Computer Science and Engineering) Semester – V

1. COMPUTER GRAPHICS

Lectures: 3 hrs/week — Theory: 100 marks
Practicals: 2 hrs/week — T/W: 25 marks

SECTION – I

1. Introduction to graphics devices:
Display Devices and Adapters, Working of Printers, LCD Display. (3)

2. Transformations**:** Basic 2D & 3D transformations - Translation, Scaling, Rotation, Reflection, Shearing, Multiple Transformations, Rotation about an axis parallel to a coordinate axis, Rotation about an arbitrary axis in space, Affine and Perspective Geometry, Orthographic projections and Axonometric projections. (8)

3. Raster Scan Graphics:
Bresenham's line and circle drawing algorithms, Scan Conversion techniques: RLE, Frame Buffer, Scan converting polygons: Edge fill and Seed fill algorithms, Anti-aliasing and Half-toning. (7)

SECTION – II

4. Viewing and clipping:
Introduction, Windowing and View-porting, Introduction to clipping, Point clipping, line clipping: Sutherland - Cohen line clipping algorithm. (5)

5. Curves and Surfaces:
Curve Representation, Non-parametric and parametric curves, representation of space curves, Cubic Spline, Parabolic Blended curves, Bezier curves and B-spline curves, Z-buffer, Warnock algorithm. (8)

6. Introduction to OpenGL & GLUT Libraries:
Introduction to OpenGL, OpenGL basic graphics primitives: The OpenGL data types, OpenGL state, establishing the coordinate systems, Line drawing in OpenGL, drawing poly-lines and polygons, Design & use of GLUT & GLUI menus. (5)

Text Books:

1. Mathematical elements for Computer Graphics - David F. Rogers, J. Alan Adams (MGH Int.) (For chapters 1, 2, 5)
2. Procedural elements for Computer Graphics - David F. Rogers (MGH Int.) (For chapters 3, 4)
3. Computer Graphics Using OpenGL F.S. Hill Jr. Stephen M. Kelley, (Pearson Education) (Chapter6)

References Books:

1. Principles of Interactive Computer Graphics - Newman Sproul (MGH) (chapters 1,4)
2. Principles of Computer Graphics Theory and Practice Using OpenGL and Maya, Shalini Govil-Pai, (Springer) (For Chapter 6)
3. Computer Graphics by Prof. Rajesh Maurya, (Wiley India Pvt. Ltd.) (Chapter 4)
4. Computer Graphics – Hearn & Baker.
5. Computer Graphics (second Edition) - Zhigang Xiang & Roy Plastock (Schaum's Outline Series, TMGH).

Term Work: It should consist of minimum of 8-10 experiments based on the following topics-

1. Installation of computer graphics devices and adapters.
2. 2D Transformations
3. 3D Transformations
4. Bresenham's Line/Circle generation algorithm
5. Filling algorithms
6. Clipping, / Windowing / Viewporting
7. Construction of simple pictures by drawing line, polylines, polygons using openGL.
8. Cubic Spline / Parabolic Blended curves
9. Bezier / B-Spline curves
10. File format conversion (like Bitmap, PCX)
11. Animation (Moving of object)

2. SYSTEM PROGRAMMING

Lectures: 3 hrs/week
Practicals: 2 hrs/week

Theory: 100 marks
T/W: 25 marks
Orals : 25 marks.

SECTION - I

1. Language Processors**:** Introduction, language processing activities, Fundamentals of language processing, Fundamentals of language, Specification, language Processor development tools. **(**5)

2. Assemblers: Elements of assembly language programming, a simple assembly scheme, pass structure of assemblers, design of a two pass assembler, a single pass assembler for IBM PC. (5)

3. Macros and Macro Processors: Macro definition and call, Macro Expansion, Nested macro calls, Advanced macro facilities, Design of macro preprocessor. (8)

SECTION - II

4. Compilers and Interpreters: Aspects of compilation, memory allocation, compilation of expressions, compilation of control structures, Interpreters. (7)

5. Linkers: Relocation and linking concepts, design of a linker, Self-relocating programs, linking for overlays, Loaders. (6)

6. Software tools: Editors, Debug monitors, Programming Environments, User interfaces, DLLs. (3)

7. Introduction and essential concepts of LINUX system programming: System Programming, APIs and ABIs, standards, concepts of Linux programming. (3)

Text books:

1. System Programming and operating systems – 2nd Edition D.M. Dhamdhere (TMGH)
2. LINUX system programming – Robert Love O'Reilly (SPD) (chapter 7)

Reference book:

1. System Programming -- J. J. Donovan (Mc-Graw Hill)

Term Work: Minimum of 8-10 practical assignments should be carried based on following list.

1. Implementation of Macros.
2. Implementation of Nested macros.
3. Design and implementation of 1 pass assemblers.
4. Design and implementation of 2 pass assemblers.
5. Symbol table generation for input *.c file.
6. Design Lex specifications for the tokens – keywords, identifiers, numbers, operators, white spaces.
7. Implementation of Toy-code generator.
8. Simulation of linkers.
9. Simulation of loaders.
10. 3-4 assignments on DLL on Linux shared library.
11. Use of different debugger tools.

T.E. (Computer Science and Engineering) Semester – V

3. OPERATING SYSTEM – I

Lectures : 3 Hrs/Week Theory: 100 Marks

SECTION – I

1. Introduction: Idea of an operating system, Different types of Operating Systems, System Calls. (2)

2. Process: Process Concept, Process Scheduling, Operation on process, Cooperating process, Threads, Inter-process Communication (Algorithms evaluation). (6)

3. Process Scheduling: Basic concept, Scheduling Criteria, Scheduling Algorithms, Multiple processor scheduling, Real time scheduling. (4)

4 Inter-process Synchronization: Background, Classical problems of synchronization, Critical Region, The critical section problem, Synchronization Hardware Monitors, Semaphores. (5)

SECTION – II

5. Deadlocks: System modes, Deadlock characterization, Methods for handling deadlocks Deadlock prevention, Deadlock avoidance, Deadlock detection Recovery from deadlock, combined approach to dead lock. (6)

6. Memory management: Background, Logical Versus Physical Address space, Swapping Contiguous Allocation, Virtual Memory: Background, Demand paging, Page replacement, Page replacement algorithms, Allocation of frames, Thrashing (Only concept) (5)

7. I/O system: Overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O request to hardware operation. (4)

8. Case Study: Memory, Process, File, Disk, Device Management in UNIX, MS-DOS, Windows, Linux. (4)

Text Books:

1. Operating System concepts – 5th Edition – Silberschatz Galvin (John Wiley).
2. Understanding Operating System - Ann McHoes & Ida M. Flynn, (Thomson) 5th Edition (Refer Chapters 13,14,15,16 from the book for Chapter 8: Case Study)

Reference Books:

1. Operating system with case studies in Unix, Netware and Windows NT – Achyut S. Godbole (TMGH).
2. Operating systems: concepts and design - Milan Milenkovic (TMGH).

T.E. (Computer Science and Engineering) Semester – V

4. COMPUTER ALGORITHMS

Lectures: 4 hrs/week | Theory: 100 marks
Tutorials: 1 hr/week | Term work: 25 marks

Note: The scope of the subject is as per text books. A complete analytical treatment is expected with an emphasis on complexity analysis rather than algorithms.

SECTION - I

1. Introduction **(5)**
What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Randomized Algorithms.

2. Divide and Conquer **(6)**
The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort and analysis of these algorithms.

3. The Greedy method **(6)**
The general method, , Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes , Optimal merge patterns, Single source shortest paths.

4. Dynamic Programming **(7)**
The general method, Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 knapsack, Reliability design, Traveling Sales person problem.

SECTION - II

5. Basic Traversal and Search Techniques **(7)**
Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First Search & Traversal, Depth First Search & Traversal, AND/OR graphs; Connected components and Spanning Trees; Bi-connected components and depth first search.

6. Backtracking **(6)**
The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle , Graph Coloring.

7. Probabilistic and Randomized Algorithms **(6)**
Probabilistic algorithms, Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms, probabilistic numerical algorithms, probabilistic parallel algorithms.

8. NP Hard and NP Complete Problems **(3)**
Basic Concepts, Introduction to NP Hard Graph Problems.

Text Books:

1. Fundamentals of Computer Algorithms - Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran, Universities Press, Second Edition.
2. Algorithms – Kenneth A. Berman, Jerome L. Paul, Cengage Learning. (For chapter No. 7)

References:

1. Fundamentals of Algorithmics – Gilles Brassard, Paul Bratley (Pearson Education).
2. Mastering Algorithms with C – Kyle Loudon (SPD O'Reilly).

Term work: It should consist of 8 to 10 assignments based on the following guidelines –

1. A batch of students will be assigned different algorithms and expected to analyze the algorithms in terms of time and space complexity.
2. Solve different exercise problems in the text book mentioned in the syllabus.
3. Solve more numerical problems for Greedy and Dynamic Programming methods.

T.E. (Computer Science and Engineering) Semester – V

5. NETWORK TECHNOLOGIES

Lectures: 4 hrs/week — Theory: 100 marks
Tutorials: 1 hr/week — Term work: 25 marks

SECTION – I

1. Introduction: Different generations of wireless cellular Networks, 1G to 4G Cellular systems and beyond, Wireless Standard organizations. (5)

2. Wireless Network Architecture and Operations: The Cellular Concept, Cell Fundamentals, Capacity expansion technique, Cellular Backhaw Networks, Mobility Management, Radio resources and Power management, Wireless Network security. (5)

3. GSM Technology**:** GSM system overview, Introduction to GSM, GSM Network and system Architecture, GSM Channel Concept, GSM Identities, GSM system operations. (Traffic cases). (5)

4. CDMA Technology: Introduction to CDMA, CDMA Network and system Architecture, CDMA Channel Concept, CDMA System (Layer 3) operations, 3G CDMA – IS-95B, CDMA 2000 and W-CDMA. (5)

5. Cellular Wireless Data Networks (2.5 and 3 G systems): Introduction to mobile wireless data networks, CDPD, GPRS and EDGE data Networks, CDMA data Networks, Evaluation of GSM and CDMA to 3 G, SMS, EMS, MMS and MIM services. (4)

SECTION – II

6. Wireless LANs (IEEE 802.11x**):** Introduction to IEEE 802.11X technologies, Evolution of wireless LANs, IEEE 802.11 Design issues, IEEE 802.11 Services Overview, IEEE 802.11 MAC layer operations, IEEE 802.11 a/b/g standards, IEEE 802.11- Wireless LAN security, Competing wireless Technologies. (7)

7. Wireless PANs (IEEE 802.15X)**:** Introduction to IEEE 802.15X technologies, Wireless PAN Applications and architecture, Bluetooth Link Controller Basics, Evolution of IEEE 802.15 standards. (4)

8. Broadband Wireless MANs(IEEE 802.16x): Introduction to WMAN(IEEE 802.16x) technologies, IEEE 802.16 Wireless MANs, IEEE 802.16 MAC layer details. (4)

9. Broadband Satellite and Microwave Systems**:** Introduction, Line-of-sight Propagation, Fundamentals of Satellite systems, Broad band satellite Networks, Broadband Microwave and Millimeter wave systems. (5)

10. Emerging Wireless Technologies: Introduction, New and Emerging Air Interface Technologies, New wireless Network Implementations, IEEE 802.20 - Mobile Broadband Wireless Access, Satellite ventures and other future Possibilities. (4)

Text Books:

1. Introduction to Wireless Telecommunications systems and Networks - Gary J. Mulett. Publications- Cengage Learning (India Edition).

References Books:

1. Mobile Communications - Jochen Schiller - 2nd edition, Publication-Pearsons Education.
2. 802.11 Wireless Networks - Mathew S Gast (2nd edition), Publication – SPD O'REILLY.

Term work: It should consist of 8 to 10 assignments based on the topics of the syllabus.

T.E. (Computer Science and Engineering) Semester – V

6. PROGRAMMING LABORATORY - III

Lectures: 2 hrs/week
Practicals: 4 hrs/week

Term work: 50 marks
POE: 50 marks

1. An Introduction to Java - Features of JAVA language, Java Virtual Machine and Java Programming Environment, Fundamental Programming Structures in Java, Interfaces and Inner Classes, Static and non-static inner classes, Packages and access control mechanism, Comparison of Java with C++.
2. Error Handling and Exceptions, Debugging.
3. I/O programming – Hierarchy of classes in I/O Package, Streams: Character oriented and Byte oriented, Reading basic data types from keyboard, File handling in Java.
4. Event Handling in Java - Event delegation model (MVC model), Classes supporting event handling.
5. Multithreading – Classes supporting Thread creation, Thread States & Synchronization of threads, Thread groups, Deadlock handling.
6. GUI Design in Java – Hierarchy of classes in AWT package, User Interface, Components with swings, Applets.
7. Network programming with java - Hierarchy of classes in NET package, Client server Programming, Concurrent and Iterative server design, RMI package.
8. Database programming in Java.
9. Native code and security issues in java.

Text Books :

1. Core Java Fundamentals Vol -I (The Sun Microsystems Press Java Series) Cay S. Horstmann, Gary Cornell
2. Core Java Vol – II (The Sun Microsystems Press Java Series) Cay S. Horstmann, Gary Cornell.

References:

1. Java 2 Complete Reference – 5th Edition – Herbert Schildt (TMGH).
2. Object oriented programming with JAVA – E. Balguruswamy

Term work: It should consist of minimum 14 practical experiments based on the above syllabus covering the following list of assignments.

1. Class and Method Implementation by –
   - Method overloading
   - Constructor Overloading

- Static members and methods
- Inner classes

(Use any application)

2. Implementation of Multiple Inheritance using Interface.
3. Implementation of Inheritance by
   - Method overriding
   - super constructor and super keyword
   - abstract class

   (Use any application)
4. Implementation of Package.
5. Program to read basic data types from keyboard using Scanner and check the entered values' data type for its appropriateness.
6. Exception Handling for –
   - Divide by zero error
   - Null values
   - Data entry
7. Program to read the data from user and save it to two different files, display the contents and exchange the contents of those two files using IO package.
8. Synchronization of threads.
9. Develop an animation program using Multithreading viz. Bouncing Ball.
10. Program to scroll the banner using applet.
11. Program using Applet to illustrate event handling with interactive radio buttons to control font style of a text field. Also provide a text box wherein the user may enter font size.
12. Design 8-digit calculator using AWT package and layout managers.
13. GUI design using Swing package - a) Celsius to Fahrenheit conversion b) Login and Password Verification.
14. Implementation of Client / Server mechanism using Socket classes.
15. Design Database program for Employee details and implement INSERT, SELECT, DELETE, UPDATE queries.
16. Design concurrent server that will handle multiple clients using multithreading.
17. Develop a simple client-server application using RMI.

T.E. (Computer Science and Engineering) Semester – V

7. MINI PROJECT – II

Practicals: 2 hrs/week

Term work: 25 marks
Oral Exam : 50 marks

The mini-project should be undertaken preferably by a group of 3 students who will jointly work and implement the mini-project. The group will select a project with the approval of the guide and submit the name of the project with a synopsis of the proposed work of not more than 2 to 3 pages. The mini-project should consist of designing and developing a web site using web designing tools. The web site should contain components like –

1. Static pages.
2. Dynamic pages.
3. Applets.
4. User Interactive components.
5. Multi-media components.
6. Any other components.

A presentation on the above work should be done and a report thereof should be submitted to the department as the term work.

Note: Use of Open source tools should be preferred.

T.E. (Computer Science and Engineering) Semester – VI

1. COMPILER CONSTRUCTION

Lectures: 3 hrs/week — Theory: 100 marks
Practicals: 2 hrs/week — Term work: 25 marks

SECTION – I

1. Introduction to Compiling:
Compilers, Phases of a compiler, Compiler construction tools (2)

2. Lexical Analysis:
Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator. (4)

3. Syntax Analysis:
Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers. (7)

4. Syntax Directed Translation:
Syntax directed definitions, construction of syntax tree, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed definitions. (6)

SECTION – II

5. Run Time Environments :
Source language issues, storage organization and allocation strategies, parameter passing, symbol table organizations and generations, dynamic storage allocations. (4)

6. Intermediate Code Generation :
Intermediate languages, declarations, assignment statements and Boolean expressions, case statements, back patching, procedure calls. (4)

7. Code Generation :
Issues in design of a code generator and target machine, Run time storage management, Basic blocks and flow graphs, Next use information and simple code generator, Issues of register allocation, assignment and basic blocks, code generation from Dags and the dynamic code generation algorithm. (5)

8. Code Optimization :
Sources of optimization, Peephole optimization and basic blocks, loops in flow graphs, Data flow analysis and equations, code improving transformation and aliases, Data flow analysis and algorithms. (5)

Text Book:

1. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D. Ullman (Pearson Education.)

Reference Books:

1. Crafting A Compiler with C - Charles Fischer, Richard LeBlanc (Pearson publication) (For practical use only)
2. Modern Compiler Design - D. Grune , H. Bal , C. Jacobs , K. Langendoen (Wiley publication) (For practical use only).
3. Modern Compiler Implementation in Java - Andrew W. Appel (Cambridge University Press 1998).
4. Compiler construction – D.M. Dhamdare (Mc-Millan)
5. Unix / Linux manuals.

Term work:

It should consist of minimum 8-10 experiments based on the above topics covering the following list of assignments.

1. Design of preprocessor for C program.
2. Design a complete lexical analyzer for C language and also construct the symbol table.
3. Use of LEX & YACC tools to design a simple grammar to perform calculator operations.
4. Using recursive descent parsing method design a syntax analyzer for Simple expression in C language.
5. Program to create a syntax tree for simple expression in C language using Recursive descent parsing techniques.
6. Implement intermediate code generator for the Boolean expression in three Address code format using lex and yacc tool.
7. Implement intermediate code generator for the conditional statements in three Address code format using lex and yacc tool.
8. Using labeling algorithm label the Syntax tree constructed for simple expression in C language using Lex and Yacc tools.
9. Write a program to implement code generator from a labeled tree.
10. Demonstration of compiler and interpreter using Lex and Yacc.

T.E. (Computer Science and Engineering) Semester – VI

2. OPERATING SYSTEM – II

Lectures: 3 hrs/week — Theory: 100 marks
Practicals: 2 hrs/week — T/W: 25 marks

SECTION - I

1. Introduction : General Overview of the System - History, System Structure, User Perspective, Operating System Services, Assumption About Hardware, Introduction to the KERNEL - Architecture of UNIX OS, Introduction to system concepts, Kernel Data Structure, System Administration. (6)

2. The Buffer Cache : Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, advantages and disadvantages of cache. (4)

3. Internal Representation of Files : I-nodes, structure of the regular file, directories, conversion of a pathname to i-node, super block, i-node assignment to a new file, allocation of disk blocks, other file types. (4)

4. **System calls for the file System :** Open, Read, write, File and Record Locking, Adjusting the position of FILE I/O-LSEEK, Close, File Creation, Creation of Special File, Change Directory and Change Root, Change Owner and Change Mode, Stat and Fstat, Pipes, Dup, Mounting and Un-mounting file systems, Link, Unlink, File System Abstractions, File system maintenance. (4)

SECTION – II

5. The Structure of process : Process stages and transitions, layout of system memory, the context of a process, Saving context of a process, manipulation of the process address space. (4)

6. Process Control : Process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, the shell, System Boot and the Init process. **(**4)

7. Process Scheduling and Time : Process Scheduling, system call for time, clock. (2)

8. Memory management policies : Swapping, Demand passing, a hybrid system with demand paging and swapping. (3)

9. The I/O Subsystem : Driver interfaces, disk drives, terminal drivers, Streams. (3)

10. Interprocess communication: Processing Tracing, System V IPC, Network

Communications, Sockets. (3)

Text Book:

1. The design of Unix Operating System - Maurice J. Bach (PHI)

Reference Books:

1. Linux System Programming - Robert Love, Publisher - SPD, O' REILLY
2. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).
3. Unix / Linux Manuals.

Term Work : It should consist of minimum 8-10 experiments based on the above topics and covering the following list of assignments. (Reference book – Linux System Programming by Robert Love may be referred for the assignments listed below.)

1. Fundamentals of Linux system programming and programmers overview of the Linux System (Refer Chapter No 01: Introduction and Essential Concepts)
2. Study & demonstration of how the Linux Kernel implements and Manages files. Ref Chapter No 02 : File I/O
3. Study & demonstration of User Buffer I/O - Observe practically by writing 'C' program. (Refer Chapter No 03: Buffer I/O).
4. Study and demonstration of Advanced Flile I/O. (Refer Chapter No 04: Advanced File I/O).
5. Study and demonstration of Unix Process. Management – from process creation to process termination (Refer Chapter No 05: Process Management).
6. Study and Demonstration of the File and Directory Management (Refer Chapter No 07: File and Directory Management).
7. Study and demonstration of Memory Management (Refer Chapter No 08: Memory Management)
8. Study and Demonstration of Signals (Refer Chapter No 09: Signals).
9. Study and Demonstration of Time, Sleep and Clock Management (Refer Chapter No 10: Time)

T.E. (Computer Science and Engineering) Semester – VI

3. DATABASE ENGINEERING

Lectures: 4 Hrs/Week
Practical: 2 Hrs/Week

Theory: 100 Marks
T.W.: 25 Marks
POE: 50 Marks

SECTION – I

1. **Introduction:** Purpose of Database Systems, Data abstraction, Data Models, Entities and Entity sets, Mapping Constraints, E-R Diagram, Reducing E-R Diagrams to Tables, Generalization, Aggregation. (4)

2. Relational Model: Structure of Relational Databases, The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus, Structured Query Language (SQL). (7)

3. **Integrity Constraints and Design:** Domain Constraints, Referential Integrity, Functional Dependencies, Normalization using Functional Dependencies, Canonical cover. (7)

4. **File and System Structure:** Overall System Architecture, File Organization, Organization of Records into Blocks, Sequential Files, Mapping Relational Data to Files, Data Dictionary Storage, Buffer Management. (4)

SECTION – II

5. **Indexing and Hashing:** Basic Concepts, Indexing, B+ Tree Index Files, BTree Index Files, Static Hash Functions, Dynamic Hash Functions, Comparison of Indexing and Hashing, Multiple Key Access. (5)

6. **Query Processing:** Query Interpretation, Equivalence of Expressions, Estimation of Query Processing Cost, Estimation of Costs of Access using Indices. (5)

7. **Crash Recovery:** Failure Classification, The storage Hierarchy, Transactions Model, Log-Based Recovery, Buffer Management, Checkpoints, Shadow Paging, Failure with Loss of Non-Volatile Storage, Stable Storage Implementation. (5)

8. **Concurrency Control:** Schedules, Testing for Serializability, Log-Based Protocols, Time-Stamp Based Protocols, Validation Techniques. (7)

Text Book:

1. DataBase System Concept by Henry F. Korth, Abraham Silberschatz, Sudarshan (McGraw Hill Inc.) Fourth Edition.

Reference Books:

1. Fundamentals of Database Systems – by Ramez Elmasri and Shamkant Navathe Publisher -Pearson Education, 5th Edition.
2. Database Systems : Design, Implementation and management.- PeterRof, Carlos Coronel (7th Edition), Publisher - Cengage Learning.
3. Principles of Database Systems by J.D. Ullaman (Galgotia Publications).

Term Work : It should consist of minimum 8-10 experiments based on above topics and should be implemented in C++/Java and SQL / Oracle (For assignment 1 to 4 use SQL / Oracle at the backend and Java as the front end).

1. ER Diagrams & Normalization: Draw ER diagrams (around 10 in number) for college Student Activities & Convert them into tables. Apply normalization. Display constraints.
2. Data Dictionary: Write program to create tables, along with constraints and store them in a File, which will work as DD for later assignments.
3. Modify Data: Write program to modify data in tables, which is inserted in assignment 2. Implement modify operation as transaction.
4. SQL Query Processing: Write program to show use of SQL Clauses-Order by, group by and between clause.
5. B+ Tree Indexing Technique: Write program to implement B+ Tree Index (n=3 or n = 5) on the data created until now.
6. Dynamic Hashing Technique: Write program to implement Dynamic Hashing on the data created until now.
7. Database Logs: Write program to create logs of the activities of assignment 3. Choose either Immediate Log OR Deferred Log.
8. Concurrency Control: Write program to simulate any one concurrency control Protocol.

9. Canonical cover & closure: Given a set of functional dependencies find canonical cover & closure.
10. Installation of Oracle 10g or 11g. Demonstration of Installation and configuration of Oracle 10g or 11g.

T.E. (Computer Science and Engineering) Semester – VI

4. OBJECT ORIENTED MODELING AND DESIGN

Lecture: 3 hrs/week — Theory: 100 Marks
Tutorial : 1 hr/week — T/W: 25 Marks

SECTION – I

1. **Introduction:**
   Object oriented themes, evidences for usefulness, modeling as a design technique. (2)
2. **Object Modeling:**
   Object, classes, Link & association, advanced link & Association concepts, generalization & Inheritance, grouping constructs, aggregation, abstract classes, generalization as extension & restriction, multiple inheritance, metadata, candidate key & constraints. (5)

3. **Dynamic & Functional Modeling:**
   Dynamic modeling: Events & states, operations, nested state diagrams, concurrency, advanced dynamic modeling concepts & simple dynamic model, relation of object dynamic models. **Functional Modeling**: functional model, data flow diagrams, specifying operations, constriction, a simple functional model, relation of functional to object & dynamic model. (5)

4. **Design Methodology:**
   OMT methodology, Impact of an object oriented approach, analysis, system design with examples, combining models, design algorithms, design optimization, implementation of controls, design association & physical packaging , comparing methodology using structured analysis & design, Jackson structured development, information modeling notations & object orientation work. (5)

SECTION – II

5. **Structure modeling Using UML:**
   Classes, Relationship, Common Mechanisms, Diagrams, Class Diagrams. (3)
6. **Behavioral Modeling:**
   Interactions, Use Cases, Use Case Diagram, Interaction diagrams, Activity diagrams, Events & Signals, State Machines, Process & Threads, Time & Space, State chart diagrams. (8)
7. **Architectural Modeling:**
   Components, Deployment, Collaboration, Patterns & frameworks, component diagrams, Deployment diagrams. (8)

Text Books:

1. Object-orientated Modeling & Design: (Section - I) - James Rambaugh, Michael Blaha, William Premerlani, Frederick Eddy, William Lorensen. (PHI)
2. The Unified Modeling Language User Guide: (Section II) - Grady Booch, James Rambaugh, Lvar Jacobson.

Reference Books:

1. Object oriented analysis & design using UML- H. Srimathi, H. Sriram, A. Krishnamoorthy (SCITECH PUBLICATION 2nd Edition).
2. Object Oriented analysis& Design – Andrew High(TMG)
3. Practical Object Oriented Design with UML – Mark Priestley.
4. Object Oriented Analysis & design – Kahate (TMH)

5. Threat first Object oriented analysis & design - Breet Mclaughline, Garry Police & Devide West. (OREILLY)

Term Work – It should consist of 8-10 assignments based on the syllabus with examples on solving real time problems. Different batches be assigned different real time scenarios and accordingly object oriented analysis and development be carried.

T.E. (Computer Science and Engineering) Semester – VI

5. INFORMATION SECURITY

Lectures : 3 Hrs/week — Theory : 100 Marks
Tutorials: 1 hr/week — T/W :25 Marks

SECTION – I

1.Symmetric Ciphers: Overview - Services, Mechanism and Attacks, The OSI security Architecture, A model for Network security, Classical Encryption techniques – Symmetric Cipher model, Substitution techniques, Transposition techniques, Rotor Machines, Steganography. Block Cipher and Data Encryption Standard - Simplified DES, Block cipher principles, The Data Encryption Standard, The strength of DES, Differental and Linear Cryptanalysis, Block Cipher Design Principles. (8)

2. Asymmetric Ciphers: Public Key Cryptography and RSA - Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Other public key cryptosystems, Key Management, Diffie-Hellman Key Exchange, Message Authentication and HASH Functions, Authentication requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Digital Signatures and Authentication Protocols - Digital Signatures, Authentication Protocols, Digital Signature Standard. (10)

SECTION – II

3. Network Security Practice: Authentication Applications - Kerberos, X.500 Authentication Service, Electronic Mail Security - Pretty Good Privacy, S/MIME, IP Security – IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating security Payload, WEB Security - Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction. (10)

4. System Security: Intruders - Intruders, Intruder detection, Password Management, Malicious Software - Viruses and Related Threats, Virus Countermeasures, Firewall - Firewall Design principles, Trusted systems. (8)

Text Book :

1. Cryptography and Network security Principles and Practices – Williams Stallings (Pearson Education).

Reference Books :

1. Cryptography and network security – Atul Kahate (TMGH).
2. Network Infrastructure Security – Randy Weaver, Dawn Weaver, Cengage Learning.
3. Handbook of Applied Cryptography - Menezes, A. J., P. C. Van Oorschot, and S. A. Vanstone.
4. Applied Cryptography: Protocols & Algorithms - Schneier, Bruce.

Term work: It should consist of 8-10 assignments based on above topics and solving exercise problems given in the text book.

T.E. (Computer Science and Engineering) Semester – VI

6. PROGRAMMING LABORATORY - IV

Lectures: 2 hrs/week — Term work: 25 marks
Practicals: 2 hrs/week — POE: 50 marks

1. .NET Architecture (3)
The Relationship of C# to .NET, The Common Language Runtime, A Closer Look at Intermediate Language, Assemblies, .NET Framework Classes, Namespaces

2.C# Basics (5)
Variables, Predefined Data Types, Flow Control, Enumerations, Arrays, Namespaces, The Main () Method, More on Compiling C# Files, Console I/O, Using Comments, The C# Preprocessor Directives, C# Programming Guidelines

3. Objects and Types (3)
Classes and Structs, Class Members, Anonymous Types, Structs, Partial Classes, Static Classes, The Object Class, Extension Methods

4. Inheritance (2)
Types of Inheritance, Implementation Inheritance, Modifiers, Interfaces

5. Arrays (2)
Simple Arrays, Multidimensional Arrays, Jagged Arrays, Array Class, Array and Collection Interfaces, Enumerations

6. Operators and Casts (2)
Operators, Type Safety, Comparing Objects for Equality, Operator Overloading, User-Defined Casts

7. Strings (1)
System.String, Building Strings, StringBuilder Members, Format Strings

8. Errors and Exceptions (2)
Exception Classes, Catching Exceptions ,User-Defined Exception Classes

9. Threading (3)
Overview, Asynchronous Delegates, The Thread Class, Thread Pools, Threading Issues, Synchronization, Timers

10. I/O, Files and Networking (3)
Streams, Standard Devices, Networking

Text Books:

1. Professional C# 2008 (For Chapters 1 to 9)
   - Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Wrox Publication
2. Professional .Net Framework 2.0 (For Chapter 10)
   - Joe Duffy, Wrox Publication.

Term work: It should consist of 10 to 12 experiments based on the above topics.

7. SOFT SKILLS

Tutorials: 2 hrs/week T/W: 50 marks
Practicals: 2 hrs/week

The objective of this course is to enable students to acquire and enhance communication and professional skills required for personality development, corporate business and entrepreneurship skills. The syllabi contents are as per the modules proposed by **Infosys Technologies Ltd., Pune region.**

During the tutorial and practical sessions, it is expected that the contents of all modules should be delivered to the students of different batches and assignments be given based on the activities discussed as per the modules. Evaluation of the term work should be done on continuous basis and two tests (mid term and end term tests) should be conducted. Students must demonstrate the acquired skills by means of giving presentations, group discussions, interviews, etc. The modules proposed are as under.

1. Art of communication
   Communication Theory
   Barriers and Filters
   Active Listening
   Non Verbal Communication

- Feedback and Response
- Body Language

2. Hidden data of communication
   - Dealing with feelings
   - Assertiveness
   - Self – confidence
   - Emotional Intelligence
3. World of teams
   - Team concept
   - Elements of team work
   - Formation of a team
   - Team based activities
4. Adapting to corporate life
   - Corporate Grooming and dressing
   - Business Etiquette
   - Business Ethics
   - Dinning Etiquette
   - Ethics policy
5. Discussions, decisions and presentations
   - What are group discussions
   - Types of Group Discussions
   - Presentations
   - Decision making
   - Interview Skills
   - Resume Writing.
6. Any other module as and when proposed by Infosys.

Shivaji University, Kolhapur

Equivalences of T.E. (CSE) for repeater students

TE (CSE) Sem.-V

Sr.no.	TE (CSE) –I (Pre-Revised)	Equivalent / Replacement subject (Revised)
1	Advanced Microprocessors	Advanced Microprocessors of SE (CSE) Sem-IV
2	Computer Graphics	Computer Graphics of TE (CSE) Sem - V
3	System Programming	System Programming of TE (CSE) Sem - V
4	Operating Systems - I	Operating Systems – I of TE (CSE) Sem - V
5	Computer Algorithm	Computer Algorithm of TE (CSE) Sem - V
6	Programming Lab-III	Programming Lab-III of TE (CSE) Sem - V

T.E. (CSE) Sem.-VI

Sr.no.	TE (CSE) II (Pre-Revised)	Equivalent / Replacement subject (Revised)
1	Compiler Construction	Compiler Construction of TE (CSE) Sem - VI
2	Operating Systems - II	Operating Systems – II of TE (CSE) Sem - VI
3	Database Engineering	Database Engineering of TE (CSE) Sem - VI
4	Software Engineering	Software Engineering of SE (CSE) Sem - IV
5	Programming Lab-IV	Programming Lab-IV of TE (CSE) Sem - VI