



Shivaji University, Kolhapur
Department of Technology
THIRD YEAR B.TECH
Computer Science and Technology
Curriculum Structure
Semester – V

Sr. No.	Subject Code	Subject Title	Contact hours			Credits
			L	T	P	
1	CS 311	Computer Algorithms	3	-	-	3
2	CS 312	System Programming	3	-	-	3
3	CS 313	Operating System-I	3	-	-	3
4	CS 314	Software Engineering	3	-	-	3
5	CS 315	Wireless Networks	3	-	-	3
6	CS 316	Laboratory- I System Programming	-	-	2	1
7	CS 317	Laboratory-II Computer Algorithms	-	-	2	1
8	CS 318	Laboratory-III Seminar-I	-	-	2	1
9	CS 319	Laboratory-IV Java Programming	1	-	4	3
10	AC 312	Audit Course II Research Methodology	2	-	-	-
Total			18	-	10	21
Total Contact hours per week = 28						

Semester –VI

Sr. No.	Subject Code	Subject Title	Contact hours			Credits
			L	T	P	
1	CS 321	Compiler Construction	3	-	-	3
2	CS 322	Operating System-II	3	-	-	3
3	CS 323	Object Oriented Modelling and Designing	3	-	-	3
4	CS 324	Database Engineering	3	-	-	3
5	CS 325	Information Technology	3	-	-	3
6	CS 326	Laboratory- I Object Oriented Modelling and Design	-	-	2	1
7	CS 327	Laboratory-II Advanced Programming	1	-	4	3
8	CS 328	Laboratory-III Database Lab	-	-	2	1
9	CS 329	Laboratory-IV Mini Project-I	-	-	2	1
10	AC 323	Audit Course III Presentation and Communication Techniques	2	-	-	-
Total			18	-	10	21
Total Contact hours per week = 28						

Note : Tutorials and Practical shall be conducted in batches with batch strength not exceeding 18 students.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

Computer Algorithms (CS311)

Teaching Scheme: L: 3hrs/week

T: -- hrs/week

Credits: 3

Unit 1 Introduction

(5 Hrs)

What is algorithm, Algorithm Specification, Performance Analysis, heap.

Unit 2 Divide and Conquer

(7 Hrs)

The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, and analysis of these algorithms.

Unit 3 The Greedy Method

(7 Hrs)

The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Single source shortest paths.

Unit 4 Dynamic Programming

(6 Hrs)

The general method, Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 knapsack, Reliability design, Traveling Sales person problem.

Unit 5 Backtracking

(6 Hrs)

The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring.

Unit 6 Basic Traversal and Search Techniques and Polynomial Problems

(8 Hrs)

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. NP Hard and NP Complete.

Text Books:

1. "Fundamentals of Computer Algorithms", Horowitz, Sahni and Rajasekaran, Galgotia Publications.

References Books:

1. "Fundamentals of Computer Algorithms", Horowitz and Sahni, Galgotia Publishers.
2. "Design and Analysis of Algorithms", Aho, Hopcraft and Ullman, Addison Wesley.
3. "Introduction to Algorithms", Thomas Cormen, PHI Publication.
4. "Introduction to Design and Analysis of Algorithm", Goodman, McGraw Hill.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

System Programming (CS312)

Teaching Scheme: L: 3hrs/week

T: - hrs/week

Credits: 3

Unit 1 Language Processors

(5 Hrs)

Introduction, Language processing activities, Fundamentals of language processing, Fundamentals of language specification, Language processor development tools.

Unit 2 Assemblers

(8 Hrs)

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.

Unit 3 Macro Processors

(6 Hrs)

Macros facility, Macro definition and call, Macro Expansion, Nested macro calls, Advanced macro facilities, Design of macro preprocessor.

Unit 4 Compilers and Interpreters

(7 Hrs)

Aspects of compilation, memory allocation, compilation of expressions, compilation of control structures, code optimization, Interpreters.

Unit 5 Linkers & Loaders

(8 Hrs)

Relocation and linking concepts, design of a linker, Self-relocating programs, a linker for MS DOS, Linking for overlays, Loaders.

Unit 6 Software Tools

(5 Hrs)

Software tools for program development, Editors, Debug monitors, Programming Environments, User interfaces, DLLs.

Text Books:

1. “*System Programming and Operating Systems*”, D.M. Dhamdhere, TMGH, 2nd Edition.

Reference Books:

1. “*System Programming*”, J. J. Donovan, Mc-Graw Hill.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

Operating System -I (CS313)

Teaching Scheme: L: 3hrs/week

T: - -hrs/week

Credits: 3

Unit 1 Introduction Hrs

(5 Hrs)

What is an operating system?, Simple Batch System, Multi programmed Batch System, Time Sharing System, Personal Computer System, Parallel System, Real Time System, System Calls.

Unit 2 Process

(8 Hrs)

Process Concept, Process Scheduling, Operation on process, Cooperating process, Threads, Inter process communication (Algorithm evaluation). **Process Scheduling:** Basic concept, Scheduling Criteria, Scheduling Algorithms, Multiple processor scheduling, real time scheduling.

Unit 3 Interprocess Synchronization

(5 Hrs)

Background, Classical problems of synchronization, Critical Region, The critical section problem, Synchronization Hardware Monitors, Semaphores.

Unit 4 Deadlocks

(7 Hrs)

System modes, Deadlock characterization, Methods for handling, deadlocks Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to dead lock.

Unit 5 Memory Management

(9 Hrs)

Background, Logical Versus Physical Address space, Swapping Contiguous Allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory:** Background, Demand paging, Page replacement, Page replacement algorithms, Allocation of frames, Thrashing, Demand segmentation.

Unit 6 I/O System

(5 Hrs)

Overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O request to hardware operation.

Text Books:

1. “*Operating System Concepts*”, Silberschatz Galvin, John Wiley, 5th Edition.

Reference Books:

1. “*Operating System A Design Oriented Approach*”, Charles Crowley, TMGH.

2. “*Operating System with Case Studies in Unix, Netware and Windows NT*”, Achyut S. Godbole, TMGH.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

Software Engineering (CS314)

Teaching Scheme: L: 3hrs/week

T: --hrs/week

Credits: 3

Unit 1 Introduction & Software Processes Hrs (6 Hrs)

The S/W problem, S/W applications, the S/W Engineering Approach & Benefits. Software Process, Characteristics of a software process, Software development process, project management process, Software configuration management process, process management process

Unit 2 S/W requirements Engineering & Planning Software Project (7 Hrs)

S/W requirements, problem Analysis, Requirements Specification, validation, metrics. Project Management Plan, a. Cost estimation, project scheduling, staffing and personnel planning. b. Software Configuration Management plans, Quality Assurance plans. c. Project Monitoring Plans, Risk Management.

Unit 3 Software Design (6 Hrs)

Objective, Design principles, module level concepts, Design notation and specifications, Artifacts system design document & detailed design document, Structured Design methodology, Verification, Metrics

Unit 4 Object Oriented Design with UML (7 Hrs)

Introduction , Object Technologies, Unified Process, Use Case Model : methods, Use Case View - Use Case diagrams, Activity diagrams, Design Views- Class Diagrams, Interaction Diagrams, State Chart Diagrams, Process View- Class and Interaction Diagrams, Implementation View- Component Diagrams, Deployment View- Deployment Diagrams. (Case studies on UML views for business requirements).

Unit 5 Coding & Software Testing (8 Hrs)

Programming Practice, verification, Metrics: Testing Fundamentals, Testing Levels, Functional testing, Structural testing, Testing object oriented programs, Regression Testing, Testing process Metrics-Reliability Estimation.

Unit 6 Software Quality & Project Monitoring and Control (5 Hrs)

Objectives, need for improvement, cost of Quality, Software quality factors, Total Quality Management, Quality standards such as ISO, CMM and CMMI along with their comparison, Six Sigma Project Manager Skills, Team management, Project tracking, milestone analysis, Activity – level Analysis using SPC, Defect Analysis and prevention, Process monitoring and Audit.

Text Books:

1. “*An integrated approach to S/W engineering*”, Pankaj Jalote, Narosa Publishers, 2nd Edition.
2. “*Software Project Management in practice*”, Pankaj Jalote, Pearson Education.

Reference Books:

1. “*Software Engineering: Practitioner’s Approach*”, Roger S. Pressman.
2. “*Software Engineering*”, Jawadekar W.S, TMGH.
3. “*Managing Software Engineering: CASE studies and solutions*”, Gillies A.C. and Smith P, Chapman and Hall, London.
4. “*Object oriented software concepts*”, Bertrand Mayer.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

WIRELESS NETWORK (CS315)

Teaching Scheme: L: - 3 hr/week

T: - - hrs/week

Credits: 3

Unit 1 Introduction:

(5Hrs)

Different generations of wireless cellular Networks, 1G to 4G .Cellular systems and beyond, Wireless Standard organizations.

Unit 2 Wireless Network Architecture and Operations:

(9 Hrs)

The Cellular Concept, Cell Fundamentals, Capacity expansion technique, Cellular Backhaw Networks, Mobility Management, Radio resources and Power management, Wireless Network security. 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.

Unit 3 Wireless LANs (IEEE 802.11x):

(7 Hrs)

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.

Unit 4 Wireless PANs (IEEE 802.15X):

(4Hrs)

Introduction to IEEE 802.15X technologies, Wireless PAN Applications and architecture, Bluetooth Link Controller Basics, Evolution of IEEE 802.15 standards.

Unit 5 Broadband Wireless MANs(IEEE 802.16x):

(9Hrs)

Introduction to WMAN(IEEE 802.16x) technologies, IEEE 802.16 Wireless MANs, IEEE 802.16 MAC layer details. Broadband Satellite and Microwave Systems: Introduction, Line-of-sight Propagation, Fundamentals of Satellite systems, Broad band satellite Networks, Broadband Microwave and Millimeter wave systems.

Unit 6 Emerging Wireless Technologies:

(4Hrs)

Introduction, New and Emerging Air Interface Technologies, New wireless Network Implementations, IEEE 802.20 – Mobile Broadband Wireless Access, Satellite ventures and other future Possibilities.

Text Books:

1. Introduction to Wireless Telecommunications systems and Networks - Gary J. Mullett. 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.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)
System Programming Lab (CS316)

Teaching Scheme: P: - 2hrs/week

Credits: 1

Lab will consist of minimum of 8-10 experiments based on following topics

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.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)
Computer Algorithms Lab (CS317)

Teaching Scheme: P: - 2hrs/week

Credits: 1

Minimum 8 experiments will be performed to understand functioning of Computer Algorithms topics as mentioned below

1. Study assignment on time complexity and space complexity
2. Implement Merge sort
3. Implement Quick sort
4. Implement MAX MIN algorithm
5. Implement Knapsack problem
6. Implement job sequencing with deadline problem
7. Implement Prim's and Kruskal's Algorithms
8. Implement Optimal storage on tapes
9. Implement Single source shortest paths.
10. Implement 8-queen problem
11. Implement sum of subsets
12. Implement Breadth First Search
13. Implement Depth First Search



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)
Seminar-I (CS318)

Teaching Scheme: P: - 2hrs/week

Credits: 1

The main objectives of seminar are to provide exposure to latest developments and trends in CSE & IT and to prepare a detailed seminar report for submission and evaluation.

Seminar is to be carried out in a batch of maximum three students. Seminar should be delivered by individual student, using multimedia presentation and report should be submitted preferably using Latex.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)
Java Programming Lab (CS319)

Teaching Scheme: L: - 1 hr/week
P: - 4hrs/week

Credits: 3

Unit 1 An Introduction to Java Hrs

(8Hrs)

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, Error Handling and Exception.

Unit 2 I/O Programming

(4Hrs)

Hierarchy of classes in I/O Package, Streams: Character oriented and Byte oriented. Reading basic data types from keyboard, File handling in Java.

Unit 3 Graphics Programming and Working with AWT and Swing

(7Hrs)

Event handling, Applet & its applications, AWT classes, Component, classes, panel, Layout management, Graphics, working with color, menus, dialog, Swing.

Unit 4 Generic Programming

(3Hrs)

Multithreading, String handling

Unit 5 Networking

(3Hrs)

Hierarchy of classes in NET package, Client server Programming, RMI package.

Unit 6 JDBC and Java Beans

(4Hrs)

Database programming with JDBC, Bean Events, Bean Properties.

The above mentioned theory should be covered in practical sessions only.

Lab Course:

1. Create a program to practice creating strings for printing out numerical values. Write code to print example values of all 8 primitive types.

i) Create a variable such as x, set it to value, and then use the "+" append operator to print out the value in an equation as in "x=3".

ii) Create 9 integer variables and assign each to a particular value. Then print the variables out in a matrix of 3 rows by 3 columns.

2. Create a class employee which extends from a class person. The attribute of person class are name, address, age. The attributes of the employee class are ID, Department, Grade and Basic. Also write the appropriate constructors for these classes. Write a menu based program which shows the following options.

- i) Create.
- ii) Search.
- iii) Add.
- iv) Display.
- v) Exit.

3. Expand on the Complex class to make it more useful. Include the following and any other properties you think would be useful:
 - i) Additional constructors such as a default with zero real and imaginary values, a constructor that sets its values to that of a complex object taken as an argument, etc.
 - ii) Provides a static "i" value.
 - iii) Absolute value method.
 - iv) Inverse value.
 - v) Multiplication.
4. Create your own Exception My Exception and throw it when entered String is palindrome. Override to String method to display information about My Exception.
5. Create a table bank account having columns account no., name, balance in account with some records already existing write GUI based java programs for
 - i) After entering acc_no displays balance
 - ii) Option for withdraw/deposit of amount.
6. Create a table to store information of resumes. Write GUI based java programs for
 - i) Insert new records in table.
 - ii) To view record of given person.
7. Random Rectangles: Design a window based program which displays rectangles of random color. Display should switch to start & stop for every mouse click.
8. Write a program for digital clock applet.
9. Design a socket based echoserver.
10. Implement the menu driven program for matrix addition and multiplication. Matrix must be implemented as a class object having properties rows and columns.
11. Create package A, B and C which contains classes X and Y resp. having functions show & display resp. Import these packages in another package named D with class Z having main function.
12. The client program presents a simple user interface and prompts for text input. When you click the button, the text is sent to server program. The client program expects an echo from the server and prints the echo it receives in another text field.
13. Currency conversion using RMI. Design RMI server having function for :
 - i) Conversion from rs to dollars
 - ii) Conversion from dollars to rs,Call this functions from GUI based RMI client.
14. Design GUI based forms to register user and to authenticate it. [use JDBC [login/new user]].
15. Creation of Double linked List.

Text Books:

1. "Core Java Fundamentals Vol –I", Cay S. Horstmann, Gary Cornell, The Sun Microsystems Press Java Series.
2. "Core Java Vol – II", Cay S. Horstmann, Gary Cornell, The Sun Microsystems Press Java Series.
3. "Database Programming with JDBC and JAVA", Gorge Reese, O'REILLY.

Reference Books:

1. "Java 2 Complete Reference", Herbert Schildt, TMGH, 5th Edition.
2. "How to Java", Dietel & Dietel.



THIRD YEAR B.TECH
Semester – V
(Department: Computer Science and Technology)

Research Methodology (AC312)

Teaching Scheme: L: - 2hrs/week

Audit Course

Unit I: Research:

- a) Types, Research process and steps in it, Hypothesis, Research proposals and aspects.
- b) Research Design: Need, Problem Definition, variables, research design concepts, Literature survey and review, Research design process, Errors in research.
- c) Research Modelling: Types of Models, Model building and stages, Data consideration and testing, Heuristic and Simulation modelling.
- d) Report Writing: Pre writing considerations, Thesis writing, Formats of report writing, formats of publications in Research journals.

Unit II: Design of Experiments:

- a) Objectives, strategies, Factorial experimental design, Designing engineering experiments, basic principles-replication, randomization, blocking, Guidelines for design of experiments.
- b) Single Factor Experiment: Hypothesis testing, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effects model, Estimation of variance components, Model adequacy checking.
- c) Two factor Factorial Design, Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two-factor factorial design; Models-Effects, means and regression, Hypothesis testing.

References:

1. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
2. Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics & Probability For Engineers (Wiley India)
3. Kothari, C.R., Research Methodology –Methods and techniques, New Age Publications, New Delhi, 2009.
4. Krishnaswamy, K.N., Sivakumar, Appal Ayer and Mathiranjani M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
5. Panneerselvam, R., Research Methodology, Prentice-Hall of India, New Delhi, 2004.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Compiler Construction (CS321)

Teaching Scheme: L: 3hrs/week

T: -- hrs/week

Credits: 3

Unit 1 Introduction

(4Hrs)

Compilers, Phases of a compiler, Compiler construction tools, A simple one pass compiler.

Unit 2 Lexical Analysis

(7Hrs)

Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator.

Unit 3 Syntax Analysis

(9Hrs)

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.

Unit 4 Syntax Directed Translation and Run Time Environments

(7Hrs)

Syntax directed definitions, construction of syntax tree, Source language issues, storage organization and allocation strategies, parameter passing, symbol table organizations and generations, dynamic storage allocations.

Unit 5 Intermediate Code Generation

(5Hrs)

Intermediate languages, declarations, assignment statements and Boolean expressions, case statements, back patching, procedure calls.

Unit 6 Code Generation

(7Hrs)

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.

Text Books:

1. “*Compilers - Principles, Techniques and Tools*”, A.V. Aho, R. Shethi and J.D.Ullman, Pearson Education.

Reference Books:

1. “*Compiler Construction*”, Dhamdere, Mc-Millan.

2. “*Compilers - Principles, Techniques and Tools*”, A.V. Aho, R. Shethi and J.D.Ullman, Addison Wesley Publishing Company.

3. “*Compiler Construction*”, Barret, Bates, Couch, Galgotia.

4. “*Unix Programming*”, Pepkin Pike.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Operating System-II (CS322)

Teaching Scheme: L: 3hrs/week

T: -- hrs/week

Credits: 3

Unit 1 Introduction

(5 Hrs)

General Overview of the UNIX System - History, System Structure, User Perspective, Operating System Services, Assumption about Hardware, Introduction to system concepts, Kernel Data Structure, System Administration.

Unit 2 The Buffer Cache

(5Hrs)

Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, advantages and disadvantages of cache.

Unit 3 Internal Representation of Files

(10Hrs)

Inodes, structure of the regular file, directories, conversion of a pathname to inode, super block, inode assignment to a new file, allocation of disk blocks, other file types. 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 Unmounting file systems, Link, Unlink, File System Abstractions, File System maintenance.

Unit 4 The Structure of Process

(5Hrs)

Process stages and transitions, layout of system memory, the context of a process, Saving context of a process, manipulation of the process address space.

Unit 5 Process Control

(9Hrs)

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, Process Scheduling and Time : Process Scheduling, system call for time, clock.

Unit 6 Memory Management Policies

(5Hrs)

Swapping, Demand passing, hybrid system with demand paging and swapping.

Text Books:

1. “*The Design of Unix Operating System*”, Maurice J. Bach, PHI.
2. Unix/Linux Manuals.

Reference Books:

1. “*Unix Concepts and Administration*”, Sumitabha Das, TMGH, 3rd Edition.
2. “*Unix Shell Programming*”, Yeshvant Kanetkar, BPB Publications.
3. “*Unix Utilities*”, Tare, MGM.
4. “*Advanced Programming in the UNIX Environment*”, Stevens and Rego, Pearson Education, 2nd Edition.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Object Oriented Modelling and Designing (CS323)

Teaching Scheme: L: 3hrs/week

T: - hrs/week

Credits: 3

Unit 1 Introduction Hrs (6Hrs)

Object Oriented development and themes, evidence for usefulness, modeling as a Design Technique. Objects, classes, links and associations, generalization and inheritance, grouping constructs, aggregation, abstract classes, generalization as extension and restriction, multiple inheritance, metadata, candidate keys and inheritance.

Unit 2 Dynamic and Functional Modeling (6Hrs)

Events, states, operations, concurrency, nested state diagrams, advanced dynamic modeling concepts, relation of object and dynamic models, DFD, relation of functional to object and dynamic models.

Unit 3 Design Methodology (7Hrs)

Impact of an object oriented approach, Analysis, System design with examples, combining models, Designing models, designing Algorithms, Optimization of design, control. Associations, Physical packaging, Comparing methodologies using structure analysis and design, Jackson's structured Development Information modeling notation and object oriented works.

Unit 4 Structural Modeling using UML (6Hrs)

Classes, Relationships, Common mechanisms. Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram

Unit 5 Behavioral Modeling using UML (7Hrs)

Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.

Unit 6 Architectural Modeling using UML (7Hrs)

Components, Deployment, Collaboration, Patterns and Frame works, Component Diagrams and Deployment Diagrams .

Text Books:

1. "*Object Oriented Modeling and Design*", Rumbaugh, Premerlani, Eddy, Lorensen, PHI.
3. "*The Unified Modeling Language User Guide*", Grady Booch, James Rumbaugh, Ivar Jacobson, Addison Wesley.

Reference Books:

1. "*Object Oriented Analysis and Design*", Andrew High, TMG.
2. "*Practical Object Oriented Design with UML*", Mark Priestley.
3. "*Object Oriented Analysis and Design*", Kahate, TMH.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Database Engineering (CS324)

Teaching Scheme: L: 3 hrs/week

T: - -

Credits: 3

Unit 1 Introduction and Database Modeling using ER Model (6Hrs)

General introduction to database systems and its advantages & applications, Database System Architecture, Database users and Administrator, Data models, Database management system, Database languages, View of Database, Data Models. ER Model, Entity set, Entity types, attributes, Notations, Relationship sets, Relationship types, Keys- super key, candidate key, primary key, Extended Features of ER Model- Generalization, Specialization and aggregation.

Unit 2 Data Modeling and SQL (7Hrs)

Concept of relations, Schema-instance distinction, Referential integrity and foreign keys, Relational algebra, Various types of joins, Tuple relation calculus, Domain relational calculus, Example queries, Introduction to SQL, Data definition statements with constraints, Update behaviors, Nested Queries, Aggregate functions group by and having clauses.

Unit 3 Database Design (6Hrs)

Importance of a good schema design, Motivation for normal forms, dependency theory - functional dependencies, Closure of a set of FD's, Definitions of 1NF, 2NF, 3NF and BCNF, Decompositions and desirable properties of them, Multi-valued dependencies and 4NF, Join dependencies and definition of 5NF.

Unit 4 Data Storage and Indexes (5Hrs)

File organizations, Primary, Secondary index structures, Various index structures - hash-based, Dynamic hashing techniques, Multi-level indexes, B+ tree indices, Multiple key access.

Unit 5 Transaction Processing and Concurrency Control (10Hrs)

Concepts of transaction processing, ACID properties, Transaction states, Implementation of atomicity, isolation and durability, Serializability, Testing for serializability.

Concurrency Control: Lock-based protocols, Timestamp - based Protocols, Validation - based Protocols, Multiple Granularities, Deadlock handling.

Unit 6 Recovery System (5Hrs)

Failure classification, Storage structure, Implementation of stable storage, Recovery and Atomicity, Log based recovery, Checkpoints, Shadow Paging, Buffer management in crash recovery.

Text Books:

1. “*Database System Concepts*”, Abraham Silberschatz, Henry F. Korth and S.Sudarshan, Mc Graw Hill, 2002, 4th Edition.

Reference Books:

1. “*Database Management Systems*”, Raghu Ramakrishnan and Johannes Gehrke, 2002, 3rd Edition.
2. “*Fundamentals of Database Systems*”, Ramez Elmasri and Shamkant Navathe, Benjamin Cummings, 1999, 3rd Edition.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Information Technology (CS 325)

Teaching Scheme: L: 3 hrs/week
T: -- hrs/week

Credits:3

Unit 1 Organization, Environments & Information Technology (4Hrs)

The new world of business, Examples of Information systems at work world wide, Information technology developments and trends

Unit 2 Information Technologies (4Hrs)

Concepts and managements – Information systems concepts and definitions, classification of information systems, transactional and functional processing, operational, managerial and strategic systems, information infrastructure and architecture, managing information resources.

Unit 3 Strategic Information systems (4Hrs)

Strategic advantage and information technology, Porter's competitive forces model and strategies, Porter's value chain analysis model, strategic information systems frameworks.

Unit 4 Business Process Re-engineering & Information Technology (5Hrs)

Basic concepts & need for BPR, principles of BPR & the role of IT, BPR & restructuring the organization, The networked organizations.

Unit 5 Network computing (5Hrs)

Discovery, communication & collaboration – The Internet, Groupware technology & infrastructure, some internet implementation topics.

Unit 6 Impacts of IT on Organizations, Individuals and Society (6Hrs)

Does it have only positive effects? Ethical issues, impacts on organization, impacts on individuals at work, Societal impacts and the internet community.

Supporting Management and Decision making: The Managers and decision making, decision support systems, Corporate-level decision support, Advance decision support topics.

Text Books:

1. Information Technology for Management – Turban, McLean, Wetherbe (John Wiley & Sons Inc., 2nd Edi.)
2. Information systems, theory and practice – John Burch Jr., Felix Strater Jr.(Hamilton publishing company).
3. Information system design – Brookes, Grouse, Jeffery and Lawrence (PHI)



**THIRD YEAR B.TECH
Semester – VI**

(Department: Computer Science and Technology)

Object Oriented Modelling and Design Lab (CS326)

Teaching Scheme: P: - 2hrs/week

Credits: 1

The objective of the lab is to draw different diagrams of UML for a given application. Assignment should be based on concept of UML diagram, tools for UML-Umbrello and Rational Rose suite and Case studies.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Advanced Programming Lab (CS327)

Teaching Scheme: L: - 1hrs/week

P: - 4hrs/week

Credits: 3

Unit 1 Introduction to Windows Operating System

(3 Hrs)

Developing window application in SDK, Detail study of Windows messages.

Unit 2 Introduction to GDI

(4 Hrs)

understanding DC, scrollbars, drawing lines, dots, GDI mapping modes, drawing filled areas, Working with keyboard & mouse – understanding keyboard & mouse basics, keyboard messages, mouse messages, capturing mouse

Unit 3 Introduction to MFC

(6 Hrs)

Working with Window controls – study of various buttons, study of controls ,edit box , scrollbars list box etc, Working with menus – adding icons, cursor, custom resources ,adding menus to application, enabling disabling menu items. Working with Dialog boxes – modal dialog box, modeless dialog box, common dialog box

Study of Documents, Views& Frames

creating SDI application, understanding document template, using documents& views together. Developing Dynamic Linked Libraries (DLL)

Unit 4 .NET Architecture

(3 Hrs)

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

Unit 5 C# Basics

(6 Hrs)

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 Classes and Structs, Class Members, Anonymous Types, Structs, Partial Classes, Static Classes, The Object Class, Extension Methods

Arrays, Strings Operators and Casts

Simple Arrays, Multidimensional Arrays, Jagged Arrays, Array Class, Array and Collection Interfaces, System.String, Building Strings, StringBuilder Members, Format Strings Enumerations Operators, Type Safety, Comparing Objects for Equality, Operator Overloading, User-Defined Casts

Unit 6 Inheritance, Errors and Exceptions and Threading

(6 Hrs)

Types of Inheritance, Implementation Inheritance, Modifiers, Interfaces Exception classes, Catching Exceptions ,User-Defined Exception Classes Overview, Asynchronous Delegates, The Thread Class, Thread Pools, Threading Issues, Synchronization, Timers

Text Books:

1. Charles Petzold “Programming Windows” fifth edition Microsoft press
2. David Kruglinski, shepherd, Wingo “Programming Visual C++” Microsoft press
3. Pappas Murray, “Complete Reference VC++ 6” – (TMGH).
4. Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, “Professional C# 2008” - Wrox Publication
5. Joe Duffy “Professional .Net Framework 2.0” - Wrox Publication.

Reference Books:

1. Chapman “Teach yourself Visual C++ in 21 days” Techmedia publications
2. Jon Bates & Tim Tompkins “Practical Visual C++” (PHI)
3. Herbert Schildt “MFC Programming from the ground up” (TMH)
4. Yashwant kanetkar “Visual c++ Progrmming vol – I”
5. Yashwant kanetkar “Visual c++ Progrmming vol – II”



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)
Database Lab (CS328)

Teaching Scheme: P: - 2hrs/week

Credits: 1

Lab Assignments should be performed on following.

1. **Draw ER diagrams** (Approximately 5) for different schemas & Convert them into tables (Assume any suitable schema). Apply normalization. Display constraints.
2. **Study of SQL.**
3. **Design the relational database** for any of the ER Model from assignment No.1 using SQL.
4. **Insert and Modify Database:** Write program to insert data in tables created in assignment 3 and store data in separate File / Table. Implement insert operation as transaction.
5. **View Data:** Write program to view table data. Accept table attribute for ordering dynamically.
6. **Canonical cover & Closure:** For given a set of functional dependencies find canonical cover & closure.
7. **B+ Tree Indexing Technique:** Write program to implement B+ Tree Index ($n=3$ or $n = 5$) on the data created until now.
8. **Dynamic Hashing Technique:** Write program to implement Dynamic Hashing on the data created until now.
9. **Concurrency Control:** Write program to simulate any one concurrency control Protocol.
10. **Database Logs:** Write program to create logs of the activities of assignment 3 & 4. Choose either Immediate Log OR Deferred Log.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

Mini Project-I (CS329)

Teaching Scheme: L:- hrs/week
P: - 2hrs/week

Credits: 1

The objective of Mini Project is to design, develop and implement a group project and to prepare a detailed project report for submission and evaluation. Four students (Maximum) in a group will carry out a mini project. A batch of practical / Tutorial will be divided into mini project groups. Mini project topics and the work for these groups in the batch will be guided by a teacher for the batch, preferably on one of the topics of following subjects:

1. Compiler Construction
2. Database Engineering
3. Operating System
4. Computer Graphics and Multimedia.
5. Advanced Programming

Alternatively, a group may select another topic of relevance in consultation with senior students and teachers. This work will be in addition to the laboratory work for the subjects Database Engineering , Compiler construction, Computer Graphics and Multimedia Lab. The teacher will periodically assess the performance of individual student in the mini project, jointly with a teacher of another batch.

Project group will submit hardcopy project report along with project demonstration software in CD and/or project hardware gadget at the term end.

The IOE of mini project will be jointly conducted by appointed examiners.



THIRD YEAR B.TECH
Semester – VI
(Department: Computer Science and Technology)

PRESENTATION AND COMMUNICATION TECHNIQUES (AC 323)

Teaching Scheme: L: - 2 hr/week
P: - hrs/week

Audit Course

Unit 1 Communication in a Business Organization (6 Hrs)

Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions) External Communication, Strategies for conducting successful business meetings, documentation (notice, agenda minutes) of meetings. Introduction to modern communication techniques (for e.g. e-mail, internet, video conferencing etc), Legal & ethical issues in communication (intellectual property rights, patents)

Unit 2 Advanced Technical Writing (5 Hrs)

- a. Report – Writing and presentation:** Definition and importance of reports. Qualities of Reports, language and style in reports, type of reports, formats (letter, memo, project- reports), methods of compiling data. A computer- aids
- b. Technical Paper Writing**
- c. Writing Proposals**

Unit 3 Interpersonal Skills (4Hrs)

Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution Assertiveness, Leadership, Team-building, Decision-making, Time-management

Unit 4 Interview Techniques (5 Hrs)

Preparing for job interviews, verbal and non-verbal communication during interview. Observation sessions and role-play techniques may be used to demonstrate interview strategies.

Unit 5 Group Discussion (4 Hrs)

Dynamics of Group Behavior, Techniques for effective participation.

ASSIGNMENTS

Written

- Communication topics (minimum 2 Assignments)
- Report writing (minimum 3 assignments)
- Interpersonal Skills (minimum 3 assignments)
- 1 class test

Oral:

Practical sessions on Group-discussion / Interview Skills / Project Presentation / Power point Presentation.

Break up of Term Work Marks (External Exam)

- a) Assignments Written: 20 marks
- b) Test: 10 marks
- c) Performance in Oral: 20 Marks
- Total 50 marks

BOOKS RECOMMENDED

A. For classroom teaching

- (i) Fred Luthans, ‘ Organizational Behaviour’ McGraw Hill International Edition
- (ii) Lesiker and Petit ‘Report writing For Business’ McGraw Hill International Edition
- (iii) Huckin and Olsen ‘Technical Writing and Professional Communication’ – McGraw Hill International Edition
- (iv) Wallace and Masters ‘Personal Development for life and Work’ (workbook) Thomson
- (v) Herta Murphy ‘Effective Business Communication’ Herta Murphy Herbrutwildebraudt- McGraw Hill

B. For Additional Reading:

- (i) Lewicki, Saunders, Minton ‘Essential of Negotiation’ McGraw Hill International Edition
- (ii) Hartman Lemay ‘Presentation Success’ Thomson learning.
- (iii) Kitty O Locker & Kaczmark – Business Communication Building Critical Skills McGraw Hill
- (iv) Vikas Gupta: Comdex Computer Course Kit, IDG Books Pvt, Ltd.
- (v) Heller & Handle: The Essential Manager’s Manual – Dorleen Kindercey
- (vi) The Sunday Times ‘Creating Success Series’
 1. Develop your Assertiveness
 2. Make every Minute Count
 3. Successful Presentation Skills
 4. How to motivate people
 5. Team building.

Equivalence of T.Y B. Tech (Computer Science and Technology) Semester V & VI

The above detailed syllabus is a revised version of the T. Y. B. Tech (Computer Science and Technology) course being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2013-14.

The Equivalence for the subjects of Computer Science and Technology at T.Y.B. Tech Semester V and VI pre-revised course under the faculty of Engineering and Technology is as follows.

T.Y.B Tech Semester V (Computer Science and Technology)

Sr. No	T. Y. B. Tech (Computer Science and Technology) Semester V Pre-revised syllabus	T. Y. B. Tech (Computer Science and Technology) Semester V & VI Revised syllabus	Remark
1	System Programming	System Programming	No change in the subject content
2	Computer Algorithm	Computer Algorithms	No change in the subject content
3	Operating System -I	Operating System-I	No change in the subject content
4	Software Engineering	Software Engineering	No change in the subject content
5	Computer Graphics and Multimedia Techniques	-	Shifted to semester IV
	-	Wireless Networks	Newly Added to Semester V
6		Laboratory- I System Programming	
7		Laboratory-II Computer Algorithms	
8	Seminar	Laboratory-III Seminar-I	
9	Programming Lab-III	Laboratory-IV Java Programming Lab	No change in the subject content
10		Audit Course II Research Methodology	

T.Y.B Tech Semester VI (Computer Science and Technology)

Sr. No	T. Y. B. Tech (Computer Science and Technology) Semester VI Pre-revised syllabus	T. Y. B. Tech (Computer Science and Technology) Semester V & VI Revised syllabus	Remark
1	Compiler Construction	Compiler Construction	No change in the subject content
2	Operating System- II	Operating System-II	No change in the subject content
3	Object Oriented Modelling and Design	Object Oriented Modelling and Designing	No change in the subject content
4	Advance Database Management System	-----	Shifted to semester VII
5	-----	Database Engineering	Shifted from Semester IV
6	Information Security	-----	Shifted to semester VIII
7	-----	Information Technology	Shifted from Semester VII
8		Laboratory- I - Object Oriented Modelling and Design	
9	Programming Lab-IV	Laboratory-II Advanced Programming	No change in the subject content
10	---	Laboratory-III Database Lab	
11	Mini Project	Laboratory-IV Mini Project-I	
12	Presentation and communication Techniques	Audit Course III Presentation and Communication Techniques	