BIT 283

## MINI PROJECT - II

Instruction 3 Periods per week
Sessional 25 Marks

Software Engineering Project development for any business application.

Or

Development of any Controller Circuits using CPLDs or FPGAs.

Or

Micro Processor Based Project.

* * *





## SCHEME OF INSTRUCTION AND EXAMINATION

### B.E. IIIrd YEAR

### INFORMATION TECHNOLOGY

SEMESTER - I

| Sl. No. | Syllabus Ref. No. | Subject | Scheme of Instruction | | Scheme of Examination | | |
|---|---|---|---|---|---|---|---|
| | | | Periods per Week | | Duration in Hrs | Maximum Marks | |
| | | | L | D/P | | Univ. Exam | Sessionals |
| | | THEORY | | | | | |
| 1. | CM 321 | Managerial Economics & Accountancy | 4 | - | 3 | 75 | 25 |
| 2. | BIT 302 | Data Communications | 4 | - | 3 | 75 | 25 |
| 3. | BIT 303 | Digital Signal Processing | 4 | - | 3 | 75 | 25 |
| 4. | BIT 304 | Database Systems | 4 | - | 3 | 75 | 25 |
| 5. | BIT 305 | Operating Systems | 4 | - | 3 | 75 | 25 |
| 6. | BIT 306 | Theory of Automata | 4 | - | 3 | 75 | 25 |
| | | PRACTICALS | | | | | |
| 1. | BIT 331 | Operating Systems Lab | - | 3 | 3 | 50 | 25 |
| 2. | BIT 332 | Database Lab | - | 3 | 3 | 50 | 25 |
| 3. | BIT 333 | Mini Project - III | - | 3 | - | - | 25 |
| | | TOTAL | 24 | 9 | - | 550 | 225 |

## CM 321

## MANAGERIAL ECONOMICS & ACCOUNTANCY

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

### UNIT-I

Introduction to Economics and its evolution - Managerial Economics its scop. Importance and relation to other sciences, its usefulness to engineers, basic concept of managerial economics.

### UNIT-II

Demands analysis - Concept of demand, determinants, law of demand, its assumptions, elasticity of demand, price, income and cross elasticity, demand forecasting - markets competitive structures, price-output determination under perfect competition and monopoly (theory questions and small numerical problems can be asked).

### UNIT-III

Theory of Production - Film and industry, production function, input-outpu relations, laws of returns, internal and external economics of scale.

Cost analysis : Cost concepts, fixed and variable costs, explicit and implici costs, out of pocket costs and imputed costs, opportunity cost - cos output relationship, break-even analysis (theory and problems).

### UNIT-IV

Capital management its significance, determinants and estimation of fixed and working capital requirements, sources of capital, introduction to capital budgeting, methods with problems.

### UNIT-V

Book keeping, principles and significance of double entry book keeping. Journal, subsidiary books, ledger accounts, trial balance concept and preparation of final accounts with simple adjustements, analysis and interpretation of financial statement through ratios. (theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios.



**Suggested Reading:**


1. Varshney RL and KL Maheswari, *"Managerial Economics"*, Sultan Chand.
2. JC Pappas and EF Brigham, *"Managerial Economics"*
3. Grawal T.S., *"Introduction to Accountancy"*
4. Meheswari S.N, *"Introduction to Accountancy"*
5. Panday I.M, *"Financial Management"*.
6. M. Kasi Reddy & S. Saraswati, *"Managerial Economics and Financial Accounting"*, PHI.

**BIT 302**

## DATA COMMUNICATIONS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

Data Communications and Networking Overview : Protocol architectures : OSI, TCP/IP and ATM.

Data Transmission Guided and wireless transmission.

Data Encoding : Digital data signals, digital data analog signals, analog data digital signals, analog data analog signal.

**UNIT-II**

Multiplexing : Circuit switching and packet switching, Spread Spectrum, Asynchronous.

Transfer Mode : Protocol Architecture, ATM logical Connection, TM Cells, Transmission of ATM Cells, Service categories, ATM Adaptation Layer, Digital Data Communication Techniques. Asynchronous and Synchronous Transmission, DSL and ADSL.

**UNIT-III**

Data Link Control : Error detection Techniques, Interfacing, Line configurations Flow control, Error control, Data link control protocols, protocol verification.

**UNIT-IV**

Wireless LANS : 802.11 Broadband wirelss : 802.16, Bluetooth Bridge, Spanning Tree Bridge, Remote Bridge, Repeaters, Hubs, Switches, Routers and Gateways, Virtual LANs.

**UNIT-V**

Local Area Network, LAN Technologies, MAC sub layer, CSMA/CD, Token Ring, Fibre Channel, IEEE Standards.

High Speed LAN : Switched, Fast, Gigabit Ethernets.



**Suggested Reading :**

1. William Stallings : *Data and Computer Communications*, 8th Edition, Pearson Education.
2. Andrew S. Tannenbaum : *Computer Networks*, 4th Edition, Pearson Education.

**Reference Reading :**

1. Behrouz A. Forouzan, *Data Communications and Networking*, 4th Edition, TMH.
2. Fred Halsall, *Data Communications, Computer Networks and Open Systems*, 4th Edition, Pearson Education.

WITH EFFECT FROM THE ACADEMIC YEAR 2008-2009

BIT 303

## DIGITAL SIGNAL PROCESSING

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT - I**

Basic Elements and advantages of DSP. Classification of signals. Discrete time signals and systems, analysis and discrete times LTI systems. Impulse response of a LTI system. The Fourier series for Discrete time periodic signals, Fourier transform of discrete time a periodic signals, energy density spectrum. LTI systems as frequency selective filters, LPF, HPF, BPF ideal charactristics. Review of Z transforms.

**UNIT-II**

Frequency domain sampling; properties of DFT, filtering of long data sequences, efficient computation of the DFT, FFT algorithm. Discrete computation of DFT, Radix-2 FFT algorithm.

**UNIT-III**

Design of FIR filters, characteristics of practical frequency selective filters, symmetric and anti symmetric FIR filters. Design of linear face FIR filters using windows. Design of optimum equiripple linear face FIR filters. Structure for the realization of discrete time systems : structure for FIR systems, direct form, cascade form structures.

**UNIT - IV**

Design of IIR filters from analog filters, IIR filter design by impulse invariance, Bilinear transformation. Butterworth filters, Chebyshev filters. Frequency transformation in analog and digital domains.
Structures for IIR systems, direct form, cascade form, parallel form. Representation of numbers, Round off effect in digital filters.



**UNIT-V**

Application of Digital Signal Processing to Speech : Introduction - Model of speech production - Short time spectrum analysis - Speech analysis and synthesis - Channel voice coder - Voice coder analysis and synthesizers - Pitch detection and voiced / unvoiced decision and detections.

**Suggested Reading :**


1. John G. Proakis, Dimitris G. Manolakis, *"Digital Signal Processing"*, 3rd edition, PHI, 2005.
2. Lawerence R Rabiner, Bernard Gold, *"Theory and Application of Digital Signal Processing"*, 2001.


**Reference :**


1. Sanjit K. Mitra, *"Digital Signal Processing"*, Tata McGraw Hill, 1998.
2. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, *"Digital Signal Processing"*, TMH, 2006.
3. Oppenheim, A.V., and Schaffer, RW., *"Discrete Time Signal Processing"*, PHI, 2003.
4. Robert J. Schilling and Sandra L. Harris, *Fundamentals of Digital Signal Processing using MATLAB*, Thomas, 2007.

BIT 304

## DATABASE SYSTEMS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

### UNIT-I

**Introduction :** Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-based and Semistructured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators.

**Database Design and E-R Model :** Overview of the Design Process, The E-R Model, Constraints, E-R Diagram, E-R Design Issues, Weak Entity Sets, Extended E-R features, Database Design for Banking Enterprise, Reduction to Relational Schemas, Other aspects of Database Design, The UML.

### UNIT-II

**Relational Model :** Structure of Relational Databases, Fundamental Relational Algebra Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Null Values, Modification of the Database.

**Structured Query Languages :** Data Definition, Basic Structure of SQL Queries, Set Operation, Aggregate Functions, Null Values, Nested Subqueries, Complex Queries, Views, Modification of the Database, Joined Relations.

### UNIT-III

**Advanced SQL :** SQL Data Types and Schemas, Integrity Constraints, Authorization, Embedded SQL, Dynamic SQL, Functions and Procedural Constructs, Recrusive Queries, Advanced SQL Features.

**Relational Database Design :** Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional Dependency Theory, BCNF Decomposition, 3NF Decomposition.



### UNIT-IV

**Indexing and Hashing :** Basic Concepts, Ordered Indicies, B+Tree Index Files, B-Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indicies, Index Definition in SQL.

**Transactions :** Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isoloation, Testing for Serialiazability.

### UNIT-V

**Concurrency Control :** Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Multiversion Schemes, Deadlock Handling, Insert and Delete Operations, Weak Levels of Consistency, Concurrency in Index Structures.

**Recovery System :** Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failiure with Loss of Non volatile Storage, Advanced Recovery Techniques. Remote Backup Systems.

**Suggested Reading :**

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, *"Database System Concepts"*, Fifth edition, McGraw Hill International edition, 2006.

**References :**

1. Date C.J, Kannan A, Swamynatham S, *"An Introduction to Database Systems"*, Eigth Edition, Pearson Education, 2006.
2. Raghu Ramakrishan, Johannes Gehrke, *"Database Management Systems"*, Third Edition, McGraw Hill, 2003.
3. Ramez Elmasri, Durvasul VLN Somayazulu, Shamkant B Navathe, Shyam K Gupta, *"Fundamentals of Database Systems"*, Fourth Edition, Pearson Education, 2006.
4. Peter Rob, Carlos Coronel, *"Database Systems"*, Thomson, 2007.

**BIT 305**

## OPERATING SYSTEMS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

Introduction - Computer System Organization & Architecture, Operating System Structure & Operations, Process, Memory and Storage Managements, Protection and Security, Distributed and Special-Purpose Systems, Computing Environments.

Systems Structures - Operating-System Services, User Operating-System Interface, System Calls, Type of System Calls, System Programs, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.

Process Concept - Overview, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems, Communication in Client Server Systems.

Multithreaded Programming - Overview, Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

**UNIT-II**

Process Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Thread Scheduling, Operating System Examples, Algorithm Evaluation.

Process Coordination Synchronization - Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock.

**UNIT-III**

Memory-Management Strategies - Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example : The Intel Pentium.



Virtual Memory Management - Background, Demand Paging, Copy-on-write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Other Considerations, Operating-System Examples.

Storgage Management - File System, File Concept, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection.

**UNIT-IV**

Implementing File Systems - File System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, Log-structured File Systems, NFS, Example : The WAFL File System.

Secondary-Storage Structure - Overview of Mass-storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Stable-Storage Imlementation, Tertiary-Storage Structure.

I/O Systems - Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Request to Hardware Operations, STREAMS, Performance.

**UNIT-V**

Protection and Security - Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

System Security - The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer Security Classification, AN Example : Windows XP.

**Suggested Reading :**

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, *"Operating System Principles"* Seventh Edition, 2006.

**References :**

1. A. Tanenbaum - *"Modern Operating Systems"*, New edition, Pearson Education.
2. William Stallings - *"Operating Systems"* Fifth edition, Pearson Education, 2005.
3. Ida M. Flynn, *"Understanding Operating Systems"*, 4th edition.

BIT 306

## THEORY OF AUTOMATA

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

### UNIT-I

**Automata :** Introduction to Finite Automata, Central Concepts of Automata Theory, Finite Automata : An informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, An Application, Finite Automata with Epsilon Transitions.

**Regular Expression and Languages :** Regular Expressions, Finite Automata and Regular Expression, Applications of Regular Expressions, Algebric Laws for Regular Expression.

### UNIT-II

**Properties of Regular Languages :** Proving Languages not to be Regular, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalance and Minimization of Automata.

**Context Free Grammars and Languages :** Context-Free Grammar s, Parse Trees, Applications, Ambiguity in Grammars and Languages.

### UNIT-III

**Pushdown Automata :** Definition, Language of PDA, Equivalence of PDA's and; CFG's. Deterministic Pushdown Automata. Properties of Context Free Languages : Nornal Forms for Context-Free Grammars, Pumping Lemma, closure properties, Decision Properties of CFL's.

### UNIT-IV

**Introduction to Turning Machines :** Problems that Computer Cannot Solve, The Turning, Machine, Programming Techniques for Turning Machines, Extensions to the Turning 4 Machines, Restricted Turning Machines, Turning Machine and Computers.



### UNIT-V

Undecidability : A language that is not Recursively Enumerable. An undecidable Problem that is RE, Undecidable problems about Turning Machines, Post's Correspondence Problem, Other Undecidable Problems.

Intractable Problems : The Classes P and NP, An NP Complete Problem, A Restricted satisfiability Problem.

### Suggested Reading :

1. John E. Hopcroft, Rajeev Motwani, Jeffery D Ulman, *Introduction to Automata Theory Languages and Computation*, Second edition, Pearson Education, 2007.

### References :

1. John C. Martin, *Introduction to Languages and the Theory of Computation*, 3rd edition, Tata McGraw Hill, 2003.
2. Cohen Daniel I.E. *"Introduction to Computer Theory"* 2nd edition, Wiley India, 2007.
3. Bemard Moret, *The Theory of Computation*, Pearson Education, 2002.

**BIT 331**

## OPERATING SYSTEMS LAB

| | |
|---|---|
| Instruction | 3 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 50 Marks |
| Sessional | 25 Marks |

1. Familarity and usage of sytem calls of LINUX / WINDOWS NT on
   - Process management - fork ( ), exec ( ) etc.,
   - IPC & Synchoronization - pipes, shared memory, messages, semasphores etc.,
   - File management - read, write etc.
2. Creating Threads and Manipulating under Windows - NT platform.
3. Implementing a program to get the attributes of a File/Directory on Linux using related system calls.
4. Implementing a program to get and set the environment variables using system calls.
5. Implementation of Echo Server using pipes.
6. Implementation of Echo Server using shared memory.
7. Implementation of Echo Server using Messages.
8. Implementing Producer Consumer Problem using Semaphores.
9. Implementing Producer Consumer Problem using Message passing
10. Implementing Reader-writers problem using Semaphores.
11. Implementing Dining Philosophers problem using Semaphores.
12. Implementing Dining Philosophers problem using Windows - NT threads.
13. Implemention of Limited Shell on Linux platform.

**References :**

1. Richard Stevens, *"Unix Network"*.





**BIT 332**

## DATABASE LAB

| | |
|---|---|
| Instruction | 3 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 50 Marks |
| Sessional | 25 Marks |

1. Creation of database (Exercising the commands for creation)
2. Simple condition query creation using SQL Plus.
3. Complex condition query creation using SQL Plus.
4. Usage of Triggers and Stored Proceures.
5. Creation of Forms for Student Information, Library Information, Pay roll, etc.,
6. Writing PL/SQL procedures for data validation.
7. Generation using SQL reports.
8. Creating Password and Security features for applications.
9. Usage of File locking, table locking, facilities in applications.
10. Creation of small full pledged database application spreading over 3 sessions.

**Note :** The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

***References :***

1. Nilesh Shah, *"Database Systems Using Oracle"*, PHI, 2007.
2. Rick F Van der Lans, *"Introduction to SQL"*, Fourth edition, Pearson Education, 2007.
3. Benjamin Rosenzweig, Elena Silvestrova, *"Oracle PL/SQL by Example"*, Third edition, Pearson Education, 2004.
4. Albert Lulushi, *"Oracle Forms Developer's Handbook"*, Pearson Education, 2006.

BIT 333

## MINI PROJECT - III

Instruction 3 Periods per week

Sessional 25 Marks

The Students are required to carry out Mini Project in any of the areas such as Database Management Systems, Operating Systems.

Students are required to submit a report on the Mini Project at the end of the Semester.

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## SCHEME OF INSTRUCTION AND EXAMINATION

### B.E. IIIrd YEAR

## INFORMATION TECHNOLOGY

### SEMESTER - II

| Sl. No. | Syllabus Ref. No. | Subject | Scheme of Instruction | | Scheme of Examination | | |
|---|---|---|---|---|---|---|---|
| | | | Periods per Week | | Duration in Hrs | Maximum Marks | |
| | | | L | D/P | | Univ. Exam | Sessionals |
| | | **THEORY** | | | | | |
| 1. | BIT 351 | Computer Networks | 4 | - | 3 | 75 | 25 |
| 2. | BIT 352 | Real Time Systems | 4 | - | 3 | 75 | 25 |
| 3. | BIT 353 | Object Oriented System Development | 4 | - | 3 | 75 | 25 |
| 4. | BIT 354 | Artificial Intelligence | 4 | - | 3 | 75 | 25 |
| 5. | BIT 355 | Design & Analysis of Algorithms | 4 | - | 3 | 75 | 25 |
| 6. | | **ELECTIVE-I** | 4 | - | 3 | 75 | 25 |
| | BIT 356 | Compiler Construction | | | | | |
| | BIT 357 | Computer Graphics | | | | | |
| | BIT 358 | Advanced Computer Architecture | | | | | |
| | | **PRACTICALS** | | | | | |
| 1. | BIT 381 | OOSD Lab | - | 3 | 3 | 50 | 25 |
| 2. | BIT 382 | Network Programming Lab | - | 3 | 3 | 50 | 25 |
| 3. | BIT 383 | Mini Project - IV | - | 3 | - | - | 25 |
| | | TOTAL | 24 | 9 | - | 550 | 225 |

WITH EFFECT FROM THE ACADEMIC YEAR 2008-2009

**BIT 351**

## COMPUTER NETWORKS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

**Introduction :** Uses of Computer Networks, Network Hardware, Network Software : Reference Models (ISO-OSI, TCP/IP).

**Network Layer :** Network Layer Design Issues, Routing Alogrithms, Congestion Control Algorithms, Quality of Service.

**UNIT-II**

**Internetworking :** Concatenated virtual circuits, connectionless internetworking, tunneling, internet work routing, and fragmentation.

**Network layer in the Internet :** IP protocol, IP addressees Internet control protocols, OSPF, BGP, internet multicasting, mobile IP, IPv6.

**Transport Layer :** The Transport Service, Element of Transport Protocols, The Internet Transport Protocols : UDP, Internet Transport Protocols : TCP.

**UNIT-III**

Network Programming

Socket Interface : Sockets, Socket Address, Elementary Sockets, Advanced Sockets, Socket Options, Non Blocking I/O, Out of Band Data, Daemon Process and Intenet Super Server, IPv4 and IPv6 Interoperability.

Application Layer :

Domain Name System : DNS Name Space, Resource Records, Name Servers.

**UNIT-IV**

**Electronic Mail :** Architecture and Services, User Agent, Message Formats, Message transfer and Final Delivery.



**World Wide Web :** Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Wireless Web.

**Multimedia :** Digital Audio, Streaming Audio, Voice over IP, Video on Demand.

**UNIT-V**

**Network Security :** Cryptography, symmetric key algorithms, Publics key Algorithms, Digital Signatures, Management of Public Keys, Communication Security, Authentication protocols, E-mai security, web security.

***Suggested Reading :***


1. Andrew S. Tanenbaum, *"Computer Networks"*, 4th edition, Pearson Education, 2004.
2. W. Richard Stevens, *"Unix Network Programming"*, Pearson Education, 2008.


***References :***


1. Behrouz A Forouzan *"Data Communications and Networking"*, 4th edition, Tata McGraw Hill, 2007.
2. Natalia Olifer, Victor Olifer, *"Computer Networks, Principles, Technologies and Protocols for Network Design"*, Wiley India, 2006.
3. Larry L. Peterson & Bruce S. Davie : *"Computer Networks"* 4th edition, Elsevier, Morgan Kaufmann Publishers, 2007.

BIT 352

## REAL TIME SYSTEMS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

Definitions of real time systems, Typical real time applications, Hard versus soft real time systems, a reference model of Real-Time systems, commonly used approaches for real time scheduling.

**UNIT-II**

Real time system life cycle, structured design approaches including event based, process-based and graph based theoretical model, Real-Time programming, Ada a real time programming language.

**UNIT-III**

Real time operating systems, overview, time services and scheduling mechanisms, other basic operating system functions, capabilities of commercial real time operating systems.

**UNIT-IV**

Real time data bases Vs general purpose databases, main memory databases, transactions and concurrency control issues, disk scheduling algorithms, predictability, serialization, consistency, databases for hard real time sytems.

**UNIT-V**

Fault tolerance techniques, definitions, fault types, fault detection, fault and error containment, redundany, integrated failure handling.

**Suggested Reading :**

1. Jane W.S.Liu, *"Real Time Systems"*, Pearson Education, Asia, 2001.
2. Shem Tov Levi & Ashok & Agrawal, *"Real Time System Design"*, McGraw Hill Publishing Company - 1990.
3. C.M. Krishna and Kang G. Shin, *"Real Time Systems"*, McGraw Hill Companies Inc., 1997.





BIT 353

## OBJECT ORIENTED SYSTEM DEVELOPMENT

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

UML Introduction : Why we Model, Introduction to UML, Elements of UML.

Basic Structural Modeling : Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.

Advanced Structural Modeling : Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams, Component.

**UNIT-II**

Basic Behavioral Modeling : Interactions, Use Cases, Use Case Diagrams, Interaction diagrams, Activity diagrams.

Advanced Behavioral Modeling : Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

**UNIT-III**

Architectural Modeling : Artifacts, Deployment Collaborations, Patterns and Frame-works, Artifact diagrams, Deployment diagrams, Systems and models.

**UNIT-IV**

Unified Software Development Process : The Unified Process, The Four Ps, A Use-Case-Driven Process, An Architecture-Centric Process, An Iterative and Incremental Process.

**UNIT-V**

Core Workflows : Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

***Suggested Reading:***

1. Grady Booch, James Rumbaugh, Ivor Jacobson, *"The Unified Modeling Language-User Guide"* (Covering UML 2.0), 2nd edition, Pearson Education, India, 2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, *"The Unified Software Development Process"*, Pearson Education, India, 2008.

## BIT 354
## ARTIFICIAL INTELLIGENCE

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

Introduction : Definition, history and applications of AI.

Search in State Spaces : Agents that plan, Uniformed search, Algorithm A*, Heuristic Functions and Search Efficiency, Alternative Search Formulations and Applications, Adversarial Search.

**UNIT-II**

Knowledge Representation and Reasoning : The Propositional Calculus, Resolution in Propositional Calculus, The Predicate Calculus, Resolution in Predicate Calculus, Rule Based Expert Systems, Representing Common Sense Knowledge.

**UNIT-III**

Reasoning with Uncertain Information (Nilsson)

Planning (Nilsson) : The Situation Calculus, Planning.

**UNIT-IV**

Learning from Observations : Learning decision-trees using Information theory, Learning General Logical Descriptions.

Neural Networks : Perceptron, multilayer feedforward network, Rule Learning.

**UNIT-V**

Natural Language Processing : Communication among agents.

Speech Recognition : Signal Processing, Speech Recognition Mode (Language Model + Acoustic Model), The Viterbi Algorithm.

**Suggested Reading :**


1. Nils J Nilsson (1998), *Artificial Intelligence, A New Synthesis,* Elsevier.
2. Stuart Russell, Peter Norvig (1995), *Artificial Intelligence, A Modern Approach,* Pearson Edition/PHI.
3. Elaine Rich and Kevin Knight (1991), *Artificial Intelligence,* McGraw Hill.






## BIT 355
## DESIGN AND ANALYSIS OF ALGORITHMS

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

**Introduction :** Space and Time Complexity, Amortized Complexity, Asymptotic Notation, Randomized Algorithms.

**Elementary Data Structures :** Heaps and Heap sort. Sets representation, UNION, FIND Operations, Graphs.

**UNIT-II**

**Divide and Conquer :** The general method, binary search, finding maximum minimum. Merge sort, quick sort, selection.

**Greedy Method :** Knapsack problem, Optimal Storage on Tapes, Job sequencing with Deadlines, Optimal Merge Pattern, Minimum Cost Spanning Trees and Single Source shortest Paths.

**UNIT-III**

**Dynamic Programming and Traversal Techniques :** Multistage Graphs, All pairs shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack, Realiability Design Traveling Salesman Problem, BFS and Traversal, DFS and Traversal, Biconnected Compoents and Depth First Search.

**UNIT-IV**

**Backtracking and Branch and Bound :** 8-Queens Problem, Graph Coloring Hamiltonian cycles, Knapsack Problem. Introduction to LC Search, FIFO Branch and Bound, LC Branch and Bound, 0/1 Knapsack Problem, Traveling Salesperson problem, Lower-Bound Theory.

**UNIT-V**

**NP-Hard and NP-Completness :** Basic concepts, Non Deterministic Algorithms, Cook's theorem, NP hard graph problems and scheduling

problem. N P-hard code generation problems. Decision Problem. Node covering problem.

*Suggested Reading :*


1. Horowitz E., Sahni S. Rajasekaran S : *"Fundamentals of Computer Algorithms"*, 2nd edition, Universities Press, 2007.


*References :*


1. Anany Levitin, *"Introduction to the Design & Analysis of Algorithms"*, 2003.
2. Aho, Hopcroft, Ullman, *The Design and Analysis of Computer Algorithms*, Pearson Education, 2000.
3. Parag H. Dave, Himanshu B. Dave *"Design and Analysis of Algorithms"*, Pearson Education, 2008.
4. Udit Agarwal, *"Algorithms Design and Analysis"*, Dhanpati Rai & Co., 2007.






BIT 356

## COMPILER CONSTRUCTION

(Elective - I)

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

### UNIT-I

**Introduction :** Why compilers ? The translation process, Data structures and issues in compiler structure, Bootstrapping and Porting.

**Scanning :** The scanning process, regular expressions, Finite Automata, from regular expressions to DFA's, Implementation of a TINY scanner, use of LEX to generate scanner.

### UNIT-II

**Context free grammars & Parsing :** The parsing process, context free grammars, parse tree & abstract syntax trees, EBNF and syntax diagrams, properties of CFLs, syntax of the TINY language.

**Top down parsing :** Recursive descent parsing, LL(1) parsing, first and follow sets, a recursive descent parser for the TINY language, error recovery in top down parsers.

### UNIT-III

**Bottam-up Parsing :** Overview, LR(0) items and LR (0) parsing, SLR(1) Parsing, general LR(1) and LALR(1) parsing YACC, generation of a TINY Parser using YACC, error recovery in Bottam-up parsers.

**Semantic Analysis :** Attributes and attribute grammars, algorithms for attribute computation, the symbol table, data types and type checking, a semantic analyzer for the TINY language.

### UNIT-IV

**Runtime environments :** Memory organization during program execution, fully static runtime environments, stack-based runtime environments, dynamic memory, parameter parsing mechanisms, runtime environment for the TINY language.

UNIT-V

**Code generation :** Intermediate code and data structures for code generation. Basic code generation techniques, code generation of data structure references, code generation of control statements and logical expressions, code generation of procedure and function calls, code generation in commercial compilers, a code generation for the TINY language, code optimization techniques.

***Suggested Reading :***


1. Kenneth C.Louden : *Compiler Construction : Principles and Practices,* Thomson Learning Inc., 1997.


***References :***


1. Ravi Sethi, Aho & Ullman JP : *Compilers : Principles, Techniques and Tools,* Addison Wesley Publishing Co., 1986.
2. J.P. Tremblay, and P.S. Sorenson, *The theory and Practice of Compiler writing,* TMH, 1995.






**BIT 357**

## COMPUTER GRAPHICS

**(Elective -I)**

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

UNIT-I

Overview of Graphics systems - Video display devices, raster-scan systems, Random-scan system, graphics monitors and workstations, Input Devices, hard copy devices, Graphics Software.

Output Primitives, Line drawing, algorithms, Circle geneating algorithms, ellipse generating algorithms, pixel addressing, Filled-area primitives, Fill area functions, cell array, character generation.

UNIT-II

Attributes of output primitives : Line attributes, curve attributes, color and Gray scale level, Area fill attributes, character attributes, Bundled attributes, Enquiry function.

Two dimensional Geometric transformations : Basic transformations, Homogeneous coordinates, composite transformations, other transformations, transformations between coordinate systems, affine transformations, transformation functioins, Raster methods for transformations.

UNIT-III

Two dimensional viewing : Viewing pipeline, viewing transformation, viewing functions, line clipping - Cohen Sutherland line clipping Liang Barsky line clipping. Sutherland-Hodgman polygon clipping, Weiler Atherton polygon clipping.

UNIT-IV

Structures and Hierarchical Modeling : Structure concepts, editing structures, Basic modeling concepts, hierarchical modeling with structures.

Graphical user interfaces and Interactive input methods : The user Dialogue, logical classification of input devices, input functions and Models, Interactive picture construction techniques.

**UNIT-V**

Three dimensional object representations : Polygon surface, curved lines and surfaces, spline representations, Bezeir curves and surfaces, B-Spline curves and surfaces, CSG methods : Octress, BSP Trees.

Three Dimensional Transformation : Three dimensional viewing : Viewing coordinates, projectios, visible surface detection methods : Back-face Detections, Depth-buffer methods, depth sorting methods, Gourand shading Phong shading.

**Suggested Reading :**


1. Heam Donald, Pauline Baker M., *"Computer Graphics"*, 2nd edition, PHI, 1995.
2. Harrington S., *"Computer Graphics A Programming Approach"*, 2nd edition, McGraw Hill.
3. David F. Rogers., *"Procedural Elements for Computer Graphics"*, 2nd edition, Tata McGraw Hill, 2001.






**BIT 358**

## ADVANCED COMPUTER ARCHITECTURE

**(Elective - I)**

| | |
|---|---|
| Instruction | 4 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 75 Marks |
| Sessional | 25 Marks |

**UNIT-I**

Parallel Computer Models : Multiprocessors and Multicomputers, Multivector and SIMD Computers, IRAM and VLSI models, Architectural Development tracks, Program and Network Properties : Conditions of Parallelism, program partioning and scheduling system interconnect architecture.

**UNIT-II**

Processor and memory hierarchy : Advanced processor Technology, Super Scalar and Vector Processor.

Pipelining and Superscalar Techniques : Linear Pipeline processors, Non-linear Pipeline Processors, Instruction Pipeline design, Pipelines hazards.

**UNIT-III**

Multiprocessor and Multicomputers : Multiprocessor System interconnects, Cache Coherence and Synchoronization Mechanisms, Vector processing principles. Scalable and Multithreaded Architectures : Latency Hiding Techniques, Principles of Multithreading.

**UNIT-IV**

Parallel Modes, Languages and Compilers : Parallel programming models, parallel languages and compilers, Code optimization and Scheduling, Loop parallelization and pipelining.

**UNIT-V**

Parallel program Development and Environments : Parallel programming environments, Synchronization and multiprocessing models, Message passing program Development, Mapping programs on to multicomputer.

**Suggested Reading :**


1. Kai Hwang, *Advanced Computer Architecture*, McGraw Hill, 1999.
2. John L.. Hennessy & David A Patterson, *Computer Architecture A Quantitative Approach*, Morgan Kaufmann Publishers, Inc, 1996.

## BIT 381

## OOSD LAB

| | |
|---|---|
| Instruction | 3 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 50 Marks |
| Sessional | 25 Marks |

Students should form into groups, each group consisting of not more than three students. The teacher concerned should assign a different Case Study to each group. The students should carryout the Case Study as a group activity. The Lab should be carried out using a CASE TOOL. Finally they should submit a report.

Students have to perform the following OOSD steps on the given Case Study.

* Use case Modeling
* Structural Modeling
* Behavioural Modeling
* Architectural Modeling

***The Report should consist of***

* Use case diagrams
* Class diagrams
* Sequence diagrams
* Collaboration diagrams
* State Chart diagrams
* Activity diagrams
* Deployment diagrams
* Component diagrams





## BIT 382

## NETWORKS PROGRAMMING LAB

| | |
|---|---|
| Instruction | 3 Periods per week |
| Duration of University Examination | 3 Hours |
| University Examination | 50 Marks |
| Sessional | 25 Marks |

1. Understating and using of commands like ifconfig, netstat, ping, arp, telenet, ftp, finger, traceroute, whois etc.
2. Implementation of concurrent and iterative echo server using both connection and connectionless sockets system calls.
3. Implementation of time and day time services using connection oriented sockets systems calls.
4. Implementation of ping service
5. Build a web server using sockets
6. Implementation of remote command execution using socket system calls.
7. Demonstrate the use of advanced socket sytem calls.
8. Demonstrate the non blocking I/O.
9. Implementation of concurrent chart server that allows current logged in users to communicate one with other.
10. Implementation of file access using RPC.
11. Build a concurrent multithreaded file transfer server using threads.
12. Implementation of DNS.

**Suggested Reading :**

1. *Douglas E. Comer, "Hands-On Networking with Internet Technologies"*, Pearson Education.
2. Richar Stevens, *"Unix Networking Programming"*, PHI.