

## **201: Computer Architecture**

**(4 Credits, 3L+2T, Level 3)**

**Objective:** Main objective of this paper is to learn structure and functioning of various hardware components of digital computer. Also study the interactions and communication among these hardware components.

### **Learning Outcomes:**

At the end of this course, student should be able to understand

- Simple machine architecture and the reduced instruction set computers.
- Memory control, direct memory access, interrupts, and memory organization
- Basic data flow through the CPU (interfacing, bus control logic, and internal communications).
- Number systems, instruction sets, addressing modes, and data/instruction formats.

**Text Book(s): M Morris Mano Computer systems Architecture third edition Prentice Hall of India Publication**

### **UNIT 1.Introduction To Digital Computer – (7L)**

Data Representation – Data Types – Complements – Arithmetic Operations – Representations – Fixed –Point, Floating – Point , Decimal Fixed – Point – Binary Codes- Logic Gates, Boolean Algebra, Map Simplification – Combinational Circuits: Half-Adder, Full Adder- Flip Flops - Sequential Circuits

### **Unit 2.Introduction To Digital Components And Micro Operations – (6L)**

ICs – Decoders – Multiplexers – Registers – Shift Registers – Binary Counters – Memory Unit – Register Transfer Language – Register Transfer – Bus And Memory Transfers – Arithmetic, Logic And Shift Micro Operations , Arithmetic Logic Shift Unit.

### **Unit 3.Computerorganization And Programming – (8L)**

Instruction Codes – Computer Registers – Computer Instructions – Timing And Control – Instruction Cycle – Memory Reference Instructions – I/O And Interrupt – Machine Language – Assembly Language – Assembler - Program Loops – Programming Arithmetic And Logic Operations – Subroutines – I/O Programming.

### **Unit 4: Memory Organization And CPU – (8L)**

Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware – CPU: General Register

Organization – Control Word – Stack Organization – Instruction Format – Addressing Modes – Data Transfer And Manipulation – Program Control, RISC

**Unit5: Pipeline And Vector Processing – (5L)**

Parallel processing – Pipelining - Arithmetic pipeline - Instruction pipeline - RISC pipeline, - Vector processing - Array processor

**Unit6: Input – Output Organization – (5L)**

Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes Of Transfer – Priority Interrupt – DMA – IOP – Serial Communication.

**Unit7: Multiprocessors – (6L)**

Characteristics of Multiprocessors – interconnection structures – interprocessor Arbitration – interprocessor communication and synchronization – Cache coherence

## **202: Object Oriented Analysis and Design** **(4 Credits, 3L + 2T, Level 4)**

**Objectives:** The course aims at developing skills to analyze and design a software system using Object Oriented Analysis and Design (OOAD) and UML. And use these skills in Unified Process (UP) environment.

**Learning Outcomes:** At the end of the course, student should be able to

- A) Understand and describe the Object Oriented concepts
- B) Describe Object Oriented Analysis and Design(OOAD) concepts and apply them to solve problems
- C) Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language
- D) Describe the activity carried out in each and every phase of Rational Unified Process(RUP)

**Text Book:**

1. Craig Larman (2004), Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, 3rd Edition, Pearson Education.

**Reference Books:**

1. Martin Fowler (2003), UML Distilled, 3<sup>rd</sup> Edition, Pearson Education.
2. Roger Pressman(2009), Software Engineering: A Practitioner's Approach, Roger Pressman, ; 7th edition, McGraw-Hill
3. Brett D. McLaughlin (2006), Head First Object-Oriented Analysis and Design , 1 edition, O'Reilly

### **Syllabus**

#### **Unit 1: ( 6L)**

Introduction to OO Concepts, Object, Abstraction, Class, Encapsulation, Message Sending, Inheritance and Polymorphism, Association, Aggregation, Concept of analysis and design, introduction to Object Oriented an Analysis and Design(OOAD), review of Software Development Life Cycle(SDLC), Iterative development and Rational Unified Process(RUP), Phases of RUP

#### **Unit 2: (6L)**

Understanding Inception and requirement, writing requirements in context, use case modeling, relating use cases to user goals and elementary business process, use cases for adding values and functional requirement, actors, actor types and goals in use cases, writing use cases in UI-free style, moving from inception to elaboration.

**Unit 3: (6L)**

Elaboration Iteration 1 emphasize and requirement, System behavior, System Sequence Diagrams, Inter-System SSDs, SSDs and Use Cases, System Events and the System Boundary, Naming System Events and Operation, SSD with Use Case Text, SSDs within the UP, UP Artifacts

**Unit 4: (6L)**

Domain Modeling, Conceptual Class Identification, Resolving Similar Conceptual Classes-Register vs. "POST", Specification or Description Conceptual Classes, UML Notation, Models, and Methods: Multiple Perspectives Lowering the Representational Gap, Domain Models Within the UP, Finding and adding association, Common Associations List and Guidelines, Association Roles, Naming Associations, finding attribute and its types, UML Attribute Notation, attributes and foreign Keys, Multiplicity

**Unit 5 : (6L)**

Use cases and operation contracts, pre and post conditions, contracts leads to domain model, contracts usefulness and guidelines, contract operations and UML, contracts within UP, GRASP: Designing Objects with Responsibilities, Patterns of General Principles in Assigning Responsibilities, Object Design and CRC Cards, Use Case Realization with GRASP Patterns, Determining visibility, Design Class Diagrams(DCD), from elaboration iteration 1 to 2, Iteration 2 emphasize and requirements, Refinement of Analysis-oriented Artifacts in this Iteration 2.

**Unit- 6: (7L)**

Elaboration Iteration 3 requirements and emphasis, Use case relationships (include, extend and generalize); Concrete, Abstract, Base, and Addition Use Cases, Modeling generalization, conceptual superclass and subclass, abstract conceptual class, modeling changing states, Class Hierarchies and Inheritance in Software, Association Classes, aggregation and composition, Association Role Names, Roles as Concepts vs. Roles in Associations, Derived Elements, Qualified and Reflexive Associations, Ordered Elements, Using Packages to Organize the Domain Model

**Unit 7: (8L)**

Modeling behavior in statechart diagram, events, states, and transitions in statechart Diagrams, statechart diagrams in the UP, Use Case State chart Diagrams, classes that benefit from statechart diagrams, external and Interval events, additional statechart diagram notation, Activity diagrams, activity diagrams Vs Statechart diagrams, concept of interface, interface realization, using stereotypes in UML, collaboration diagrams , putting sequence diagram as collaboration diagrams, component and deployment diagrams.

## **203: Business Information Systems** **(4 Credits, 3L + 2T, Level 4)**

**Objectives :** The main objective is to

- a) Acquaint students with basic concepts and major issues of Business Information Systems
- b) To describe current techniques and tools used for analysis and design.
- c) To understand and develop the functionalities of various types of systems.

**Learning Outcomes :**

At the end of this course, student should be able to

- (a) Analyze user requirements using different Information gathering tools.
- (b) Apply systematic approaches to software development
- (c) Provide solutions to different systems.

**Pre-requisites:** Students should know basic concepts of computer systems and DBMS.

**Text Book(s)**

- 1) Elias M. Awad Systems Analysis and Design
- 2) V. Rajaraman Analysis and Design of Information Systems
- 3) Dr. Arpita Gopal Engineering MIS for strategic Business Processes
- 4) James A. Senn Analysis & Design of Information Systems
- 5) S. Parthasarthy and B.W. Khalkar System Analysis & Design
- 6) S.A. Kelkar Structured System Analysis and Design

**Unit 1 : Introduction to system concepts(3L)**

Introduction to system Definition of system, its characteristics. Elements of system and system types. Categories of system. Examples of system: - Business, Computer, Human as system. Computer based information systems (MIS, DSS, ES) Phases of SDLC: - a) Preliminary Investigation (Problem Identification Feasibility Study with its types) b) System Analysis. c) System Design. d) Coding. e) Testing. f) Implementation. g) Maintenance.

**Unit 2 : System Development Life Cycle (6L)**

Various models of SDLC:- Waterfall, Rapid Application Development model, Prototyping model, Spiral model, Qualities of Software, Introduction to Agile Methodology.

**Unit 3 : Information Gathering Techniques(3L)**

Record Review about firm, user staff, work flow from various literatures, forms, Manuals, On site Observations. Interviews and its types, Questionnaires.

**Unit 4 : Structured Analysis Tools(6L)**

- a) Data Flow Diagram b) Data Dictionary, c) Structured English, d) Decision Trees
- e) Decision Table and its types.

**Unit 5 : Designing Methodologies(6L)**

Designing process: - Logical and Physical. Designing Tools: Structured Charts, Functional Decomposition (concept of module with coupling and cohesion), System Flowcharts, Entity Relationship Diagram. Normalizing Relations: First Normal form, Second Normal form, Third Normal form, Boyce-Codd Normal Form(BCNF). Data Input Methods: Coding techniques, Detection of Error in code, Validations, Interactive Data Inputs. Output Design : Objectives of Output Design, Design of Output Reports, Design of Screens.

Unit 6 : Control, Audit and security Control in Information system, Audit of Information System, Testing of Information System, Security of Information System. (3L)

**Unit 7: Overview of different Business Application Systems(18L)**

Education Institute Management System, Library Management Systems, Inventory Management System, Bank Management System, Hospital Management System, Payroll System, Financial Accounting System, Hotel Management System, Human Resource System.

## **204: Discrete Structures II** **(3 Credits, 2L+2T, Level 3)**

### **Objectives:**

The aims of this Graph theory is a delightful playground for the exploration of proof techniques in discrete mathematics and its results have applications in many areas of the computing ,social and natural science,

### **Learning Outcomes:**

At the end of the course student should be able to:

- A) Use graphs as models in a variety of areas.
- B) Formulate several real- real world problems in mathematical terms

**Pre-requisites:** Discrete Structures I

### **Text Book:**

Kenneth H. Rosen , Discrete Mathematics and its Applications Edition 6<sup>th</sup> Tata McGraw Hill

### **Syllabus:**

#### **Unit -1(6L)**

Preliminary concept, Introduction, Konigsberg Bridges problem, Utilities problem, seating arrangement problem

Concept of Graph, Graph models, types of Graph, representing Graph, incidence and Adjacency Graph, Graph Isomorphism, Graph representing in computer, planner and Dual Graph

#### **Unit -2 (12 L)**

Walk, paths and Euler circuit, Hamiltonian Graph and Graph Algorithm, Konigsberge Bridge problem, city route ,puzzle problem, seating arrangement problem, Travelling salesman problem ,Warshall's algorithm, Floyd's algorithm, Dijkstra's algorithm, Depth-First Search in Directed Graph, coloring Graph and their theorem, Applications of Graph coloring

#### **Unit -3 (12 L)**

Concept of Trees, definition and properties of Trees, Application of Trees, Trees as Models, Game Trees, Tree Traversal, Infix and Postfix notation, Binary Trees and Properties , Spanning Tree, Minimum spanning Tree, Depth First search, Breadth –First search, Back tracking applications, Kruskal algorithm, Prims algorithm, Huffman's algorithm, sorting technique ( Merge sort, Heap sort),computer representation of Tree

#### **Unit-4 (9L)**

Basic counting principles-The product and Sums rules, The Inclusion-Exclusion principle, The Pigeonhole principle, Generalized Pigeonhole principle ,Application, Permutation and Combination, Generalized Permutation and Combination, Generating Permutation and

Combinations, Permutation with Indistinguishable objects, Binomial coefficients and their properties, Algorithm to compute Binomial coefficient Pascal Identity and triangle

**Unit-5 (6L)**

Advance Counting Technique-Recurrence relations and modeling with recurrence relations, Solutions to Linear recurrence relations, Divide and Conquer algorithms and recurrence relations, Master Theorem regarding recurrence relations



## **205: Financial Accounting and Management** **(3 Credits, 3L+1T, Level 2)**

### **Objectives:**

1. To orient the students to basic concepts of accounting. costs
2. To make them understand the techniques of management accounting
3. To make them understand the concepts of financial management
4. To give the dimensions of three aspects finance application background in IT packages

### **Learning outcome:**

At the end of the course the students shall be able to

1. The student shall be able to have basic understanding necessary for development of software for accounting and cost and finance
2. Interrelation of concepts as dimensions of financial management process.

**Prerequisites:** Good understanding of nature of business expenses and income/ revenue

### **Recommended Books:**

1. Ashok Sehagal and Deepak Sehagal , Financial Accounting – Taxman
2. Tulsian – Financial Accounting
3. Jain Naramg – Cost Accounting Principles and Practice
4. I.M. Pandey ,FinacialMangementVikas Publishing House
5. Book Keeping and Accountancy, M.G. Patkar

### **Syllabus:**

#### **Unit 1 : Introduction to Financial Accounting( 10 L )**

Principles of double entry book keeping, preparation of journal , ledger, trial balance and final accounts ( Trading and Profit and Loss Account and Balance Sheet ) for a sole proprietor. Accounting concepts and conventions

#### **Unit 2 : Introduction to Cost and Techniques ( 06 L )**

Concept of cost , classification of cost and preparation of cost sheet , Budgetary Control – concept and importance, Simple problems on flexible and cash budget

#### **Unit 3 : Standard and Marginal Costing ( 08 L )**

Concept of Standard Cost , Variance , advantages and limitations , Computation of basic variances of material and labour cost , concept of marginal cost P/V ration . Contribution, BEP, Margin of Safety and problems on above

**Unit 4 : Introduction to Financial Management : (04 L)**

Scope and Nature of Financial Management, Consideration while preparing financial plan.

Concept of Profit Maximization and Wealth Maximization .

Advantages and Limitation of Long Term Sources of Finance, Venture Capital

**Unit 5 : Sources of Short Term Finance (07 L)**

Concept of inventory management and EOQ.

Concept of Working Capital and factors affecting working capital, simple problems on estimation of working capital.

**Unit 6: Investment Decision( 10L )**

Concept of Time value of money, Risk and Return, Simple problems on Capital Budgeting Techniques – Simple Pay Back , Discounted Pay Back , NPV, ARR, Profitability Index

Ratio Analysis : ( At theory level ) significance of ratios with reference to examples of leverage ,profitability , activity, liquidity ratio

## **206: Database Management with Oracle** **(4 Credits, 2L + 4P, Level 3)**

**Objectives:** The main objective is to teach the concepts related to database its techniques and operations. SQL (Structured Query Language) is introduced in this subject. This helps creates strong foundation for application of data design.

**Learning Outcomes:** At the end of this course, student should be able to (a) Simple Query using sample datasets(b) Complex queries using SQL.(c) Writing PL/SQL blocks (d) Introducing Object Oriented Concepts in Oracle.

**Pre-requisites:** Concept of Database Management Systems

### **Text Books:**

1. Ivan Bayross SQL, PL/SQL The Programming Language of Oracle 3rd Revised Edition  
BPB Publications

### **Syllabus:**

#### **Unit 1: Introduction (6L)**

Concepts of RDMS, Introduction to Oracle, SQL, Defining a database in SQL, creating table, Dual, Arithmetic Operators, comparison operator, Logical operator,

DDL Commands – Creating table, changing table definition, removing table, Creating Tables with constraints on row level and column level, primary key, foreign key, check ,alter, copy. creating data integrity controls, DML Commands- Inserting, updating, deleting data – batch input, deleting database content, changing database content, processing single table clauses of select statement, using expressions, using functions, using wildcards, sorting results; order by clause, categorizing result; group by Having clause. Project Case – Library, Hospital, Reservation system. SET Operations, Intersect, Union, Minus, Union ALL, SUBMULTISET, MULTISET UNION. DCL commands- Granting and Revoking Permissions, Revoking Privileges given

#### **Unit 2: Database Objects: (3L)**

Creating index, simple index, composite index, unique index, dropping indexes, multiple indexes on table, using rowed to delete duplicate rows from a table, Creating sequence, altering sequence, dropping sequence, Views -Using and defining, modifying, deleting. Insert / Drop / filter view. Complex view.

#### **Unit 3: Joins and Oracle Functions: (3L)**

Table Alias, Inner Join, Outer Join, Self Join, cross join, Outer join left right, Aggregate Functions , Numeric Functions , String Functions, Conversion functions, Date conversion functions, Date functions

#### **Unit4: Introduction to PL/SQL programming – ( 6L)**

What is PL/SQL, Structure of PL/SQL block, header section, declaration section, execution section, exception section. Creating a simple PL/SQL procedure, procedure versus functions, creating stored procedure, creating a functions , PL/SQL variable and constants. Declaring PL/SQL variables and constants, assigning values to variable. Using variables, control structures in PL/SQL – conditional control, iterative control, sequential control. Error handling – Exceptions, System defining exceptions, user defined exception with example.

#### **Unit 5: Cursor and Triggers – (9L)**

Types of cursor, implicit cursor attributes, explicit cursor attributes, functionality of Open ,fetch and close commands , cursor FOR loops, parameterized cursors. Triggers- Introduction, Database Triggers, Database Triggerv/s Procedures,Database Triggers v/s Declarative Integrity constraints, Types of Triggers –Row Triggers, Statement Triggers, Before Triggers, After Triggers, Combination Triggers, Deleting a Trigger

#### **Unit 6: Object oriented concepts –(3L)**

Introductions to Object Oriented concepts in Oracle. V-array, object type, nested table with examples.

#### **Assignment on PL/SQL**

- 1) Print the name, salary and deptno of all employees who belong to deptno 10.
- 2) Print the name, job of employees having job as manager or analyst.
- 3) Write a PL/SQL block to print 3<sup>rd</sup>, 6<sup>th</sup>, and 7<sup>th</sup> record from employee.
- 4) Write a PL/SQL block which assign comm = 500 for those employee who are getting null commission.
- 5) Update the salary of employee by 20 for even records and 100 for odd records.
- 6) Print the information of all employees using cursor.
- 7) Print 4<sup>th</sup>, 6<sup>th</sup> and 10<sup>th</sup> records from employee table.
- 8) Print the names of employee having commission as null.
- 9) Print the information of 1<sup>st</sup> five highest salary earner.
- 10) Update salary of dept 10 by 1000 and dept 20 by 2000 using cursor.
- 11) Accept deptno and print the number of employees working in that department.
- 12) Accept the deptno and print department name and location.
- 13) Accept employee name and print date of joined.
- 14) Print the name of employee having maximum and minimum salary.

- 15) Accept salary and print number of employees having salary less than or equal to accepted salary.
- 16) Print the name of employees working in department no 10 and having maximum salary.
- 17) Print the number of employees joined in the month of December.
- 18) Increment the salary of employee by 1000 having location as New York.
- 19) Increment the salary of employee 'Raj' by 10% and of 'Ravi' by 20%.
- 20) Check whether Smith's salary is greater than Black's salary or not.
- 21) If Smith's salary is greater than Black's salary then update employee table and set Black's salary same as Smith's salary otherwise set Smith's salary same as Black's salary.
- 22) Write PL/SQL block to process an order for keyboard.
  - a. Check Quantity > 0
  - b. If Yes then insert in purchase order 'One Keyboard purchased' and sysdate.
  - c. Less 1 from Product\_Master.
  - d. Else in purchase\_order 'No Keyboard Available' sysdate.
- 23) Accept a number and print factorial of it.
- 24) Accept a number and print it in reverse order.
- 25) Accept a number and print it in reverse order.
- 26) Accept a number and print it is prime or not.
- 27) Accept 10 numbers in loop and print sum of accepted numbers.
- 28) Accept 10 numbers in loop and print sum of accepted even numbers and odd numbers separately.
- 29) Accept a string and print it as follows:
  - O
  - Or
  - Ora
  - Orac
  - Oracl
  - Oracle
- 30) Using PL/SQL block generate square and cube of 1 to 10 numbers.  
Store the same in a table with columns no, square and cube.

## **207: Project I**

**(2 Credits, 4 Lab)**

**Objectives:** Few computing professionals can expect to work in isolation for very much of the time. Software development projects are always implemented by groups of people working together as a team. MCA students therefore need to learn about the mechanics and dynamics of effective team participation as part of their education. Moreover, because the value of working in teams (as well as the difficulties that arise) does not become evident in small-scale projects, students need to engage in team-oriented projects that extend over a reasonably long period of time, possibly a full semester or a significant fraction thereof. To ensure that students have the opportunity to acquire these skills, the MCA programme has four Minor Projects and one full semester project. The course 207 is the first in this series. Students in groups of 3 or 4 (only) are expected to undertake a project preferable in C environment. Every student in the group spends about 50 hours on the project. The guide should simulate the team environment and each student performance their major responsibilities satisfactorily.

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