



THE MADURA COLLEGE (Autonomous), MADURAI – 625 011

(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)

RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P1DMC1

**COURSE TITLE : Mathematical Foundations of
Computer Science**

QN.NO : 9501

TIME : 3 Hours

MAX.MARKS :75

Unit - I: Mathematical Logic

Statements and Notation – Connectives - Normal forms.

Unit - II: Calculus

The theory of inference for the statement calculus - The Predicate Calculus-Inference theory and Predicate Calculus

Unit - III: Lattices and Boolean algebra

Grammars and Languages - Polish Expressions and their Compilation. Lattice as Partially Ordered Sets.

Unit - IV: Boolean Algebra

Boolean Functions-Representation and Minimization of Boolean Functions.

Unit - V: Graph Theory

Finite - State Machines. Basic concepts of Graph Theory.

Text Book:

J.P. Tremblay and R. Manohar – “Discrete Mathematical Structures with Applications to Computer Science” - McGraw Hill Book Company.

Reference Books:

1. Alan Doerr – “Discrete Mathematics for Computer Science “.
2. Seymour Lipschutz, Marc Lipson – “Discrete Mathematics for Computer Science” - Schaum’s Outlines Discrete Mathematics - Second Edition Tata McGraw – Hill Publication.

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P1DMC2

**COURSE TITLE : Design and Analysis of
Algorithms**

QN.NO : 9502

TIME : 3 Hours

MAX.MARKS :75

Objectives :

To study the concepts of algorithms and analysis of algorithms using divide and conquer, greedy method, dynamic programming, backtracking, and branch and bound techniques

UNIT I:

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

UNIT II:

Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen’s Matrix Multiplication.

UNIT III:

The Greedy Method: General Method - Container Loading - Knapsack Problem -Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

UNIT IV:

Dynamic Programming: The General Method – Multistage Graphs – All- Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees -String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques:
Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNIT V:

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets –Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: The Method - 0/1 Knapsack Problem.

Text Book:

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

References:

1. Langsam, Augenstein, Tenenbaum, Data Structures Using C - PHI
2. V.Aho, Hopcroft, Ullman , Data structures and Algorithms, LPE
3. S.E. Goodman, ST.Hedetniem Introduction to design and Analysis of Algorithms – TMH



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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P1DMC3

COURSE TITLE : Web Technology

QN.NO : 9503

TIME : 3 Hours

MAX.MARKS :75

UNIT I:

Introduction – History of the Internet – Services and Accessibility – Uses – Protocols – Internet Standards – HTML – Introduction – HTML Document – Head Section – Body Section – HTML Forms – Java Script – Introduction – Language Elements – Objects of Java Script – Other Objects – Arrays.

UNIT II:

Dynamic HTML - CSS – Document Object Model – Event Handling – Filters and Transitions – Data Binding

UNIT III:

Web Servers and Servlets - Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues

UNIT IV:

Introduction to JSP - The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

UNIT V:

JSP Application Development - Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods- Error Handling and Debugging -Sharing Data Between JSP pages, Requests, and Users -Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

Text Books:

1. N P Gopalan, J Akilandeswari, Web Technology – A Developers Perspective –Prentice Hall of India Pvt. Ltd., New Delhi, 2008 (Units I and II).
2. Marty Hall and Larry Brown Pearson, Core SERVLETS AND JAVA SERVER PAGES VOLUME 1: CORE TECHNOLOGIES Pearson Education India (Units III, IV and V)

Reference Book:

1. J Jaworkski, Mastering Javascript, BPB Publications, 1999

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P1DMC4

COURSE TITLE : Linux Programming

QN.NO : 9504

TIME : 3 Hours

MAX.MARKS :75

Unit I:

Linux Introduction and Installation: Linux-Advantages-Red Hat Linux-New Features-Installation procedures and Methods. Using Desktop-GNOME-KDE-Linux Commands Accessing and Running Applications

Unit II:

Installing Red Hat Linux Applications, Running Window Application, Running Window, DOS and Macintosh Applications –Tools for using Internet and Web.

Unit III:

Administration: Understanding System Administration: Root login-super user-GUI tools, commands and Log files-Configuring Hardware-File System and Disk Management-Monitoring performances.

Unit IV:

Setting Up and Supporting users: Creating user accounts – Setting user defaults –Creating Desktops-Modifying and Deleting Accounts.

Unit V:

Security Issues: Hacker versus Cracker-Password Protection- Protection from break-in-FilteringNetwork Access-Firewalls-Detecting Instructions – Encryption techniques

Text Book:

1. Christopher Negus “Red Hat Linux 9 Bible”, WILEY- Dreamtech India Pvt.Ltd, New Delhi,First Edition, 2003

Reference Book:

1. Thomas Schenk, “Red Hat Linux System Administration”, Techmedia, New Delhi,2003.

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P2DMC5

**COURSE TITLE : Object Oriented Analysis and
Design with UML**

QN.NO : 9507

TIME : 3 Hours

MAX.MARKS :75

Unit I:

Structured approach to system construction : SSADM/SADT - An overview of object oriented systems development & Life cycle

Unit II:

Various object oriented methodologies – Introduction to UML

Unit III:

Object oriented analysis – Use cases- Object classification, relationships, attributes, methods

Unit IV:

Object oriented design – Design axioms – Designing classes – Layering the software design
:- data access layer, User interface layer, Control/business logic layer

Unit V:

UML - Examples on: Behavioral models – Structural models – Architectural models from real world problems.

TEXT BOOK(s):

1. **Bahrami Ali**, Object oriented systems development, Irwin McGrawHill, 2005 (First 4 units covered here).
2. **Booch Grady, Rumbaugh James, Jacobson Ivar**, The Unified modeling language – User Guide, Pearson education, 2006 (ISBN 81-7758-372-7) (Unit: -5 covered here).

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P2DMC6

COURSE TITLE : Advanced Java Programming

QN.NO : 9508

TIME : 3 Hours

MAX.MARKS :75

Unit 1:

Servlet Overview – Servlet life cycle - The Java Web Server – Simple Servlet – Servlet Packages – Using Cookies - Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to servlet communication.

Unit 2:

Java Beans: The software component assembly model- The java bean development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool-JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

Unit 3:

EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in Perl- Perl control structures and operators – functions and scope

Unit 4:

RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

Unit 5:

JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions.

Text Book(s):

1. James McGovern, Rahim , Adatia, Yakor Fain, 2003, “J2EE 1.4 Bible”, Wiley-dreamtech India Pvt. Ltd, New Delhi
2. Herbert Schildt, 2002, “ Java 2 Complete Reference, 5th Edition”, Tata McGraw Hill, New Delhi.
3. Jamie Jaworski, 1999, “Java 2 Platform – Unleashed” , First Edition, Techmedia-SAMS.

Reference books:

1. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2. D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
3. Joseph O’Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
4. T. Valesky, T.C. Valesky, 1999, Enterprise JavaBeans, Addison Wesley.
5. Cay S Horstmann & Gary Cornell, 2013, Core Java Vol II Advanced Features, 9th Edition, Addison Wesley.



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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P2DME1

COURSE TITLE : Computer Networks

QN.NO : 9510

TIME : 3 Hours

MAX.MARKS :75

Unit 1:

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

Unit-2:

Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

Unit 3:

Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

Unit 4:

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

Unit 5:

Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

Text book:

A. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

Reference Books:

- 1) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
- 2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
- 3) D. Bertsekas and R. Gallager, 1992, Data Networks, Prentice hall of India, NewDelhi.
- 4) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.



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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P2DME2

**COURSE TITLE : Data Structures and
Algorithm in C++**

QN.NO : 9511

TIME : 3 Hours

MAX.MARKS :75

UNIT1:Programming Techniques:

Classes- Constructor Syntax and Accessors - Interface and Implementation - Pointers – Templates - Class Templates, Function Templates - Object, Comparable-Function Objects - Separate Compilation of Class Templates - Algorithm Analysis - Mathematical Background - Model - Running-Time Calculations - General Rules Logarithms in the Running Time - Limitations of Worst-Case Analysis.

UNIT 2: Lists, Stacks, Queues, Trees:

Abstract Data Types (ADTs) - The List ADT - Simple Array Implementation of Lists- Simple Linked Lists - vector and list in the STL - Iterators - Example: Using erase on a List - const_iterators - Implementation of vector - Implementation of list - The Stack ADT - Implementation of Stacks - Applications - The Queue ADT - Queue Model- Array Implementation of Queues -Applications of Queues- Trees Preliminaries - Implementation of Trees - Tree Traversals with an Application - Binary Trees - An Expression Trees - Binary Search Trees - findMin and findMax - AVL Trees -Single Rotation - Double Rotation - Splay Trees .

UNIT 3: Hashing and Priority Queues:

Hashing - General Idea - Hash Function - Separate Chaining - Hash Tables without Linked Lists - Linear Probing - Quadratic Probing - Double Hashing - Rehashing - Hash Tables in the Standard Library - Hash Tables with Worst-Case - Perfect Hashing - Cuckoo Hashing - Hopscotch Hashing -Priority Queues (Heaps) - Model - Simple Implementations - Binary Heap - Structure Property - Heap-Order Property - Basic Heap Operations - Other Heap Operations -Applications of Priority Queues -The Selection Problem - Leftist Heaps - Skew Heaps - Binomial Queues .

UNIT 4: Sorting, DisjointSets:

Sorting - Insertion Sort Algorithm - STL Implementation of Insertion Sort - A Lower Bound for Simple Sorting Algorithms -Shellsort - Worst-Case Analysis of Shellsort -Heapsort - Mergesort - Quicksort - Actual Quicksort Routines - Analysis of Quicksort - A Linear-Expected-Time Algorithm for Selection - A General Lower Bound for Sorting - Decision - Linear-Time Sorts: Bucket Sort and Radix Sort - External Sorting.

The Disjoint Sets Class - Equivalence Relations -The Dynamic Equivalence Problem

P.T.O

UNIT 5: Graph and Algorithm Design Techniques :

Graph Algorithms - Definitions - Representation of Graphs - Topological Sort - Shortest-Path Algorithms - Unweighted Shortest Paths - Dijkstra's Algorithm - Graphs with Negative Edge Costs - Acyclic Graphs - All-Pairs Shortest Path - Shortest Path - Network Flow Problems - Minimum Spanning Tree - Prim's Algorithm - Kruskal's Algorithm - Applications of Depth-First Search - Undirected Graphs - Biconnectivity - Euler Circuits - Directed Graphs.

Algorithm Design Techniques - Greedy Algorithms - A Simple Scheduling Problem - Huffman Codes - Divide and Conquer Method.

Text Book:

MARK ALLEN WEISS – “Data Structures and Algorithm Analysis in C++” – Pearson Publishing Company Fourth edition.

References:

1. Seymour Lipschutz: “Theory & Problems of Data Structures”, Schaum's Outline Series (McGraw-Hill)
2. Ellis Horowitz, Sartaj Sahni – Fundamentals of Data Structures (CBS Publications)
3. E Horowitz and S. Sahani, Fundamentals of Computer Algorithm, Galgotia Publications, 1991.

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P3DMC7

COURSE TITLE : Relational Database

QN.NO : 9517

Management System

TIME : 3 Hours

MAX.MARKS :75

Objectives:

- To impart the knowledge of Relational Concepts in DBMS.
- Learning the concept of designing DB with relational algebra

UNIT I: Introduction:

Introduction: Database system Applications – Purpose of database systems – View of Data – Relational databases – Database Design – Object based semi structured databases - Data storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators. Relational Model: Structure of Relational databases – Fundamental Relational Algebra Operations – Additional Relational Algebra Operations – Extended Relational Algebra Operations

UNIT II: ER –Model:

Database Design and ER Model: Overview of the Design Process – The Entity Relationship Model – Constraints - Entity-Relationship diagram - Entity-Relationship Design Issues – Weak Entity sets – Extended E-R features – Database design for Banking Enterprise .Relational Database Design: Features of good Relational Designs – Atomic Domains and First Normal form – Decomposition using functional Dependencies – Functional Dependency Theory - Decomposition using functional Dependencies – Decomposition using Multivalued Dependencies.

UNIT III: SQL:

Object based Databases: Overview – Complex Data types – Structured types and Inheritance in SQL – Table Inheritance – Array and Multi set types in SQL – Object Identity and Reference types in SQL –Implementing O-R features – Persistence Programming Languages – Object oriented Versus Object Relational Databases.

UNIT IV: File Structures:

Storage and File Structure: Overview of Physical Storage Media – Magnetic Disk – RAID – Tertiary Storage – Storage Access – File Organization - Organization of Records in files –

Data Dictionary Storage. Indexing and Hashing: Basic Concepts – Ordered Indices – B++ Tree Index Files – Multiple Key Access – Static Hashing – Dynamic Hashing.

UNIT V: Data Recovery :

Transactions: Transaction Concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – Testing for Serializability Concurrency Control: Lock-based protocols – Timestamp-based protocols - Validation-based protocols. Recovery System: Failure Classification – Storage Structure – Recovery and Atomicity – Log-based Recovery - Recovery with Concurrent Transactions.

Text Book:

Abraham Silberschatz, Henry F.Korth and S.Sudarshan, Database System Concepts, McGraw Hill International Edition 2006, Fifth Edition.

UNIT I : Chapter 1.1 to 1.3, 1.5 to 1.9, 1.11 & 1.12 and Chapter 2.1 to 2.4

UNIT II : Chapter 6.1 to 6.8 and Chapter 7.1 to 7.6

UNIT III : Chapter 9.1 to 9.9

UNIT IV : Chapter 11.1 to 11.8 and Chapter 12.1 to 12.3, 12.5 to 12.7

UNIT V : Chapter 15.1 to 15.8 , Chapter 16.1 to 16.3, and Chapter 17.1 to 17.5

Reference books:

1. Database Management Systems – Raghu Ramakrishnan & Johannes Gehrke, McGraw Hill International Edition – Third Edition – 2003
2. Database Management Systems - Alexis leon & mathews Leon, “Leon Vikas Publishing, Chennai, 2002.

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P3DMC8

COURSE TITLE : Software Engineering

QN.NO : 9518

TIME : 3 Hours

MAX.MARKS :75

OBJECTIVES:

- To impart the knowledge of software development with an engineering aspects..
- Learning the concept of designing software product, test and maintenance

Unit 1: Introduction:

The software Process: Software and software engineering, process models, agile development.

Unit 2: Modelling:

Modelling: Understanding requirements, Requirements modelling: Scenarios, information, and analysis classes, flow, behaviour, patterns and web applications.

Unit 3: Quality Management:

Quality Management: Quality concepts, review techniques, software quality assurance, software testing strategies and formal model verification.

Unit 4: Estimation and scheduling:

Managing Software Projects: Project management concepts, process and project metrics, estimation for software projects and project scheduling.

Unit 5: Software process improvements:

Advanced Topics: Software process Improvement and emerging trends in software Engineering

Text Book:

Software engineering - A practitioner's approach - 7th Edition - By Roger S. Pressman - McGraw Hill International editions.

Reference Books:

1. Software engineering concepts – Richard Fairley – Tata Mcgraw – hill publishing company limited, Newdelhi 1997.
2. Software engineering – K. L. James, Prentice hall of india pvt. Ltd. , Newdelhi –2009.
3. Fundamentals of software engineering – Rajib Mall, Prentice hall of india pvt. Ltd. , New Delhi – 2003
4. Analysis and design of information system – by Jams a Sen - Tata Mcgraw - Hill publishing company limited Elective-III (III Semester)

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P3DME3

COURSE TITLE : Dot Net Technologies

QN.NO : 9519

TIME : 3 Hours

MAX.MARKS :75

OBJECTIVES:

- To teach the concepts of Dot NET programming.
- Learning the techniques of designing the front-end components with networking.

UNIT I : INTRODUCTION:

Introduction to .Net - .Net Framework Features & Architecture, CLR, Common Type System, MSIL, Assemblies and Class Libraries.

UNIT II

Advanced ADO.NET –Disconnected Data Access – Grid view, Details View, and Form View Controls – Crystal Reports –Role of ADO.NET in Distributed Applications.

UNIT III

Advanced ASP.NET – Ad Rotator, Multiview, Wizard and Image Map Controls –Master Pages – Site Navigation – Web Parts – Uses of these controls and features in Website development.

UNIT IV

Advanced features of ASP.NET – Security in ASP.NET – State Management in ASP.NET – Mobile Application development in ASP.Net – Critical usage of these features in Website development.

UNIT V

Introduction to Dynamic Web Applications: Server Side Scripting basics –Server Side Scripting Languages – PHP Scripting - General Syntactic Characteristics – Primitives, operations and expressions – Control Statement –Arrays – Functions – Pattern Matching – Form Handling – Files – Cookies –Session Tracking – Database access with PHP and MYSQL.

Text Books

1. Wather, ASP .Net 3.5, SAMS Publication, 2005
2. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", James Lee and Brent Ware, Dorling Kindersley (India) Pvt.Ltd, 2008

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PROGRAMME: PG NME - Computer Science

COURSE CODE : 17P3DNM1

COURSE TITLE : Introduction to Internet

QN.NO : 9518

TIME : 3 Hours

MAX.MARKS :75

OBJECTIVES:

- To teach the basic ideas about the usage of an Internet and its applications.
- Learning the architecture of an internet .

UNIT I:

Introduction to internet: Internet- Growth of Internet and ARPANet - Owners of the Internet - Anatomy of Internet – History of WWW - Basic Internet Terminologies - Internet Applications - Commerce on the Internet – Governance on the Internet - Impact of Internet on Society.- Internet Protocols - TCP/IP – Router - Internet Addressing Scheme- Machine Addressing - E-mail Addresses – Resource Addresses.

UNIT II:

Interconnectivity: Connectivity types - Setting up a connection - Hardware requirements- Selection of a modem - Software requirements – Internet accounts by ISP-ISDN-Protocol options-Service options. Internet Network: Network Definition-Common terminologies – Node - Host- Workstation -Network Administrator - Network security - Network Components – Servers-client Server- Communication Media - Types of Networks - Addressing in Internet – DNS - Network topologies.

UNIT III

Browsers and Search engines: Browsers – browser-INTRODUCTION – Parts of a browser window -Running a browser - working with a Browser. Search engines: What is search engine? - Types of search engines - Search and meta search engine s.

UNIT IV:

E-mail: E-mail - E-mail Networks and Servers - E-mail Protocols - Structure of E-mail - Attachments – E-mail Clients - E-mail Clients - web based E-mail-Address book – Signature File.

TEXT BOOK:

Internet Technology and Web design, Ramesh Bangia, Firewall Media, (An imprint of Lakshmi Publications Pvt. Ltd.), Third Edition, 2011.

Unit 1: Chapter 1.2

Unit 2: Chapter 3 & Chapter 4

Unit 3: Chapter 5(5.6), Chapter 8(8.11 &8.13)

Unit 4: Chapter 5 (5.1) & Chapter 6

REFERENCE BOOKS:

1. The Internet Book, Douglas E. Comer, Fourth Edition, PHI Learning Pvt. ltd. , New Delhi, 2009.
2. Using the Internet the Easy Way, Young Kai Seng, Minerva Publications, First Edition, 2000.
3. Fundamentals of Information Technology By Alexis Leon and Mathews Leon, Vikas Publishing House Pvt. Ltd., Revised Edition.



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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P4DMC9

COURSE TITLE : Network Security

QN.NO : 9523

TIME : 3 Hours

MAX.MARKS :75

OBJECTIVES:

- To teach the algorithms on security in the network architecture.
 - Learning the concept of designing security algorithms.
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Unit I

Overview-Symmetric Ciphers: Classical Encryption Techniques

Unit II

Symmetric Ciphers: Block ciphers and the Data Encryption Standards Public key
Encryption and Hash Functions: Public-Key Cryptography and RSA

Unit III

Network Security Practices: Authentication applications-Electronic Mail
Security

Unit IV

Network Security Practices: IP Security-Web Security

Unit V

System Security: Intruders-Malicious Software-Firewalls

TEXT BOOK:

1. William Stallings, Cryptography and Network Security-Principles and Practices, Prentice-Hall, Third edition, 2003

REFERENCES

1. Johannes A. Buchaman , Introduction to cryptography, Springer-Verlag.
2. Atul kahate , Cryptography and Network Security, TMH.

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PROGRAMME: M.Sc., Computer Science

COURSE CODE : 17P4DME4

COURSE TITLE : Data Mining and Data

QN.NO : 9526

Warehousing (Ele – IV)

TIME : 3 Hours

MAX.MARKS :75

OBJECTIVES:

- To teach the data mining functions and enhancement on mining process.
- To impart the knowledge of on-line analytical processing.

UNIT I

DATA MINING AND DATA PREPROCESSING: Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Pre-processing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

UNIT II

DATA WAREHOUSING: Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – On Line Analytical Processing - On Line Analytical Mining.

UNIT III

FREQUENT PATTERNS, ASSOCIATIONS AND CLASSIFICATION: The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbour – Other Classification Methods.

UNIT IV

CLUSTER ANALYSIS: Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

UNIT V

SPATIAL, MULTIMEDIA, TEXT AND WEB DATA: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

Text Book

Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques“, 2nd Ed., Morgan Kaufmann Publishers, 2006.

REFERENCE BOOK

Margret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2003.

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PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: I M.Sc. Computer Science		
Sem	Course Type	Course Code	Course Title	Time	Maximum	Question Number
I	Major Core - 1	21P1DMC1	Mathematical Foundations For Computer Science	3 hrs	75 marks	12901

Nature of Course					
Knowledge and skill		✓		Employability	
Skill oriented				Entrepreneurship oriented	

Course Objectives

1. To introduce the concepts of Mathematical Logic.
2. Students should develop mathematical thinking and problem-solving skills associated with writing proofs.
3. To discover various groups, properties of groups and its operations.
4. To construct a K – map to minimize the Boolean Expressions.
5. To apply theoretical knowledge to solve realistic problems in real life.

Unit	Content	Hrs	K-Level	CLO
I	Mathematical Logic: Statements and Notation- Connectives- Negation-Conjunction-Disjunction-Statement formulas and truth tables –Conditional and Biconditional –Well-formed formulas –Tautologies-Equivalence of Formulas-Duality law-Tautological Implications-Normal forms-Disjunctive Normal forms-Conjunctive Normal forms- Principal Disjunctive Normal forms- Principal conjunctive normal forms-Ordering and Uniqueness of Normal forms-The theory of Inference for the statement calculus-Validity using Truth tables-Rules of Inference Consistency of Premises and Indirect method of proof-The Predicate Calculus-Predicate formulas- Free and Bound variables-The Universe of Discourse.	15	Up to K3	1
II	Set Theory : Basic concepts of Set theory-Notation-Inclusion and Equality of Sets-The Power set-Some Operations on sets-Venn Diagrams-Some Basic set Identities-Cartesian Products-Relations and Ordering-Relations-Properties of Binary Relations in a set-Relation Matrix and the graph of a Relation-Equivalence Relations-Composition of Binary Relations-Partial Ordering-Partially Ordered set: Representation and Associated Terminology-Functions-Definition and Introduction-Composition of Functions-Inverse Functions-Binary and n-ary Operations.	15	Up to K3	2
III	Algebraic Structures: Semigroups and Monoids-Definitions and Examples-Homomorphism of semigroups and Monoids-Subsemigroups and Submonoids-Grammars and Languages- Discussion of Grammars-Formal Definition of a Language-Groups-Definitions and Examples-Subgroups and Homomorphisms.	15	Up to K2	3
IV	Lattices and Boolean Algebra: Lattices as Partially Ordered sets-Definition and Examples-Some properties of Lattices-Lattices as Algebraic systems-Sub lattices, Direct product and Homomorphism-Some special Lattices-Boolean Algebra-Definition and Examples-Subalgebra, Direct product and Homomorphism-Boolean Functions- Boolean forms and free Boolean algebras-Values of Boolean Expressions and Boolean functions-Representation and Minimization of Boolean functions-Representation of Boolean Functions-Minimization of Boolean Functions.	15	Up to K4	4
V	Graph Theory: Introduction-Graph-Finite and Infinite Graphs-Incidence and Degree-Isolated Vertex, Pendant vertex and Null graph- Paths and Circuits-Isomorphism-Subgraphs- Walks, paths and Circuits-Connected Graphs, Disconnected Graphs, and Components-Euler Graphs-Operations on Graphs-Trees-Some Properties of Trees-Pendant vertices in a tree-Distance and Centres in a tree.	15	Up to K4	5

Books for Study

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R. Manohar, McGraw-Hill Publishing Company Limited.
2. Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Prentice Hall of India Private limited, New Delhi, 2003.

Chapters

Text Book 1

Unit I: 1.1-1.5

Unit II: 2.1, 2.3, 2.4

Unit III: 3.2, 3.3, 3.5

Unit IV: 4.1-4.4

Text Book 2

Unit V -1.1, 1.3-1.5, 2.1, 2.2, 2.4 - 2.6, 2.7, 3.1 - 3.4

Books for Reference

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 7th edition, McGraw Hill education (India) Private Limited.
2. Outline Discrete Mathematics by Seymour, 2nd Edition Tata McGraw- Hill Publications.
3. Discrete Mathematics, D.S. Malik and M.K. Sen, Revised edition Cengage Learning.

Web Resources

1. <https://youtu.be/ELmAyJt1E8w>
2. <https://youtu.be/0WL4fO2MGwY>
3. <https://youtu.be/F71odJrr5Bs>

Rationale for Nature of the course

- Learn working principle of Turing machine related mechanism.

Activities on Knowledge and Skill

- Practice to Solve Problems
- Group Discussion
- Seminar

Pedagogy

Chalk and talk, Materials, PPT, Assignment, Seminar, Problem solving, Group discussion, Interaction and Demonstration.

Lesson Plan

Unit	Topics to be Covered	Hrs	Mode
I	Statements and Notation—Conditional and Biconditional.	3	Chalk and Talk, Quiz, Chalk and Talk, Problem Solving Chalk and Talk, Group Discussion Chalk and Talk
	Duality law- Normal forms. The theory of Inference for the statement calculus.	3	
	Rules of Inference Consistency of Premises and Indirect method of proof.	5 4	
II	Basic concepts of Set theory - Cartesian Products.	4	Chalk and Talk, Group Discussion, Problem Solving Chalk and Talk, Chalk and Talk
	Relations and Ordering - Relation Matrix and the graph of a Relation	5 4	
	Composition of Binary Relations Partially Ordered set		
	Composition of Functions.	2	

III	Semigroups and Monoids	3	Chalk and Talk, Seminar
	Grammars and Languages - Discussion of Grammars.	3	Chalk and Talk, quiz
	Formal Definition of a Language – Groups - Definitions and Examples.	5	Chalk and Talk
	Subgroups and Homeomorphisms.	4	Chalk and Talk, Tutorial
IV	Lattices as Partially Ordered sets.	2	Chalk and Talk, quiz Chalk and Talk, Problem Solving Chalk and Talk, Tutorial Chalk and Talk,
	Sublattices, Direct product and Homomorphism-Some special Lattices-Boolean Algebra.	4	
	Boolean forms and free Boolean algebras.	5	
	Representation of Boolean Functions-Minimization of Boolean Functions.	4	
V	Graph-Finite and Infinite Graphs-Incidence and Degree.	3	Chalk and Talk, quiz Chalk and Talk, Chalk and Talk, Seminar Chalk and Talk Tutorial. Assignment
	Paths and Circuits.	5	
	Disconnected Graphs and Components-Trees.	5	
	Trees-Some Properties of Trees-Pendant vertices in a tree.	2	

Course Learning Outcomes

On the completion of the course, the students will be able to

CLOs	COURSE LEARNING OUTCOMES	K - Level
CLO 1	Evaluate mathematical problems.	Up to K3
CLO 2	Make use of the Concept of Set Theory and its functions.	Up to K3
CLO 3	Discover various groups, properties of groups and its operations.	Up to K2
CLO 4	Apply the concepts of Lattices as Partially Ordered sets.	Up to K4
CLO 5	Model and solve real-world problems using graphs and trees.	Up to K4

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	1	2	2	2	-
CLO 2	2	1	3	3	3	2
CLO 3	2	1	1	1	1	-
CLO 4	2	2	2	1	1	-
CLO 5	2	2	3	3	3	2

(3– Advanced Application, 2 – Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K4
Quiz	5	K4
Total	25	

Learning Outcome Based Education & Assessment (LOBE)

Formative - Blue Print – Model for Mathematical Foundations for Computer Science

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K3	2	K1	2(K2&K2)	2(K3)
	CLO 2	Up to K3	3	K2	2(K3&K3)	1(K3)
CIA II	CLO 3	Up to K2	2	K1	2(K1&K1)	2(K2)
	CLO 4	Up to K4	3	K2	2(K4&K4)	1(K4)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		10		10	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	4	-	-	4	6.67	33
K2	6	10	-	16	26.67	
K3	-	10	30	40	66.67	67
K4	-	-	-	-	-	-
Total Marks	10	20	30	60	100	100
K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	4	10	-	14	23.33	66
K2	6	-	20	26	43.33	
K3	-	-	-	-	-	-
K4	-	10	10	20	33.33	34
Total Marks	10	20	30	60	100	100

P.T.O.

Learning Outcome Based Education & Assessment (LOBE)
Summative - Blue Print – Model for Mathematical Foundations for Computer Science
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Units	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No of Questions	K - Level	No of Questions	K - Level		
1	CLO 1	Up to K3	2	K2 & K3	1	K1	2(K2&K2)	1(K3)
2	CLO 2	Up to K3	2	K2 & K3	1	K2	2(K3&K3)	1(K3)
3	CLO 3	Up to K2	2	K1 & K1	1	K1	2(K1&K1)	1(K2)
4	CLO 4	Up to K4	2	K3 & K4	1	K2	2(K4&K4)	1(K4)
5	CLO 5	Up to K4	2	K3 & K4	1	K3	2(K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analyzing, presentation and make inferences with evidences

Distribution of Section – wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total Marks	% of Marks without choice	Consolidated
K1	2	4	10	-	16	13.33%	13%
K2	2	4	10	10	26	21.67%	22%
K3	4	2	10	20	36	30%	30%
K4	2	-	20	20	42	35%	35%
Total Marks	10	10	50	50	120	100	100

PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: I M.Sc. Computer Science		
Sem	Course Type	Course Code	Course Title	Time	Maximum	Question Number
I	Major Core - 2	21P1DMC2	Data Structures And Algorithms in C++	3 hrs	75 marks	12902

Nature of Course		
Knowledge and skill		Employability oriented
Skill oriented	✓	Entrepreneurship oriented

Course Objectives

1. To impart knowledge on fundamental ADTs.
2. To learn the organized structures of Trees and Hashing.
3. To understand the concepts of updatable Queues and Sorting
4. To apply the Graph Algorithms on related applications.
5. To design optimized algorithms with efficacy.

Unit	Content	Hrs	K-Level	CLO
I	Algorithm Analysis and Lists, Stacks, & Queues : Algorithm Analysis: Mathematical Background – Model – What to Analyze – Running –Time Calculations. Lists, Stacks, & Queues: Abstract Data Types – The List ADT – The Stack ADT – The Queue ADT.	15	Up to K2	1
II	Trees and Hashing : Trees: Preliminaries – Binary Trees – The Search Tree ADT - Binary Search Trees – AVL Trees – Tree Traversals – B-Trees – Hashing: General Idea – Hash Function – Separate Chaining – Hash Tables without Linked Lists – Rehashing – Universal Hashing – Extendible Hashing.	15	Up to K3	2
III	Priority Queues (Heaps) and Sorting : Model – Simple Implementation – Binary Heap – Applications of Priority Queues – d-Heaps – Leftist Heaps – Skew Heaps – Binomial Queues – Sorting: Preliminaries - Insertion Sort – A Lower Bound for Simple Sorting Algorithms – Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting .	15	Up to K3	3
IV	Graph Algorithms : Definitions – Topological Sort – Shortest Path Algorithms –Network Flow Problems - Minimum Spanning Tree – Applications of Depth First Search – Introduction to NP-Completeness.	15	Up to K4	4
V	Algorithms Design Techniques: Greedy Algorithms – Divide and Conquer – Dynamic Programming – Randomized Algorithms – Backtracking Algorithms.	15	Up to K5	5

Book for Study

Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss, Fourth Edition, Pearson Publications.

Chapters

Unit I: 2, 3.1, 3.2, 3.5 – 3.7

Unit II : 4.1 – 4.4, 4.6, 4.7, 5.1 – 5.5, 5.8, 5.9

Unit III: 6.1 - 6.8, 7.1 – 7.7, 7.12

Unit IV: 9

Unit V:10

Books for Reference

1. Data Structures with C by Seymour Lipchitz, Mc Grow Hill Publications.

P.T.O.

2. Data Structures and Algorithm Analysis in C by Mark Allen Weiss, Second Edition, Pearson Publications.
3. An Introduction to Data Structure with Application by Jean-Paul Tremblay, Paul Sorenson, TMH, II Edition – 1991.

Web Resources

1. <http://freecodecamp.org>
2. <https://www.dzone.com>
3. <https://lecturenotes.in>

Rationale for Nature of the course

- The methods and techniques of data structure are widely used in system programming and application programming.
- Helps to develop logic and structured program by using organized data.

Activities on Skill Oriented

- Practice to write Algorithms
- Seminar
- Data Organization

Pedagogy

Chalk and talk Materials, PPT, Assignment, Seminar, Group Discussion and Interaction.

Lesson Plan

Unit	Topics to be Covered	Hours	Mode
I	Algorithm Analysis	7	Chalk and talk
	Lists, Stacks, & Queues	8	Group Discussion
II	Trees	3	Chalk and talk, Materials
	AVL Tree	3	PPT
	Hashing	5	Chalk and talk, PPT
	Rehashing	4	Chalk and talk, PPT
III	Priority Queues (Heaps)	4	Chalk and talk, PPT
	Binomial Queues	4	Chalk and talk, PPT
	Sorting	4	Group Discussion
	Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting	3	Chalk and talk, Group Discussion
IV	Graph Algorithms	7	Chalk and talk, PPT
	Minimum Spanning Tree	8	Chalk and talk, PPT
V	Algorithms Design Techniques	8	Chalk and talk, Group Discussion, Assignment
	Randomized Algorithms – Backtracking Algorithms	7	Chalk and talk, Seminar

Course Learning Outcomes

On the completion of the course, the students will be able to

CLOs	COURSE LEARNING OUTCOMES	K – Level
CLO 1	Design and analyze the problem statements and various ADTs.	Up to K2
CLO 2	Gain knowledge of non linear data structure like trees and hash which can be applied to solve problems.	Up to K3
CLO 3	Describe the computational efficiency of various sorting techniques.	Up to K3
CLO 4	Design and implement the graph operations and its application.	Up to K4
CLO 5	Analyze the complexity of different algorithms to solve real life problems	Up to K5

P.T.O.

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	3	2	3	3	2	-
CLO 2	3	3	3	3	2	-
CLO 3	3	3	3	2	2	2
CLO 4	3	3	3	3	2	2
CLO 5	3	3	3	3	2	-

(3– Advanced Application, 2– Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K5
Quiz	5	K4
Total	25	

P.T.O.

Learning Outcome Based Education & Assessment (LOBE) Formative - Blue Print – Model for Data Structures and Algorithms in C++ Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K2	2	K1	2(K1&K1)	2(K2)
	CLO 2	Up to K3	3	K1	2(K2&K2)	1(K3)
CIA II	CLO 3	Up to K3	2	K2	2(K3&K3)	2(K3)
	CLO 4	Up to K4	3	K2	2(K4&K4)	1(K4)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		10		10	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	10	10	-	20	33.33	83
K2	-	10	20	30	50	
K3	-	-	10	10	16.67	17
K4	-	-	-	-	-	-
Total Marks	10	20	30	60	100	100

P.T.O.

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	-	-	-	-	-	17
K2	10	-	-	10	16.67	
K3	-	10	20	30	50	50
K4	-	10	10	20	33.33	33
Total Marks	10	20	30	60	100	100

**Learning Outcome Based Education & Assessment (LOBE)
Summative - Blue Print – Model for Data Structures and Algorithms
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)**

UNITS	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No of Questions	K - Level	No of Questions	K - Level		
1	CLO1	Up to K2	2	K1& K1	1	K1	2(K1&K1)	1(K2)
2	CLO2	Up to K3	2	K2 & K3	1	K1	2(K2&K2)	1(K3)
3	CLO3	Up to K3	2	K2 & K3	1	K2	2(K3&K3)	1(K3)
4	CLO4	Up to K4	2	K3 & K4	1	K2	2(K4&K4)	1(K4)
5	CLO5	Up to K5	2	K3 & K4	1	K3	2(K4&K4)	1(K5)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analysing, presentation and make inferences with evidences
- K5 – Ability to integrate ideas from one situation to newer situations.

Distribution of Section – wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total Marks	% of Marks without choice	Consolidated
K1	2	4	10	-	16	13.33%	13%
K2	2	4	10	10	26	21.67%	22%
K3	4	2	10	20	36	30%	30%
K4	2	-	20	10	32	26.67%	27%
K5	-	-	-	10	10	8.33%	8%
Total Marks	10	10	50	50	120	100	100

PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: <i>I M.Sc. Computer Science</i>		
Sem	Course Type	Course Code	Course Title	Time	Maximum	Question Number
I	Major Core – 3	21P1DMC3	Python Programming	3 hrs	75 marks	12903

Nature of Course			
Knowledge and skill			Employability oriented
Skill oriented	✓		Entrepreneurship oriented

Course Objectives

1. To learn and understand the basics of Python programming.
2. To gain Knowledge of handling Strings and Files in Python.
3. To learn the usage of Lists, Tuples, Dictionaries, Classes and Objects in Python programs.
4. To apply the concepts of Inheritance, Overloading and Exception Handling.
5. To implement the techniques like Multiprocessing, Threading, Networking and Graphics.

Unit	Content	Hrs	K-Level	CLO
I	Basics, Controls Statements, Functions and Modules : Basics of python Programming: Features of Python – History of Python – The future of Python – Executing Python program – Literal Constants – Variables and Identifiers _ Data Types – Input Operation – Comments – Reserved Words – Indentation – Operators and Expression – Expressions in Python – Operations on Strings – Other Data Types – Type Conversion. Decision Control Statements: Selection / Conditional Branching Statements – Basic Loop Structures / Iterative Statements – Nested Loops – break, continue, pass statement - Functions and Modules.	15	Up to K2	1
II	Python Strings and File handling : Python Strings: Concatenating, Appending and Multiplying Strings – Strings are Mutable – Formatting Operator - Built-in String Methods and Functions – Slice Operation – Comparing Strings – Iterating String – The String Module – Regular Expression. File Handling: File Path – Types of Files – Opening and Closing of Files – Reading and Writing Files – File Positions – Directory Methods – CSV files.	15	Up to K3	2
III	Data Structures, Classes and Objects: Data Structures: Sequence – Lists -Functional Programming – Tuple – Sets – Dictionaries. Classes and Objects: Classes and Objects – Class Variables and Object Variables – Public and Private Data Members – Private Methods – Built- in Functions – Built-in Class Attributes – Garbage Collection – Class Methods – Static Methods.	15	Up to K3	3

P.T.O.

IV	Inheritance, Operator Overloading, Error and Exception handling: Inheritance: Inheriting Classes in Python – Types of Inheritance – Composition or Containership or Complex Objects – Abstract Classes and Interfaces. Operator Overloading: Implementing Operator Overloading – Reverse Adding – Overriding. Error and Exception Handling: Errors and Exceptions – Handling Exceptions – Instantiating Exceptions – Built-in and User-defined Exceptions.	15	Up to K4	4
V	Processes and Threading, Networking, Database Programming and Simple Graphics: Processes and Threading: Multiprocessing Module – Threading Module. Networking: Creating a TCP Client- Creating a TCP Server. Database Programming: SQL Database. Simple Graphics: Simple Graphics Using Turtle.	15	Up to K5	5

Books for Study

1. Python Programming: Using Problem Solving Approach by Reema Thareja, 2017, Oxford University Press.
2. Programming in Python 3: A Complete Introduction to the Python Language by Mark Summerfield, 2018 second edition, Pearson Education.

Chapters

Text Book 1

Unit I - 3, 4, 5

Unit II – 6, 7, Web Resources 1

Unit III – 8, 9

Unit IV - 10, 11, 12

Text Book 2

Unit V - Chapters 10, 11, 12, Appendix C (from Book 1)

Books for Reference

1. Python for Programmers by Paul Deitel& Harvey Deitel, first edition 2020, Pearson Education Inc.
2. Core Python Programming by R. Nageswara Rao, Second edition 2018, Dreamtech.
3. Programming and Problem Solving with Python by Ashok Namdev Kamthane, Amit Ashok Kamthane, McGraw Hill Education India, 2018.

Web Resources

1. <https://realpython.com/python-csv/>
2. <https://docs.python.org/3/>
3. <https://cseweb.ucsd.edu/classes/wi14/cse141/pdf/>

Rationale for Nature of the course

- Develop wide variety of applications including web applications, software and Game development, Network programming, GUI, Scientific and Numeric applications.

P.T.O.

Activities on Skill Oriented

- Practice to write coding
- Quiz
- Seminar

Activities on Employability Oriented

- Software Development
- Data Analysis

Pedagogy

Chalk and talk Materials, PPT, Assignment, Seminar, Group Discussion and Interaction.

Lesson Plan

UNIT	Topics to be covered	Hours	Mode
I	Features of Python– Comments – Reserved Words.	3	Lecture, GD
	Indentation – Operators and Expression.	5	Lecture, PPT
	Decision Control Statements	7	Lecture
II	Python Strings.	5	Lecture
	Built-in String Methods and Functions.	5	Lecture, quiz
	File Handling.	5	Lecture
III	Data Structures.	5	Lecture
	Classes and Objects.	5	Lecture, Seminar
	Built- in Functions.	5	Lecture
IV	Inheritance.	5	Lecture, PPT
	Operator Overloading.	5	Lecture
	Error and Exception Handling.	5	Lecture
V	Processes and Threading.	4	Lecture, Assignment
	Networking.	4	Lecture
	Database Programming.	4	Lecture
	Simple Graphics.	3	Lecture

Course Learning Outcomes

On the completion of the course, the students will be able to

CLOs	COURSE LEARNING OUTCOMES	K – Levels
CLO 1	Explain basics, control statements and modules.	Up to K2
CLO 2	Classify various string operations and File handling methods.	Up to K3
CLO 3	Compare various Data Structures and to implement Classes & Objects	Up to K3
CLO 4	Apply the concepts of Object-Oriented Programming.	Up to K4
CLO 5	Utilize Standard libraries to perform Multithreading, Networking, Database and Graphics.	Up to K5

P.T.O.

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	2	1	2	2	1
CLO 2	2	3	2	2	2	2
CLO 3	2	3	3	2	1	1
CLO 4	2	3	3	2	2	2
CLO 5	2	2	2	2	2	1

(3– Advanced Application, 2 – Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K5
Quiz	5	K4
Total	25	

Learning Outcome Based Education & Assessment (LOBE)

Formative - Blue Print – Model for Python Programming Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K2	2	K1	2(K1&K1)	2(K2)
	CLO 2	Up to K3	3	K1	2(K2&K2)	1(K3)
CIA II	CLO 3	Up to K3	2	K2	2(K3&K3)	2(K3)
	CLO 4	Up to K4	3	K2	2(K4&K4)	1(K4)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		10		10	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

P.T.O.

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	10	10	-	20	33.33	83
K2	-	10	20	30	50	
K3	-	-	10	10	16.67	17
K4	-	-	-	-	-	-
Total Marks	10	20	30	60	100	100

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	-	-	-	-	-	17
K2	10	-	-	10	16.67	
K3	-	10	20	30	50	50
K4	-	10	10	20	33.33	33
Total Marks	10	20	30	60	100	100

Learning Outcome Based Education & Assessment (LOBE)

Summative - Blue Print – Model for Python Programming

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

UNITS	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No of Questions	K - Level	No of Questions	K - Level		
1	CLO1	Up to K2	2	K1& K1	1	K1	2(K1&K1)	1(K2)
2	CLO2	Up to K3	2	K2 & K3	1	K1	2(K2&K2)	1(K3)
3	CLO3	Up to K3	2	K2 & K3	1	K2	2(K3&K3)	1(K3)
4	CLO4	Up to K4	2	K3 & K4	1	K2	2(K4&K4)	1(K4)
5	CLO5	Up to K5	2	K3 & K4	1	K3	2(K4&K4)	1(K5)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analyzing, presentation and make inferences with evidences
- K5 – Ability to integrate ideas from one situation to newer situations.

Distribution of Section – wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total Marks	% of Marks without choice	Consolidated
K1	2	4	10	-	16	13.33%	13%
K2	2	4	10	10	26	21.67%	22%
K3	4	2	10	20	36	30%	30%
K4	2	-	20	10	32	26.67%	27%
K5	-	-	-	10	10	8.33%	8%
Total Marks	10	10	50	50	120	100	100

PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: <i>IM.Sc. Computer Science</i>		
Sem	Course Type	Course Code	Course Title	Time	Maximum	Question Number
I	Elective - 1	21P1DME1(A)	Advanced Computer Organization and Architecture	3 hrs	75 marks	12904

Nature of Course			
Knowledge and skill	✓		Employability oriented
Skill oriented			Entrepreneurship oriented

Course Objectives

1. To impart knowledge on functions of computer.
2. To learn the working principle of CPU with pipelining.
3. To understand memory concepts, arithmetic operations and the importance of I/O system.
4. To know the importance of parallel computing models and properties of networks.
5. To understand the performance of multi core processors.

Unit	Content	Hrs	K-Level	CLO
I	Basic Structure of Computers: Basic operational concepts – Bus structures – Software. Machine Instructions and Programs: Memory operations - Instructions and instruction sequencing– Addressing modes – Basic Input / Output operations – Stacks and Queues – Subroutines.	15	Up to K2	1
II	Basic Processing Unit & Pipelining: Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control. Pipelining: Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets	15	Up to K3	2
III	Memory System & Arithmetic: Basic concepts – Semiconductor RAM – Cache memories - Virtual memory. Arithmetic: Addition & Subtraction of signed numbers – Multiplication of positive numbers – Signed operand multiplication. I/O Organization: Accessing I/O devices –Interrupts – Direct Memory Access.	15	Up to K4	3
IV	Parallel Computer Models: The state of computing - Multiprocessors and multicomputers – Multivector and SIMD computers. Program and Network properties: Conditions of parallelism – Program Partitioning and scheduling – Program flow mechanism - system interconnect architectures.	15	Up to K3	4
V	Multiprocessors and Multicomputers: Multiprocessor System interconnects – Message Passing Mechanisms. Multivector and SIMD Computers: Vector processing principles – SIMD Computer Organizations – Scalable, Multithreaded, and Dataflow Architectures: Principles of Multithreading, Fine-Grain Multicomputers. Software for Parallel Programming: Parallel Programming Models – Parallel Languages and Compilers – Dependence Analysis of Data Arrays.	15	Up to K4	5

P.T.O.

Books for Study

1. “Computer Organization” by Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Fifth Edition, Tata McGraw Hill, 2002.
2. “Advanced Computer Architecture – Parallelism, Scalability and Programmability” by Kai Hwang, Naresh Jotwani, , second edition, TMH, New Delhi.

Chapters

Text Book – 1:

Unit I - 1.3, 1.4, 1.5, 2.3, 2.4, 2.5, 2.7, 2.8, 2.9

Unit II - 7.1 - 7.5, 8.1 - 8.4

Unit III – 5.1, 5.2, 5.5, 5.7, 6.1, 6.3, 6.4, 4.1, 4.2, 4.4

Text Book – 2:

Unit IV – 1.1 – 1.3, 2.1 – 2.4

Unit V – 7.1, 7.4, 8.1, 8.4, 9.2, 9.3, 10.1 – 10.3

Books for Reference

1. “Computer Architecture – A Quantitative Approach” by David A. Patterson and John L. Hennessy, Sixth Edition, Morgan Kaufmann Publishers, Elsevier.
2. “Computer Organization and Architecture – Designing for Performance” by William Stallings, Sixth Edition, Pearson Education, 2003.
3. “Computer Architecture and Organization” by John P. Hayes, Third Edition, Tata McGraw Hill, 1998.

Web Resources

1. <http://list.zju.edu.cn/kaibu/comparch/>
2. <https://www.slideshare.net>
3. <https://cseweb.ucsd.edu/classes/wi14/cse141/pdf/>

Rationale for Nature of the course

- Emphasizes the data flow, timing analysis, memory hierarchy, trade off between execution cycles, hardware requirements/cost and software that must be made in order to produce good system design.
- An overview of computer architecture, which stresses the underlying design principles and the impact of these principles on computer performance. General topics include design methodology, processor design, control design, memory organization, system organization, and parallel processing.

Activities on Knowledge and Skill

- Group Discussion
- Quiz
- Seminar

Pedagogy

Chalk and talk Materials, PPT, Assignment, Seminar, Group Discussion and Interaction.

P.T.O.

Lesson Plan

UNIT	Topics to be Covered	Hours	Mode
I	Basic operational concepts	4	Lecture
	Memory operations	6	Lecture
	Basic Input / Output operations.	5	Lecture & GD
II	Execution of a complete instruction	5	Lecture
	Hardwired control – Micro programmed control	5	Lecture
	Pipelining	5	Lecture & GD
III	Semiconductor RAM – Cache memories	5	Lecture
	Arithmetic Operations	5	Lecture, PPT
	Accessing I/O devices –Interrupts, Direct Memory Access	5	Lecture
IV	The state of computing - Multiprocessors and multicomputers – Multivector and SIMD computers.	7	Lecture
	Conditions of parallelism – Program partitioning and scheduling – Program flow mechanism - system interconnect architectures.	8	Lecture & GD
V	Multiprocessor System interconnects – Message Passing Mechanisms.	4	Lecture
	Vector processing principles – SIMD Computer Organizations - Principles of Multithreading, Fine-Grain Multicomputers.	5	Lecture, Assignment
	Parallel Programming Models – Parallel Languages and Compilers – Dependence Analysis of Data Arrays.	6	Lecture

Course Learning Outcomes

On the completion of the course, the students will be able to

CLOs	COURSE LEARNING OUTCOMES	K - Level
CLO 1	Explain basic operational concepts and identify the use of various Addressing Modes.	Up to K2
CLO 2	Classify types of controls used in instruction execution and inspect the principle of Pipelining.	Up to K3
CLO 3	Compare various memory organizations and focus on Arithmetic Operations and Interrupt techniques to access I/O devices.	Up to K4
CLO 4	Utilize different types of parallelism and interconnect architectures	Up to K3
CLO 5	Assess the use of vector processing, multithreading and parallel processing software.	Up to K4

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	1	-	-	1	-
CLO 2	2	2	2	1	2	-
CLO 3	2	3	2	2	3	2
CLO 4	2	1	-	1	2	-
CLO 5	2	2	1	1	2	2

(3– Advanced Application, 2 – Intermediate Level, 1- Basic Level)

P.T.O.

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K4
Quiz	5	K4
Total	25	

**Learning Outcome Based Education & Assessment (LOBE)
Formative - Blue Print – Model for Advanced Computer Organization
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)**

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K2	2	K1	2(K1&K1)	2(K2)
	CLO 2	Up to K3	3	K2	2(K3&K3)	1(K3)
CIA II	CLO 3	Up to K4	2	K2	2(K4&K4)	2(K4)
	CLO 4	Up to K3	3	K1	2(K2&K2)	1(K3)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		10		10	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	4	10	-	14	23.33	66
K2	6	-	20	26	43.33	
K3	-	10	10	20	33.33	34
K4	-	-	-	-	-	-
Total Marks	10	20	30	60	100	100
K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	6	-	-	6	10	33
K2	4	10	-	14	23.33	
K3	-	-	10	10	16.67	17
K4	-	10	20	20	50	50
Total Marks	10	20	30	60	100	100

P.T.O.

Learning Outcome Based Education & Assessment (LOBE)
Blue Print – Model for Advanced Computer Organization
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Units	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No of Questions	K - Level	No of Questions	K - Level		
1	CLO 1	Up to K2	2	K1 &	1	K1	2(K1&K1)	1(K2)
2	CLO 2	Up to K3	2	K2 &	1	K2	2(K3&K3)	1(K3)
3	CLO 3	Up to K4	2	K3 &	1	K2	2(K4&K4)	1(K4)
4	CLO 4	Up to K3	2	K2 &	1	K1	2(K2&K2)	1(K3)
5	CLO 5	Up to K4	2	K3 &	1	K3	2(K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analyzing, presentation and make inferences with evidences

Distribution of Section – wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total Marks	% of Marks without choice	Consolidated
K1	2	4	10	-	16	13.33	13%
K2	2	4	10	10	26	21.67	22%
K3	4	2	10	20	36	30.00	30%
K4	2	-	20	20	42	35%	35%
Total Marks	10	10	50	50	120	100	100%

PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: I PG		
Sem	Course Type	Course Code	Course Title	Time	Maximum	Question Number
I	NME - 1	21P1DNM1	Office Automation	3 hrs	75 marks	12909

Nature of Course					
Knowledge and skill			✓	Employability oriented	✓
Skill oriented				Entrepreneurship oriented	

Course Objectives

1. To provide foundations for learning computer concept and skills.
2. To explain the functions of the word processing software as used
3. To become familiar with the excel workbook
4. To construct formulas using built-in functions, relative and absolute references.
5. To create presentations that includes text, graphics, animation and transitions.

Unit	Content	Hrs	K-Level	CLO
I	MS WORD 2010: Creating a Document with Word: Viewing the Word Window – Moving around in a Document - Changing Document Views – Setting Up the Page – Setting Up the Page Margins – Selecting Text – Creating an Outline - Checking Spelling and Grammar – Inserting New Pages and Sections - Adding Header and Footers – Inserting Page Numbers and the Date and Time – Creating a Blog Posting on the Web.	6	Up to K2	1
II	Formatting & Enhancing Document with Word: Formatting a Document with Word: Finding and Replacing Formatting – Changing Paragraph Alignment – Changing line spacing – Displaying Rulers – Setting Paragraph Tabs – Setting Paragraph Indents – Changing Character Spacing – Creating Bulleted and Numbered Lists – Hiding Text. Enhancing a Document with Word: Adding a Watermark – Adding Page Backgrounds - Creating a Table – Entering Text in a Table – Modifying a Table – Adjusting Table Cells – Formatting a Table – Calculating a Value in a Table – Addressing Envelops and labels – Creating a Form Letter.	6	Up to K2	2
III	Creating a Worksheet with Excel: Viewing the Excel Window – Selecting Cells – Moving Around the Workbook – Entering Labels on a Worksheet - Entering values on a Worksheet – Entering Values Quickly with AutoFill – Edition Cell Contents – Clearing cell content – inserting and deleting cell contents – Selecting Rows, Columns and Special Ranges – Selecting and Naming a Worksheet – Inserting and Deleting a Worksheet – Moving and Copying a Worksheet – Adjusting Column Width and Row Height.	6	Up to K2	3
IV	Building a Worksheet with Excel: Understanding Formulas – Understanding Cell Referencing – Creating a Simple formula - Create a Formula Using Formula AutoComplete – Editing a Formula – Naming Cells and Ranges – Simplifying a Formula with Ranges – Calculating Totals with AutoSum – Correcting Formulas – Creating Function – Creating Function using the Library.	6	Up to K2	4

V	Creating Presentation with PowerPoint: Viewing the PowerPoint Window – Creating New and Consistent Slides – Working with Objects – Entering and Editing Text –Modifying a Bulleted and Numbered List – Using Slides from Other Presentations- Making your Presentations Look Consistent - Adding background Style – Delivering a Presentation with PowerPoint: Adding Animation – Adding Slide Timing - Creating Slide Transitions – Inserting Videos and Audio- Creating a Custom Slide Show – Starting a Slides Show – Inserting the Date and Time – Inserting Slide Numbers	6	Up to K2	5
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Book for Study

“Microsoft Office 2010 On Demand” First Edition by Steve Johnson, Perspection, Inc, Published by Pearson Education, 2012.

Chapters

Unit I: 6

Unit II: 7, 8

Unit III: 9

Unit IV: 10

Unit V: 12, 13

Books for Reference

1. “Learning Computer Fundamentals, MS Office and Internet & Web Technology” by Dinesh Maidasani, Third Edition, Firewall Media ,
2. “Working with MS Office 2000” by Content Development Group. Tata McGraw-Hill Publishing Company Limited.
3. “PC Software for Windows 98 Made Simple” by R K Taxali, Tata McGraw-Hill Publishing Company Limited.

Web Resources

1. <http://www.computer-pdf.com/office/word/12-tutorial-microsoft-word-201.html>
2. <http://www.word-2010.com/>
3. <http://www.guru99.com/inroduction-to-microsoft-excel.html>
4. <http://www.tutorialspoint.com/powerpoint/index.html>

Rationale for Nature of the course

- Makes it possible for business organization to improve their productivity and recognize easier way to do business in profits.

Activities on Knowledge and Skill

- Formal Letter Writing
- Resume Writing
- Data Manipulation

Activities on Employability Oriented

- Data Entry Operation
- Report Generation with Calculation

Pedagogy

Chalk and talk, Materials, PPT, Assignment, Seminar, Problem solving, Group discussion, Interaction and Demonstration.

Lesson Plan

UNITS	Topics to be covered	Hours	Mode
I	MS WORD 2010	6	Lecture, PPT
II	Formatting & Enhancing Document with Word	6	Lecture,

III	Creating a Worksheet with Excel	6	Lecture, PPT
IV	Building a Worksheet with Excel	6	Lecture, PPT
V	Creating a Presentation with PowerPoint	6	Lecture, GD, Assignment

Course Learning Outcomes

On the completion of the course, the students will be able to

CLOs	COURSE LEARNING OUTCOMES	K - Levels
CLO 1	Describe how to create a Document using Microsoft Word.	Up to K2
CLO 2	Learn the concepts of Formatting & Enhancing Document using Microsoft Word	Up to K2
CLO 3	Design and Create a Worksheet using Microsoft Excel	Up to K2
CLO 4	Perform various calculation using formulae.	Up to K2
CLO 5	Design a slide show using Microsoft PowerPoint	Up to K2

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	2	2	2	2	1
CLO 2	2	2	3	2	3	2
CLO 3	2	2	3	2	3	2
CLO 4	2	2	3	2	3	3
CLO 5	2	2	3	2	2	2

(3 –Advanced Application, 2 – Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K2
Seminar	5	K2
Quiz	5	K2
Total	25	

Learning Outcome Based Education & Assessment (LOBE)

Formative - Blue Print – Model for Office Automation

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Units	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No of Questions	K - Level		
1	CLOX	Up to K2	2	K1	2(K2&K2)	2(K1)
2	CLOY	Up to K2	1	K1	2(K2&K2)	1(K1)
No. of Questions to be asked			3		4	3
No. of Questions to be answered			3		2	2
Marks for each question			2		7	10
Total Marks for each section			6		14	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

P.T.O.

Distribution of Section-wise Marks with K Levels (CIA I & II)

K - Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Total Marks	% of Marks without choice	Consolidated %
K1	6	-	30	36	56.25	100
K2	-	28	-	28	43.75	
Total Marks	6	28	30	64	100.00	100%

Learning Outcome Based Education & Assessment (LOBE)

Summative - Blue Print – Model for Office Automation

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

UNITS	CLOs	K- Level	Section A		Section B		Section C (Open Choice)
			Short Answers		(Either/or Choice)		
			No of Questions	K - Level	No of Questions	K - Level	
1	CLO1	Up to K2	1	K1	1	K2& K2	1(K1)
2	CLO2	Up to K2	1	K1	1	K2& K2	1(K1)
3	CLO3	Up to K2	1	K1	1	K2& K2	1(K1)
4	CLO4	Up to K2	1	K1	1	K2& K2	1(K1)
5	CLO5	Up to K2	1	K1	1	K2& K2	1(K1)
No. of Questions to be asked			5		10		5
No. of Questions to be answered			5		5		3
Marks for each question			2		7		10
Total Marks for each section			10		35		30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers

Distribution of Section – wise Marks with K Levels *

K Levels	Section A Short Answers	Section B (Either/or Choice)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	10	-	50	60	46.16	46%
K2	-	70	-	70	53.84	54%
Total Marks	10	70	50	130	100	100%
