DEPARTMENT OF COMPUTER SCIENCE

Master of Computer Applications (MCA)

P.G. PROGRAMME

SYLLABUS

Effective from the Academic Year 2016-2017

Loyola College (Autonomous)

Chennai- 600 034

RESTRUCTURING-2016 (2016-17 batch ONWARDS)
PG - Arts / Science / Commerce / Social Work

Part	Semester 1	Semester 2	Summer Vacation	Summer 3	Summer 4	Total Hours
Major Core (MC)	30(20 C)	24(20 C)	– –	20(15 C)	30(24 C)	104(79 C)
Elective Subject (ES)	– –	4(3 C)	– –	4(3 C)	– –	8(6 C)
Inter - Disciplinary (ID)	– –	– –	– –	6(5 C)	– –	6(5 C)
Self study Paper (SSP)				Outside class hours(2C)		(2 C)
Summer Training Program (STP)	– –	– –	3 to 4 weeks (1 C)	– –	– –	(1 C)
Life Skills Training (LST)	– –	2h + 2h# (2 C)	– –	– –	– –	2+2# (2 C)
Extension Activities	LEAP	LEAP(3 C)	– –	– –	– –	(3 C)
Total Hours (Total Credits)	30 (20 C)	30+2# (23+5 C)	–(1 C)	30 (23+2 C)	30 (24 C)	120+2# (90+6+2*)C

Note: A theory paper shall have 5 to 6 contact hours and a practical session shall have 3 to 5 contact hours.

LOYOLA COLLEGE (AUTONOMOUS)
CHENNAI - 600 034.

New format of the subject codes from the 2016 regulation

Subject codes are 10 characters long:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th

- 1st & 2nd digits – last two digits of regulation year in YY format (If 2016, it will be 16).
- 3rdalphabet: U – UG / P – PG / M – M.Phil. / D – Ph.D.
- 4th & 5thalphabets: department wise program code(example – MT / CO / HT…..)
- 6th digit: Semester for UG/ PG / M.Phil. and year for Ph.D.
- 7th & 8th alphabet: Category of paper or group of category of papers (GE/RL/OL/HE/OR/AL /ES/SK/MS/CM/CC/ ……)
- 8th & 9th digits: subject number range (01 to 99).

For example,

Example 1:16UCH1MC01

16 – Admitted in 2016
U – UG student
CH – Chemistry Student
1 – 1st Semester subject
MC01 – Major paper

Example 2:16PCO2ID01

16 – Admitted in 2016
P – PG student
CO – Commerce Student
2 – 2nd Semester subject
ID01 – Inter disciplinary paper

- For subjects which are carried forward from one regulation to the next, the first two digits representing the regulation alone will change.
- Subjects which are not carried forward from one regulation to the next, will not appear in the new regulation.
- For new subjects which need to be added to a regulation, a new subject code must be created in continuation of the last created code under that type/category.
- Subject codes which are identical (except for the first two digits which represent the regulation year) are treated as equivalent for the purpose of syllabus / question paper setting / conducting examination / etc.

COMPUTER APPLICATION

Sl. No	Sub.Code No.	Title of the paper
1	16PCA1MC01	DISCRETE STRUCTURES
2	16PCA1MC02	OBJECT ORIENTED PROGRAMMING THROUGH C++
3	16PCA1MC03	FREE AND OPEN SOURCE SOFTWARE
4	16PCA1MC04	DATA STRUCTURES AND ALGORITHMS
5	16PCA1MC05	DATABASE MANAGEMENT SYSTEMS
6	16PCA1MC06	C++ AND DATA STRUCTURES LAB
7	16PCA1MC07	DATABASE MANAGEMENT SYSTEMS LAB
8	16PCA1MC08	TECHNICAL WRITING
9	16PCA2MC01	STATISTICAL METHODS FOR COMPUTER
10	16PCA2MC02	JAVA PROGRAMMING
11	16PCA2MC03	OBJECT-ORIENTED SOFTWARE ENGINEERING
12	16PCA2MC04	COMPUTER ARCHITECTURE AND
13	16PCA2MC05	OPERATING SYSTEMS
14	16PCA2MC06	JAVA PROGRAMMING LAB
15	16PCA2MC07	LINUX PROGRAMMING LAB
16	16PHE2FC01	LIFE SKILLS TRAINING
17	16PCA3MC01	NET TECHNOLOGIES
18	16PCA3MC02	DATA COMMUNICATIONS AND NETWORKING
19	16PCA3MC03	PRINCIPLES OF MANAGEMENT ACCOUNTING
20	16PCA3MC04	.NET TECHNOLOGIES LAB
21	16PCA3MC05	COMPUTER GRAPHICS AND MULTIMEDIA LAB
22	16PCA3ID01	COMPUTER GRAPHICS AND MULTIMEDIA
23	16PCA4MC01	XML AND WEB SERVICES

24	16PCA4MC02	MOBILE COMPUTING

25	16PCA4MC03	OPEN SOURCE WEB TECHNOLOGIES
26	16PCA4MC04	XML AND WEB SERVICES LAB
27	16PCA4MC05	SOFT SKILLS II
28	16PCA4ES01	.NET TECHNOLOGIES FOR ENTERPRISE MOBILITY
29	16PCA4ES02	.NET TECHNOLOGIES FOR ENTERPRISE MOBILITY
30	16PCA4ES03	ADVANCED JAVA PROGRAMMING
31	16PCA4ES04	ADVANCED JAVA PROGRAMMING LAB
32	16PCA4TP01	SUMMER TRAINING PROGRAMME
33	16PCA5MC01	NETWORK SECURITY
34	16PCA5MC02	NETWORK SECURITY LAB
35	16PCA5MC03	DATA MINING
36	16PCA5MC04	CLOUD COMPUTING
37	16PCA5MC05	SOFTWARE TESTING
38	16PCA5MC06	SOFTWARE DEVELOPMENT LAB
39	16PCA5ES01	SOFTWARE PROJECT MANAGEMENT
40	16PCA6PJ01	PROJECT WORK

16PCA1MC01 DISCRETE STRUCTURES

SEMESTER I **CREDITS**

CATEGORY MC(T) **NO.OF HOURS/ WEEK**

Objectives:

To provide mathematical foundation for computer science courses that include data structures, database theory, compiler theory, computer architecture and operating systems.

Unit I Mathematical logic 12 hrs.

Mathematical Logic: Propositional Logic - Propositional Equivalence - Predicates and Quantifiers - Disjunctive and Conjunctive Normal Forms - Minimal Sum of Products – Inference using Predicate Logic.

Unit II Set theory and Mathematical induction 13 hrs.

Set Theory: Sets, Set Operations – Functions – Relations - Equivalence Relations - Partial Orderings - Lattices. Mathematical Induction: Strong Induction and well-ordering - Recursive Definitions and Structural Induction.

Unit III Combinatorics 12 hrs.

Counting: The Basics of Counting - Pigeonhole Principle - Permutations and Combinations - Binomial Coefficients - Recurrence Relations - Inclusion – Exclusion and its Applications.

Unit IV Graph theory 10 hrs.

Graphs: Graphs and Graph Models - Graph Terminology - Representing Graphs and Graph Isomorphism – Connectivity - Euler and Hamilton Paths - Shortest-Path Problems - Planar Graphs. Trees: Application of Trees - Tree Traversal - Spanning Trees - Minimum Spanning Trees.

Unit V Group theory and Finite automata 15 hrs.

Group Theory: Algebraic Structures - Semigroups and

Monoids – Homomorphism - Isomorphism and cyclic groups -

Cosets and Lagrange's Theorem - Elements of Coding Theory. Modeling Computation: Languages and Grammars - Finite-State Machines with output, with No output, Language Recognition.

Book for Study:

1. Kenneth H Rosen, Discrete Mathematics and Its Applications, Tata McGraw-Hill, 6th Edition 2007.
2. Ralph P. Grimaldi and B.V. Ramana, Discrete and Combinatorial Mathematics, Pearson Education, 5th Edition 2007.

Book for Reference:

1. J.P.Tremblay and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, Edition 1997.
2. Kolman, Busby and Ross, Discrete Mathematical Structures, Prentice-Hall, 5th Edition.2000
3. Seymour Lipschutz, Marc Lars Lipson, Discrete Mathematics, Tata McGraw-Hill, 3rd Edition 2010
4. T.Veerarajan, Discrete Mathematics, Tata McGraw-Hill, Edition 2007.

NPTEL Video Lectures from Loyola College Intranet under "NPTEL – Video Portal"
Discrete Structures by Prof.Kamala Kirthivasan, IIT Madras

16PCA1MC02 OBJECT ORIENTED PROGRAMMING THROUGH C++

SEMESTER I **CREDITS 4**
CATEGORY MC(T) **NO.OF HOURS/ WEEK 4**

Objectives:

1. To enable the students to learn the OOPs concepts using C++.

2. To enable the students to learn the basic graphics using C++.

UNIT I

S/W evolution - features of procedure oriented programming –features of object oriented programming - benefits of OOPs—applications of OOPs – preprocessor directives – standard function libraries - basic concepts of OOPs – data types – variables – constants – storage class specifiers – operators – expressions - selection statements – iteration statements – jump statements – expression statement – block statement – arrays: single dimensional array – 2 dimensional array – multidimensional array.

UNIT II -

Functions – simple functions – passing arguments to functions – returning values from functions – categories of function – reference arguments – overloaded functions – recursion - inline functions – scope and storage class – returning by reference – pointers – address of operator & - pointers and arrays – pointers and functions – pointers to object – this pointer – class and object - array of objects - friend functions – constructor and destructor - constructor overloading – types of constructors – references.

UNIT III

Abstract classes – Inheritance - types of inheritance – ambiguity in multiple inheritance – virtual base classes – polymorphism – operator overloading: using friend function – unary operator – binary operator – new - delete – special operators [ ], ( ), -> , comma operator – data conversion –

virtual functions – pure virtual functions – memory management functions.

UNIT IV

Stream classes – Stream errors – disk file I/O with streams - file pointers – error handling in file I/O – overloading extraction and insertion operators – command line arguments – Exception handling – fundamentals – handling derived class options – terminate() – unexpected() – uncaught_exception() function.

UNIT-V

Templates: Generic functions – applying generic functions – Generic classes – C++ GUI libraries – draw basic graphics – CASE STUDIES : simple application development using OOP's – simple graphics programs using OOP's – C++ GUI programming with Qt4.

Books for Study:

1. Herbert Schildt," The complete reference",Tata Mcgraw Hill Publications,3rd edition.

2. Robert Lafore,"Object Oriented Programming in C++", Pearson , 4th edition.

3. Michael Morrison," Learning to draw Basic Graphics in C++", SAMS.

Books for Reference:

1.. E.Balagurusamy," Object Oriented Programming with C++",McGraw Hill Publications. 4th edition.

2. Bjarne Stroustrup," C++ programming languages" Pearson education.3rd edition.

3. John R Hubbard, "programming wiwth C++",Mc Graw Hill , 3rd edition, Schaum's outlines.

4. Madhusudan Mothe, " C++ programming A practical approach", Pearson.

5. Jasmin Blanchette, Mark Summer Field," C++ GUI programming with Qt4", Prentice Hall.

Web references:

1. www.bitavoncpp.com/graphics.html
2. www.informit.com/articles/articles.asp?
3. unlimitedsourcecodes.blogspot.in

16PCA1MC03 FREE AND OPEN SOURCE SOFTWARE DEVELOPMENT

SEMESTER I **CREDITS 4**

CATEGORY MC(T) **NO.OF HOURS/ WEEK 4**

Objectives:

1. To create awareness about Free and Open Source Software
2. To acquire proficiency in Web Programming

Unit I History of FOSS **10 hrs.**

The FOSS Revolution- History of Free/Open Source and BSD Software - FOSS Licences (GPL. *CC*, ..) Living with Free Software - Discussion FOSS Projects

Unit II PHP basics 12 hrs.
Origin and Uses of PHP – Overview of PHP – General Syntactic Characteristics – Primitives, Operators and Expressions – Output Statement – Control Statements – Arrays

Unit III Functions & security 13 hrs.
Built-in Functions – User-defined Functions- Regular Expression – Validating Data Entry – Form Handling – Cookies – Session Tracking

Unit IV MySQL 16 hrs.
MySQL: Getting Started with MySQL – Basic Data Types – Database and Table Creation – Performing Operations on Table Data – Running Calculations on Table Data – Grouping the Data – Functions in MySQL - Database Access with PHP and MySQL. Eclipse, an Integrated Development Environment.

Unit V Basics of JavaScript 9 hrs.
Overview – General Syntactic characteristics – Primitives, Operations, and Expressions – Screen Output and Keyboard Input – Control statements – Object creation and Modification – Arrays – Functions – Constructors – Errors in Scripts.

Book for Study
1. Robert W. Sebesta, Programming with World Wide Web, Pearson Education 7th Edition.
2. T.V.Gopal, Open Source Software, Scitech Publications, Edition 2003
3. Ivan Bayross, Sharanam Shah, MySQL 5 for Professionals, Shroff Publishers, Edition 2007.

Book for Reference
1. Dave W & others, Beginning PHP 5, Wiley-dreamtech,

Edition 2004

2. Steven M Schafer, HTML, CSS, JavaScript, Perl, Python, & PHP, Wiley-Dreamtech, Edition 2005
3. Achyut S.Godbole and Atul Kahate, "Web Technologies", 2/E, Tata McGraw Hill, 2012.

Web Reference

1. http://www.w3schools.com/ for (PHP, MySql, CSS, jQery, AJAX, Angular JS, JSON, Bootstrap)

16PCA1MC04 DATA STRUCTURES AND ALGORITHMS

SEMESTER	**I**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives:

1. To enable the students to learn the Data Structures concepts and implement using C++
2. To teach good algorithm analysis skills to develop programs efficiently.

Unit I Linear Data Structures

Introduction - Abstract Data Types (ADT) – Arrays and its representation – - Linked Lists – Doubly Linked lists – Applications of linked list – Polynomial Addition -Stack – Operations -– Infix to postfix and prefix conversions – evaluation of infix and postfix expressions - Applications of stack -Queue– Circular Queue –Operations - Applications of Queue

Unit II Non Linear Data Structure

Trees: Basic terminologies—properties -- binary trees: representation—tree traversal—reconstruction—binary search trees—forest—conversion of forest intobinary trees—

threaded binary tree —B Trees—AVL trees—Red Black

trees—Splay trees-- Heap tree—construction of max heap-- Sorting: bubble sort—insertion sort— selection sort—quick sort— Hashing -Hashing functions - Collision Resolution Techniques - Open addressing- Separate chaining

Unit III Graphs

Definitions – Representation of graph - Graph Traversals - Depth-first traversal – breadth-first
traversal - applications of graphs - Topological sort – shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Dijkstra's algorithm – Warshall's algorithm.

UNIT IV Greedy and Divide and Conquer Algorithms

Algorithm Analysis – Asymptotic Notations – Greedy Algorithms : Knapsack Problem- Job sequencing with deadlines - Divide and Conquer : Merge Sort – Strassen's Matrix multiplication.

Unit V Dynamic Programming, Backtracking and Branch and Bound Algorithms.

Dynamic Programming: Multistage graphs – 0/1 knapsack. Backtracking: The 8-Queen's Problem – Sum of subsets. Branch and Bound: Travelling Salesman Problem

Books for Study

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia, 2013.

2. Reema Thareja, "Data Structures using C", Oxford Press, 2012.
3. E. Horowitz, S. Sahni and S. Rajasekaran, "Fundamentals of Computer Algorithms", Galgothia Publications, Imprint 2006.

Books for Reference

1. Tanaenbaum A.S.,Langram Y. Augestein M.J " Data Structures using C" Pearson
Education , 2004
2. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education
2003.
3. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", UniversityPress, 2007.
4. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007.
5. 7. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education,1983.
6. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Second Edition
7. Varsha H.Patil , "Data Structures using C++",Oxford University Press.

NPTEL Video Lectures from Loyola College Intranet under "NPTEL – Video Portal" Data Structures and Algorithms by Prof. Naveen Garg, IIT Delhi. Introduction to Problem Solving and Programming by D. Gupta, IIT Kanpur.

16PCA1MC05 DATABASE MANAGEMENT SYSTEMS

SEMESTER	**I**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives:
To learn the concept of Database Management Systems

Unit-I Structured Query Language
Definition - purpose of database system-View of Data- - Database Languages- Database Systems Structure-Relational algebra: Select – Project – Union – Additional operations- Set intersection – Natural join - SQL-Background-data definition -

Set Operations-aggregate functions - Nested sub query - null

values - Complex Queries- views -Modification of databases - Join relations-SQL data types and schemas -integrity constrains - authorization - Embedded SQL-Dynamic SQL- function and procedural constructs -advanced SQL Features.

Unit-II Database Design

Database design**:** Entity Relationship Model: Overview - ER Relationship model - constraints- keys - ER diagram - design issues - Weak entity set - extended features - generalization - Unified modeling language. Relational database design: features of good design - Atomic domain first normal form - decomposition using functional dependency - functional dependency theory - decomposition using functional, multivalued dependencies - More Normal forms - modeling temporal data.

Unit-III Application design and development

User interface and tools - web fundamentals - building large web applications - Triggers - authorization in SQL - **A**pplication security. Over view Physical storage - Magnetic disks -RAID- Tertiary storage - Storage Access - File Organization- Record organization - Data dictionary storage.

Unit-IV Indexing & Hashing

Indexing &Hashing**:** Basic concepts - ordered indices - B+ TREE-B Tree-Static Hashing-Dynamic Hashing- bitmap indices .Query processing - overview - Measure of query cost - Selection operation - sorting - join - other operations - evaluation of expressions. Query Optimization - overview - transformation of relational expressions - Evaluation plan - materialized view.

Unit-V Managing concurrency backup and recovery

Transaction : Transaction Concept- State - Implementation of atomicity and durability - Concurrent execution - recoverability - Concurrency Control -Lock-based -

Timestamp-based - validation based Protocols - Multiple

granularity - Multiversion schemes - Deadlock Handling - Recovery Systems-Failure classification - log based recovery - Recovery with Concurrent Transactions-Shadow Paging-Buffer Management-Case Studies-Oracle-Microsoft SQL Server.

Book for Study

Abraham Silberschatz, Henry F. Korth and S. Sudharssan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2010.

Books for Reference

2. C.J Date, A. Kannan, S. Swaminathan, " An introduction to Database Systems", 8th edition, Pearson 2006.
3. Ramez Elamasri, Shamkant B. Navathe " Fundamentals of Database Systems". 5th edition, Pearson 2009.
4. Raghu Ramakrishnan, Johannes Gehrke, " Database Management System", 4nd edition, McGraw Hill Higher Education, 2010.
5. Alexis Leon, Mathew Leon, " Database Management System", Vikas publications.

NPTEL Video Lectures from Loyola College Intranet under "NPTEL – Video Portal" Database Design by Prof. S. Srinath and Prof. D. Janaki Ram, IIT Madras.

16PCA1MC06 C++ AND DATA STRUCTURES LAB

SEMESTER I **CREDITS 2**

CATEGORY MC(L) **NO.OF HOURS/ WEEK 4**

LAB EXERCISES C++

1. Control statements
    a. Branching statements
    b. Looping statements

2. Arrays

a. Matrix manipulation
b. Polynomial addition

3. Functions
   a. Categories of function
4. Pointers
   a. Pointers to arrays
   b. Pointers to functions
   c. Pointers to objects
5. Class and Objects
6. Array of objects
7. Friend functions
8. Inline functions
9. Constructor and Destructor
10. Types of constructor
11. Constructor Overloading
12. Inheritance types
13. Polymorphism
    a. Function Overloading
    b. Operator overloading(unary and binary)
    c. Virtual functions
14. I/O formatting
15. Files
16. Exception handling
17. Templates
18. Simple programs using graphics.

Data Structures:

1. Stack Operations (checking the boundary conditions)
2. Stack applications
   a. Infix to Postfix expression
   b. Evaluation of Expression
3. Queue Operations (checking the boundary conditions)

4. Circular Queue

5. Singly Linked List (creation, insertion, deletion)
6. Doubly Linked List (creation, insertion, deletion)
7. Linked Stack
8. Linked Queue
9. Sorting
    a. Bubble sort
    b. Selection sort
    c. Insertion sort
10. Searching
    a. Linear search
    b. Binary search
11. Tree Traversals
12. Graph Traversals

16PCA1MC07 DATABASE MANAGEMENT SYSTEMS LAB

SEMESTER I CREDITS 2

CATEGORY MC(L) NO.OF HOURS/ WEEK 4

Lab Exercises

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB.
5. Write PL/SQL procedure for an application using exception handling.
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using

triggers.

9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).

Typical Applications - Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory, etc. using PHP as front end

16PCA2MC01 STATISTICAL METHODS FOR COMPUTER APPLICATIONS

SEMESTER II CREDITS

CATEGORY MC(T) NO.OF HOURS/ WEEK

Objectives:

1. To give foundation in statistical aspect of computer science
2. To develop skill in R programming for Statistical Computing.

Unit I Basic Statistics 16 hrs.

Review of Measures of Central Tendency – Measures of Dispersion: Introduction - Range - Coefficient of Range - Quartiles - Quartile Deviation - Coefficient of Quartile Deviation - Mean Deviation and Coefficient of Mean Deviation. Standard Deviation and Coefficient of Standard Deviation - Coefficient of variation. Correlation: Definition, Types of Correlation - Scatter Diagram method - Karl Pearson's Correlation Coefficients - Correlation coefficients for Bivariate Frequency Distribution. **Regression**: Definition - Regression lines - Regression coefficients - Properties of Regression Coefficients - Fitting of regression lines.

Basics of R Programming. Functions to implement measures of central tendency-measures of dispersion- correlation – regression in R.

Unit II Probability 11 hrs.

Sample space - events - Axiomatic approach to probability - Conditional Probability - Independent events - Baye's formula - Random variables - Continuous and Discrete random variables - Distribution Function of a Random variable - Characteristics of distribution – Expectation – Variance

Unit III Distribution Functions 10 hrs.

Binomial Distribution – Poisson Distribution – Normal Distribution – Uniform Distribution

Unit IV Concept of Sampling : 12 hrs.

Methods of sampling - Concepts of sampling distributions and standard error - Interval estimation of Mean and proportion. Test of Hypothesis - Critical region - Two types of errors - Level of significance - Large sample tests for mean and proportion - Exact tests based on normal, t, F and Chi-square distributions.

Implementation of Testing of Hypothesis using R.

Unit V ANOVA, Time series 11 hrs.

Analysis of Variance ANOVA: One- Way Classification-- Time series analysis - Measurement of Trend and Seasonal variations.

Implementation of Experimental Design and Time Series forecasting in R.

Books for Study

1. R.K.Gupta, "Statistical Methods", PHI
2. Sudha G. Purohit and others, “Statistics using R”, Narosa publication, 2009.

Books for Reference

1. S.C. Gupta and V.K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand Publication.
2. S.C. Gupta and V.K. Kapoor, "Fundamentals of Applied Statistics", Sultan Chand Publication.
3. John Verzani, "Using R for Introductory Statistics", CRC Press.
4. Michael J.Crawley, "Statistics an introduction using R".
5. Torsten Hothorn, Brain Everitt, "Handbook of Statistical Analysis using R.
6. Phil Spector, "Data Manipulation with R", Springer, 2008.

Nicholas J.Horton and Ken Kleinman, "Using R for Data Management, Statistical Analysis and Graphics.

16PCA2MC02 JAVA PROGRAMMING

SEMESTER II **CREDITS**
CATEGORY MC(T) **NO.OF HOURS/ WEEK**

Objectives:

1. To introduce the basics of Java Programming

2. To prepare them to learn advanced Java Programming

Unit I Introduction to Java 11 hrs.

Java Language origin and Features - java buzz words - OOPS Concepts – Lexical Issues- Data types – Variables – Arrays - Operators – Control Statements. Classes – Objects – Constructors – Overloading Methods – Access Control- static and Fixed Methods – Inner classes. Inheritance – Overriding methods – Abstract classes.

Unit II String classes 13 hrs.

String Objects – String methods – String buffers - I/O

streams. Packages in java - Access Protection – Importing

Package – interaction among packages - Interfaces – Exception handling – Throw and Throws - User defined exception.

Unit III Java Threading 12 hrs.

Thread -Synchronization – Messaging - Runnable Interface - Inter-thread Communication – Deadlock – Suspension, Resuming and Stopping threads – Multithreading - Util Packages.

Unit IV Applet 11 hrs.

Applet basics – Architecture – Applet Skeleton – Using status window – HTML applet tags – Passing parameters to applets – Methods available in applets Audioclip, AppletStub Interfaces- Event handling: Event classes – source – Listener interfaces - Mouse, Keyboard events.

Unit V Working with Awt classes and networking basics 13 hrs.

AWT controls- layout managers and menus- Networking: basics – Socket Programming – Proxy Servers – TCP/UDP Sockets – Net Address – URL Datagrams - JDBC: Types of drivers - Steps to establish connectivity - example of connectivity.

Books for Study

1. Herbert Schildt, ” The Complete Reference JAVA 2”,7th Edition, Tata McGraw Hill.2010.
2. Dr. K. Somasundaram " Programming in Java2", Jaico Publishing house, 2005. (JDBC)

Book for Reference

1. Y. Daniel Liang, " Introduction to Java Programming", 7th Edition, Pearson education, 2010.
2. Dr. C. Muthu, "Programming with Java", 2nd edition, Tata McGraw Hill.2010.

3. C. Thomas Wu " An introduction to Object-Oriented Programming with Java" , McGraw Hill international edition 2010,
4. Joseph L. Weber "Using Java 2 platform", Prentice Hall of India(PHI),

16PCA2MC03 OBJECT-ORIENTED SOFTWARE ENGINEERING

SEMESTER II CREDITS

CATEGORY MC(T) NO.OF HOURS/ WEEK

Objectives:

1. Imparting the importance of software engineering, its methodologies, and process.
2. Emphasizing UML Object Orientation in Software Engineering .

Unit I Software Engineering Concepts.

Software And Software Engineering - Process Models - Software Development Methodologies: Conventional , Agile - System Development As A Process Of Change – System Development And Reuse – Methodology. Object-Oriented System Development: Introduction – Function/Data Methods – Object-Oriented Analysis – Object-Oriented Construction – Object-Oriented Testing. **No. of Hours:13**

Unit II Modeling With UML

Introduction – An Overview – Modeling Concepts – A Deeper View Into UML: Use Case Diagram – Class Diagram – Interaction Diagram – Statechart Diagram – Activity Diagram – Diagram Organization.- System Development Is Model Building - The Requirements Model – The Analysis Model.
No. of Hours:13

Unit III Construction

Introduction – The Design Model – Block Design – Working With Construction – User Interface Design - Object DBMS. Components: What Is Component – Use Of Component.
No. of Hours:12

Unit IV Testing

Introduction – Testing Concepts – Testing Activities: Component Inspection – Usability Testing – Integration Testing – System Testing –Planning Testing - Documentation Testing – Regression Testing – Automation Testing. Case Study: Warehouse Management System. **No. of Hours:11**

Unit V Managing Object-Oriented Software Engineering

Introduction – Project Selection – Product Development Organization –Project Organization and Management – Project Staffing – Software Quality Assurance – Software Metrics – Software Configuration Management. **No. of Hours:11**

Books for Study

1) Roger S. Pressman, Software Engineering – A Practitioner's Approach, Seventh Edition, 2010.
2) Ivar Jacobson Et.Al , Object-Oriented Software Engineering, Pearson Education, 1992.
3) Bernd Bruegge, Allen H. Dutoit, Object-Oriented Software Engineering, Pearson Education, Second Edition, 2004.

Books for Reference

1) Grady Booch & Others, Object-Oriented Analysis And Design With Applications, Pearson Education,Third Edition, 2010
2) Stephen R.Schach, Object-Oriented And Classical Software Engineering, Tata Mcgraw-Hill, Fifth Edition, 2002
3) Ali Bahrami, Object Oriented System Development, Mcgraw-Hill International, 1999.
4) NPTEL Video Lectures From Loyola College Intranet Under "NPTEL – Video Portal"

16PCA2MC04 COMPUTER ARCHITECTURE AND MICROPROCESSOR

SEMESTER II CREDITS

CATEGORY MC(T) NO.OF HOURS/ WEEK

Objectives

To understand the structure and logic behind the operations of various functional modules of a computer and the interaction between them. To introduce the basic concepts of Microprocessor

Unit I Basics of Logic Design No. of Hours:13

Introduction: Simple Computer Organization - Number System – Data Representation – Boolean Algebra – Logic Gates - Map Simplification – K Map - Introduction To Sequential Circuits And Combinational Circuits.

Unit II Digital Components and Organization No. of Hours:12

Adders – Subtractors – Decoders – Multiplexer – Flip Flops: RS, JK, D, T Flip Flops – Excitation Table – Master / Slave Flip Flop- Registers – Counters – General Register Organization.

Unit III Basic Computer Architecture No. of Hours:11

Instruction Format – Instruction Type - Timing And Control – Addressing Modes – Memory Reference Instructions – Data Transfer And Manipulation – Computer Arithmetic – RISC - CISC.

Unit IV Microprocessor 8086 No. of Hours:12

Microcomputer: structure and operation . Microprocessor: evolution and types— 8086 internal architecture—pin configuration.—Introduction to programming: addressing modes—program development steps -- program development tools— standard program structure.

UNIT V Microprocessor Operations No. of Hours:12

Assembler directives - Instruction descriptive— procedures – Macros— Bus signals : 8086 bus activities—observing bus signals. CASE STUDIES: simple application development using MASM, Emulator

Books for Study

1. M.Morris Mano "Computer System Architecture", Pearson Education, Third Edition 2007.
2. M.Morris Mano "Digital Logic And Computer Design", Pearson Education, 1979, Tenth Impression: 2008.
3. Douglas V. Hall," Microprocessors and Interfacing". Tata McGraw-Hill edition, 2nd edition,1999.
4. V.Vijayendran, " Fundamentals of Microprocessor", V.Subramanian & S.Viswanathan Publishers pvt Ltd.

Books for Reference

1. William Stallings, " Computer Organization And Architecture – Designing For Performance", Eighth Edition, 2010.
2. Thomas C.Bartee, "Computer Organization And Digital Logic" Pearson Education, Seventh Edition, 2006.
3. John P.Hayes"Computer Architecture And Organization", Mcgraw-Hill NPTEL Video Lectures From Loyola College Intranet Under "NPTEL – Video Portal"

- Computer Organization By Prof. S. Raman, IIT Madras
- Computer Architecture By Prof. Anshul Kumar, IIT Delhi

16PCA2MC05 OPERATING SYSTEMS

SEMESTER II CREDITS

CATEGORY MC(T) NO.OF HOURS/ WEEK

Objectives:

1. To impart hands-on training on the fundamental OS Concepts by being centric onUNIX
2. To enable students to acquire theoretical knowledge along with the know-how to implement the concepts

programmatically

3. To expose students to the various gamut of UNIX Programming such as Shell Scripts,Stand-alone and Network Programming

Unit I

Operating System – Definition – Functions – Components – Goals – Types of OSs, CPU Scheduling- Scheduling Strategies – Preemptive Strategy – Policies under PreemptiveStrategy, Non-Preemptive Strategy – Policies under Non-preemptive Strategy. 11 Hrs

Unit II

MemoryHierarchy – Memory Management Functions – Memory Management Techniques – SingleContiguous – Partitions – Paging- Segmentation.
UNIXArchitecture - Shell – Shell Scripts – Shell Programming – UNIX Basic Commands 12 Hrs

UNIT III

UNIX system Overview -Files and directories -File I/O – Files and Directories- File systems – Symbolic links - Standard I/O -library – Streams and file objects –Buffering - System data files and information - Password file – Group file – Login accounting –System identification. 12 Hrs

Unit IV

Process Environment – Process Control – Process relationship –Signals – Thread and Thread control -Process Communication using Message Queue - Pipes – FIFOs – Deadlock – Mutex – Process Synchronization using Semaphores and Shared Memory 12 Hrs

Unit V

Introduction to OSI Model – Transport Layer – Ping and Traceroute - UNIX Networking Commands - Sockets - Sockets API for Connection oriented Data Transmission –

Sockets API for Connectionless Data Transmission -TCP

Sockets – UDP Sockets – Raw Sockets – Socket Programming 13 Hrs

Books for Study

1. H.M Dietel, P.J Dietel, D.R. Choffnes – "**Operating Systems**" – Third Edition – Pearson Education
2. James L. Peterson, Abraham Silbershatz – "**Operating System Concepts**" – Second Edition- Addison Wesley Publication
3. W.Richard Stevens, Stephen A. Rago – "**Advanced programming in the UNIX environment**", Third Edition- Addison Wesley Publication

Books for Reference

1. **Silberschatz , Galvin , Gagne** , Operating System Concepts , 9/E,John Wiley 2015
2. **Andrew S. Tanenbaum, Modern Operating Systems, 3/E , Printice Hall of India**
3. Stuart E. Madnick, John J. Donovan –"**Operating Systems**" - Tata McGraw-Hill- 2009 Edition

P.M. Dhamdhere – "**Operating Systems - A Concept-based Approach**"- Tata McGraw-Hill- 2006 Edition

NPTEL Video Lectures from Loyola College Intranet under "NPTEL – Video Portal" Operating Systems by Prof. P.C.P. Bhatt, IISc., Bangalore

16PCA2MC06 JAVA PROGRAMMING LAB

SEMESTER II CREDITS

CATEGORY MC(L) NO.OF HOURS/ WEEK

LAB EXERCISES

1. Programs implementing Inheritance, method overriding
2. Programs implementing Access specification among

the package.

3. Programs implementing Inter Thread communication.
4. Programs implementing Calendar, random, vector classes.
5. Programs implementing the event handling both mouse and Keyboard.
6. Programs implementing AWT menus, font, images, images.
7. Programs implementing JBDC to a applet window to get and displaying Student details.
8. Programs using socket programming

16PCA2MC07 LINUX PROGRAMMING LAB

SEMESTER	**II**		**CREDITS**
CATEGORY	**MC(L)**	**NO.OF HOURS/ WEEK**	

LAB EXERCISES

1. Program to demonstrate the UNIX basic Commands.
2. Program using basic Network commands.
3. Program to demonstrate the Programming Constructs for Shell Scripts.
4. Construction of a Shell Script that validates whether the entered name corresponds to a file name or directory name.
5. Program to demonstrate the Access Permissions.
6. Program to demonstrate System Calls for File I / O : Create, Open, Read, Write, Close, Stat, fstat, lseek.
7. Program to deploy Inter Process Communication using Pipes .
8. Program to deploy Inter Process Communication using FIFOs.

9. Program to deploy Inter Process Communication using Message Queues.
10. Program to perform Inter Process Communication using shared Memory.
11. Program to perform synchronization using Semaphores.
12. Program to demonstrate Shortest Job First CPU Scheduling.
13. Program to demonstrate Round-Robin Scheduling.
14. Program using TCP sockets (Client and Server).
15. Program using UDP sockets (Client and Server). And Program for FTP

16PHE2FC01 LIFE SKILLS TRAINING

SEMESTER II **CREDITS 2**
CATEGORY FC(T) **NO.OF HOURS/ WEEK 2+2**

OBJECTIVES OF PG SYLLUBUS

1. To improve and sustain the primal level of competence and performance of PG students through an advanced training of holistic development of oneself.
2. To empower through various skills and strengthen them to face the future life issues and challenges.
3. To equip them with practical and value based learning of soft skills for a better life in future.

INSIDE CLASS HOURS (2 hrs)

Unit – I: Constructing Identity

Self Image – Understanding self image – shadows down the lane – self acceptance - **Self Knowledge** – Knowing oneself - **Self**

confidence – Guilt and grudges - Power of belief – positive

thinking– optimizing confidence - **Self development –** perception, attitude and Behavioural change, developing a healthy and balance personality - **Self esteem –** signs - indicators

Unit – II: Capacity Building

Motivation – Definition, types (Intrinsic and Extrinsic), Theories (Maslow's hierarchical needs, etc), Factors that affect motivation, Challenges to motivation, Strategies to keep motivated, motivational plan. **Time Management Skills**– steps to improve time management, overcoming procrastination, assessing and planning weekly schedule, challenges, goal settings, components of goal settings, consequences of poor time management, control of interruption and distractions.

Communication, public speaking, talents, creativity, learning,

Unit – III: Professional Skills

-Leadership development skills – difference between leader and manager, different styles and their utilities, functions of leadership, application of knowledge, overcoming from obstacles, influential skills and Leadership qualities. **Application skills** – Managing Career and self-direction, Visionary thinking, formulating strategies, shaping strategies, building organizations relationships, change management. Project Management Skills, Independent working skills, Writing skills, Public Speaking, analytical Skills, Neo Research and Development. **Problem solving skills** – Process, approaches and its components, creative problem solving, Tools and techniques, application of SMART analysis and barriers to problem solving.

Unit – IV: Life Coping Skills

Life skills – Personal and reproductive Health, love, sex, marriage and family – family life education – Gender Equity - child bearing and Childrearing practices, Geriatric Care - adjustability **Human**

Relationship – formal and informal - peer group – friends – same and other gender - family – Colleagues – community – emotional intelligence - **Stress Coping skills –** Definition of stress, strategies to alleviate stress, problem and emotion focused coping, techniques to reduce stress, stress reaction phases, crisis intervention steps, creating positive affirmations, Signs, Symptoms and Reactions of Stress.

Unit – V: Social Skills

Human Rights Education, Understanding Human Rights, International and national mechanisms, protection and preservation of HRs, Human Rights in the context of new, technological and electronic society, **Peace Education,** Social Harmony in the context of religious fundamentalism and fanaticism, Understanding Peace and Justice, Conflict Resolution Strategies

Reference books

1. Healing Your Emotional Self: A Powerful Program to Help You Raise Your Self-Esteem, Quiet Your Inner Critic, and Overcome Your Shame by Beverly Engel
2. Self-knowledge and self-discipline by B. W. Maturin
3. Motivation: Biological, Psychological, and Environmental (3rd Edition) by Lambert Deckers
4. Getting Things Done: The Art of Stress-Free Productivity by David Allen
5. Managerial Skills in Organizations by Chad T. Lewis
6. Social Intelligence: The New Science of Human Relationships by Daniel Goleman

Competence building	Career Preparatory Training
Power talk	Interview Guidance
Emotional Intelligence	Group Dynamics
Stress management	Leadership skills
Decision Making	Negotiation Skills
Positive image building	Creative writing

OUTSIDE THE CLASS HOURS (2 hrs)

- Each student will choose either of the above-mentioned modules and is expected to undergo a training/workshop in that module.

- She/he will have to accomplish ten hrs outside the class hours to fulfill the 2 credits.

Methodology

Inputs, ABL model, Documentaries, group activities and Interaction, Special workshop by professionals.

Evaluation

There will be end test and a Project for 'inside the class hours'. Viva Voce will be conducted for the 'Outside the class hours'.

16PCA3MC01 .NET TECHNOLOGIES

SEMESTER III **CREDITS 4**
CATEGORY MC(T) **NO.OF HOURS/ WEEK 4**

Objectives

1. To introduce the students to .NET Framework and Visual Studio 2013
2. To impart skills for developing Window Store App and Window Phone App development and deployment
3. To train the students on ADO.NET Entity Framework model, for scalable data connectivity with Apps

Unit I Gaining grounds with .NET Framework, Window Store, & VB.NET IDE(10 Hours)

Introduction to .NET Framework, History of the Platform of .NET - .NET Framework Components Overview with Focus on CLR, CTS, Window Store, Accessing Window Store, Certification, Window Store Requirements Check list, VB.NET Development opportunities, VB.NET IDE, Tool in the IDE, The Designer and XAML Markup, Creating Widow Store App – Designing the User Interface – Code Editor – Running Window Store Apps, Building an executable file, Window desktop Apps using Windows Forms – Working with properties, Publishing a Window desktop App

History of the Platform of .NET - .NET Framework Components Overview with Focus on CLR, CTS.

Unit II - VB.NET Programming Techniques (12 Hours)

Introduction to Client-server programming model – Front-end Vs. Back-end, Fron-end development using VB.NET, Mastering data types, operators, and string processing, Control Structures, Short-circuiting Logic, Trapping Errors by using structured error handling, Using array, collections, and generics to manage data

Unit III - UI / UX Development in VB.NET (14 Hours)

Fields vs. Controls - Working with Window Store app controls, Forms vs. Windows –Working with Windows Forms Controls, XAML markup step by step - Introduction to XAML styles, Exploring (Windows 8.1 design features: Command bar, flyout, tiles, and touch, Developing Console Apps, Functions in VB.NET

Unit IV – Working with Data and Entity Framework (14 Hours)

OOPs Techniques, Introduction to data management with LINQ, Manipulating data using LINQ, Introduction to ADO.NET – Connected ADO.NET Architecture –

Disconnected ADO.NET Architecture – Entity Framework,

the successor of ADO.NET, Defining and Entity, Entity Framework Elements, Developing a simple Entity Framework Example

Unit V – Windows Phone 8 App development (10 Hours)

Opportunities in the Window Phone 8 platform, Key Windows Phone 8 Features, The Windows Phone Store, Work with Windows Phone SDK 8.0, Comparing Windows Phone 8 and Window Store Platforms – Differences and Similarities, Creating Windows Phone 8 Application, App life cycle considerations

Books for Study

1. Michael Halvorson, "Microsoft Visual Basic 2013 Step by Step", Edition 2013, Microsoft Press, ISBN: 978-0-7356-6704-4
2. John Paul Mueller, "Microsoft ADO.NET Entity Framework Step by Step", Edition 2013, Microsoft Press, ISBN: 978-0-735-66416-6

Books for Reference

1. Kogent Learning Solutions, ".NET Framework 4.0 in Simple Steps", Edition 2011, Dreamtech Press.

16PCA3MC02 DATA COMMUNICATIONS AND NETWORKING

SEMESTER	**III**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives

1. To enable the students to learn the basics of data communication.
2. To enable the students to understand functionality of 7

layers of OSI model and the like.

UNIT I - 10 hrs

Introduction -- network——protocols and standards—topology—transmission modes-network types--network models: OSI model—TCP\IP . Physical layer: analog and digital signals— performance--digital transmission: digitial to digital conversion – analog to digital conversion--analog transmission: digital to analog conversion – analog to analog conversion—bandwidth utilization: --multiplexing—spread spectrum—transmission media: guided media—unguided media. switching: circuit switch—packet switch—structure of switch.

UNIT II - 13 hrs

Data link layer :Error detection and correction: types of errors—VRC—LRC--CRC—checksum— forward error correction .data link control: services – protocols—HDLC—PPP. —point to point protocol-- Multiple access: random access—controlled access—channelization. Ethernet: standard Ethernet---fast Ethernet—gigabit Ethernet—10Gigabit Ethernet. other networks: ATM Wireless Lans--IEEE 802.11—bluetooth—satellite network--connecting devices—backbone networks—virtual LANs—frame relay.

UNIT III - 11 hrs

Network layer : introduction – services-- IPv4 addresses—network layer protocols—IP—ICMP—mobile IP--routing: routing algorithms-- unicast routing protocols—multicasting basics—intradomain multicast protocols—interdomain multicast protocols—IGMP—IPv6—protocol-- transition from IPv4 to IPv6.

UNIT IV - 14 hrs

Transport layer: Transport layer protocols—UDP—TCP—SCTP. Application layer: WWW—HTTP—FTP—email---DNS. Network management: SNMP—Multimedia: compression— multimedia data—multimedia in the internet—realtime interactive protocols.

UNIT V - 12 hrs

Security: introduction—confidentiality—other aspects of security—Internet security:--network layer security—transport layer security—application layer security--firewalls—Introduction to MPLS.

Books for Study

1. Behrouz A. Forouzan,"Data Communications and Networking", 4th edition,2006, The McGraw Hill Education Private Limited, New Delhi.

2. Behrouz A. Forouzan,"Data Communications and Networking", 5th edition, The McGraw Hill Education Private Limited, New Delhi.

3. Behrouz A. Forouzan," TCP/IP protocol suite", 3rd edition,2006, The McGraw Hill edition, New Delhi.

Books for Reference

1. "Data communication and computer networks", ISRD group, Tata McGraw hill publications.
2. Larry L.Peterson and Bruce S. Davie,"Computer networks-a system approach", 3 rd edition, Morgan Kaufmann publishers.

3. William Stalings, " Data and Computer communications", 6thedition, Pearson Education.
4. Andrew S Tanenbaum ,"Computer Networks", 4th Edition, Prentice Hall.
5. Natalia Olifer,Victor Olifer, "Computer Networks- Principles, Technologies and Protocols for Network design",2011,Wiley India..
6. Bhushan Trivedi,"Computer Netwotks", 2011,Oxford University press.

NPTEL Video Lectures from Loyola College Intranet under "NPTEL – Video Portal"

1. Computer Networks by Prof. Sujoy Ghosh, IIT Karagpur Computer Networks by Prof. Ajit Pal, IIT Karagpur
2. Computer Networks by Prof. Hema A Murthy, IIT Karagpur
3. Data Communications by Prof. Ajit Pal, IIT Karagpur
4. Data Communications by Prof. H. S.Jamadagni, IISc, Bangalore

16PCA3MC03 PRINCIPLES OF MANAGEMENT ACCOUNTING

SEMESTER	**III**	**CREDITS**	**3**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives

1. To impart the fundamentals on different forms of accounting
2. To understand financial and management accounting by explaining how the latter is used by internal decision makers

3. To empirically demonstrate how an organization's mission, goals, and investment strategies affect the different facets of management accounting

Unit I Introduction to Accounting

Accounts, Accounting, and Accounting – Conventions Types of Book-keeping – Braches of Accounting – Financial Accounting, Cost Accounting, Management Accounting - Definition for Management Accounting – Nature and Scope of Management Accounting – Characteristics - Difference between Management Accounting and Balance Sheet – Tools and Techniques in Management Accounting

Unit II Ratio Analysis

Meaning of Ratio – Steps in Ratio Analysis – Advantages – Limitations – Classification of Ratios – Traditional Classification – Introduction to Profit and Loss Account Ratios, Balance Sheet Ratios, Profit and Loss and Balance Sheet Ratios – Functional Classification – Profitability Ratios, Turnover Ratios, Financial Ratios – Problems

Unit III Fund Flow Statement Preparation

Fund Flow Statement – Meaning, Objectives, Advantages – Limitations – Value Proposition – Preparation of Fund Flow Statements. Cash Flow Statements – Meaning – Differences between Cash Flow Statement and Fund Flow Statement – Advantages – Limitation – Preparation of Cash Flow Statements as per Accounting Standard III

Unit IV Budgetary Control and Marginal Costing

Budget - Essentials of Successful Budgetary Control – Classification of Budget based on Functions – Sales Budget, Production Budget, Purchase Budget, Cash Budget, Zero-Base Budgeting - Intro to Marginal Costing and Break-even Analysis

Unit V Capital Budgeting

Definition – Significance – Factors affecting the Capital Expenditure Projects – Methods of Capital Budgeting – Traditional Methods – Pay-back Period Method, Modern Pay-back Period Method, Average Rate of Return (ARR) – Discounted Cash Flow Method - Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR) Method

Books for Study

1. T.S. Grewal, "Introduction to Accountancy", Edition 2008, S.Chand and Company Ltd.
2. A. Murthy and S. Gurusamy, "Management Accounting", Edition 2006, Vijay Nicole Imprints Pvt. Ltd.

Books for Reference

1. Rachchh - Gadade – Patil – Rachchh, "Introduction to Management Accounting", Edition 2011, Pearson Education.
2. L. Solomon Raj, A. Arockiyasamy, "Management Accounting", Edition 2011, Vijay Nicole Imprints Pvt. Ltd.

16PCA3MC04 .NET TECHNOLOGIES LAB

SEMESTER III CREDITS

CATEGORY MC(L) NO.OF HOURS/ WEEK

Lab Exercises

1. Demonstrate the conditional statements in VB.NET using a console application
2. Demonstrate the looping statements in VB.NET using a console application
3. Develop an application that demonstrates the windows controls

4. Develop a windows application with Menus and Dialog Boxes
5. Demonstrate Multithreaded Programming
6. Demonstrate subroutines and functions
7. Develop an application for deploying various built-in functions in VB.NET
8. Develop an MDI application for Employee Pay-roll transactions
9. Construct a console application to demonstrate the OOP Concepts
10. Demonstrate Events, Delegates, and Interfaces
11. Develop a Windows applications with database connectivity for core-banking transactions
12. Develop a web application for dynamic Login Processing

16PCA3MC05 COMPUTER GRAPHICS AND MULTIMEDIA LAB

SEMESTER III **CREDITS 2**
CATEGORY MC(L) **NO.OF HOURS/ WEEK 4**

Lab Exercises

1. Program using OpenGL library functions, to implement the basic primitives such as POINT, LINES, QUAD, TRIANGLES and POLYGON etc.
2. Program using OpenGL library functions, to implement the line chart as per user input. Input monthly data for period of one year.
3. Program to draw hard wired house by using basic primitives of OpenGL library functions.
4. Program by using OpenGL library functions, to implement the Digital Differential Analyser line drawing algorithm.

5. Program by using OpenGL library functions, to implement the Bresenham's Line drawing, Circle drawing, Mid-point Circle drawing and Mid-point Ellipse drawing algorithms.
6. Program by using OpenGL library functions, to implement the Cohen-Sutherland Line clipping algorithm.
7. Program by using OpenGL library functions, to implement the Liang-Barsky Line clipping algorithm..
8. Program to demonstrate 2D and 3D transformations.
9. Window to Viewport Transformation
10. Sp Splines Using OpenGL, 2D Animation

16PCA3ID01 COMPUTER GRAPHICS AND MULTIMEDIA

SEMESTER	**III**	**CREDITS**	**5**
CATEGORY	**MC(L)**	**NO.OF HOURS/ WEEK**	**3+3**

Objectives:

1. To enlighten the students on the actual foundations of 2D and 3D graphics and toappreciate the process in projecting 3D scene on a 2D plane.
2. To introduce the theories and practice of components of multimedia

UNIT I Introduction and Output Primitives

Introduction – Applications - Overview of Graphics System – Introduction to OpenGL – Output Primitives – Line - Circle -Ellipse Generating Algorithms – Interactive Input Methods. 12 Hrs

UNIT II 2D Graphics

Two - dimensional-Basic Transformations,Reflection – Shear-Two dimensional Viewing pipeline – OpenGL two dimensional Viewing Functions -Two dimensional Line and

polygon clipping – Splines - Bezier Curves. 12 Hrs

UNIT III 3D Graphics

Three -Dimensional Viewing - Visible Surface Detection Methods –Polygon rendering methods – Color Models and Color Applications – Computer Animation. 12 Hrs

UNIT IV Introduction to Visual Design

Design-definition, language of design –process of designing-Elements of design – line; applications of geometrical forms-two dimensional and three dimensional, volume and mass, texture, pattern, black and white, colour, space, movement, colour and space, form and space, visual structure. 12 Hrs

UNIT V Principles of Visual Design

Principles of design – balance, contrast, harmony, rhythm, proportion, emphasis, scale and unity. Visual center of design; space; formal and informal balance; scale-size, shape contrast; rhythm & movement; layout principles: rule of thirds, grids; proportion-the golden mean and the unity of layout elements; basic design applications. 12 Hrs

TEXT BOOKS

1. Donald Hearn and M. Pauline Baker , “Computer Graphics with OpenGL”,Third Edition,
2. 2004,Prentice Hall.
3. Timothy Samara, [2007] Design Elements: A Graphic Style Manual Rockport Publishers.
4. RanjanParekh ,“ Principles of Multimedia”, 1st Edition, 2006, Tata McGraw-Hill

REFERENCE BOOKS

1. Hearn D and Baker M.P, “Computer graphics – C Version”, 2004, 2nd Edition,
Pearson Education.

16PCA3ES01 RESOURCE MANAGEMENT TECHNIQUES

SEMESTER III **CREDITS**
CATEGORY ES(T) **NO.OF HOURS/ WEEK**

Objectives

1. To impart the knowledge of managing the resources in a software project.
2. To teach algorithms pertaining to Networks.
3. To impart the skills of effective decision making

UNIT-I Linear Programming model 16 hrs.

Introduction and Applications of Resource Management Techniques – Mathematical Formulation – Graphical solution – Simplex method – Artificial variable techniques – Variants of simplex method – Revised simplex method.

UNIT- II Transportation and Assignment model 11 hrs.

Mathematical formulation of transportation problem – Methods for finding initial basic feasible solution – optimum solution – degeneracy – Mathematical formulation of assignment problem – Hungarian algorithm – Variants of assignment problem.

UNIT- III Decision Analysis, Game and Replacement Theory 12 hrs.

Decision Making under Certainty – Decision under Risk – Decision under Uncertainty – Game Theory – Two Person Zero-Sum Games – Mixed Strategy Games.

Replacement model: Replacement of items that deteriorates gradually: value of money does not change with time –

changes with time Replacement of items that fails suddenly: Individual replacement – Group replacement.

UNIT- IV Network Models 11 hrs.

Shortest-Route Problems – Maximal Flow Problems – Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

UNIT-V Queuing Models 10 hrs.

Characteristics of Queuing Models – Poisson Queues (M/M/1): (FIFO/∞/∞),

(M/M/1): (FIFO/N/∞), (M/M/C): (FIFO/∞/∞) models.

Books for Study

1. Taha H.A., Operations Research: An Introduction,7th Edition, 2004, Pearson Education.
2. Kanti Swarup, Gupta, Man Mohan, Operations Research, 2010, Sultan Chand Publication.

Books for Reference

1. Ravindran, Philips, Solberg, Operations Research-Principles and Practice, 2nd Edition, 2007,Wiley India.
2. J.K.Sharma, Operations Research- Theory and Applications, 2nd Edition, 2003,Macmillan India.
3. Prem Kumar Gupta, D.S.Hira, Operations Research, S.Chand

16PCA3ES02 SYSTEM SOFTWARE

SEMESTER III **CREDITS 4**
CATEGORY ES(T) **NO.OF HOURS/ WEEK 4**

Objectives

To give introduction to the design and implementation of various types of system software**.**
To understand the relationship between system software and machine architecture
To understand the design, function and implementation of software tools

UNIT I BASICS OF SYSTEM SOFTWARE AND ASSEMBLER 12 hrs.

Introduction – System software and SIC/XE machine architecture - Basic assembler functions –
Assembler algorithms and data structures – Machine dependent assembler features, Instruction
formats and addressing modes – Program relocation – Machine independent assembler features –Literals – Symbol-defining statements – Expressions – Program Blocks – Control Sections and Program Linking-Implementation examples MASM assembler.

UNIT II LOADERS AND LINKERS 12 hrs.

Basic loader functions: Design of an Absolute Loader – A Simple Bootstrap Loader. Machine-
Dependent loader features: Relocation – Program Linking – Algorithm and Data Structures for Linking Loader. Machine-Independent loader features: Automatic Library Search – Loader Options - Loader Design options: Linkage Editors – Dynamic Linking – Bootstrap Loaders. Implementation examples: MSDOS linker

UNIT III MACRO PROCESSORS 11 hrs.

Basic macro processor functions: Macro Definition and Expansion – Macro Processor Algorithm and data structures –Machine-Independent Macro Processor Features: Concatenation of Micro

Parameters – Generation of Unique labels – Conditional Macro expansion – Keyword Macro parameters. Implementation examples: MASM Macro Processor

UNIT IV COMPILERS 14 hrs.

Basic Compiler Functions: Grammars – Lexical Analysis – Syntactic Analysis – Code Generation. Machine-Dependent Compiler Features: Intermediate Form of the Program – Machine-Dependent Code Optimization. Machine-Independent Compiler Features – Compiler Design Options – Implementation Examples: Java Compiler and Environment.

UNIT V OTHER SYSTEM SOFTWARE 11 hrs.

Text editors: Overview of Editing Process - User Interface – Editor Structure – Interactive Debugging Systems: Debugging functions and capabilities –Relationships with Other parts of the system – User Interface Criteria.

Book for Study

1. Leland Beck - "System Software – An Introduction to Systems Programming", Third Edition,
Pearson Education, Inc., 2008

Books for Reference

1. Srimanta Pal, " Systems Programming " , Oxford University Press, 2011.
2. A.V. Aho, R. Shethi and Ulman; Compilers - Principles, Techniques and Tools, Second Edition,Pearson Education, 2002.
3. D. M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw Hill Company, Second Edition, 2009.
4. John J. Donovan, "Systems Programming", Tata McGraw Hill Company, Second Edition, 2000.
5. V. Raghavan, "Principles of Compiler Design", Tata McGrawHill Education Publishers, 2010.

16PCA4MC01 XML AND WEB SERVICES

SEMESTER IV **CREDITS 4**

CATEGORY MC(T) **NO.OF HOURS/ WEEK 4**

Objectives:

1. To educate the students on the basics and technologies of xml thereby helping them to build xml based applications.
2. To analyse the aspects of web services and to integrate web based applications.

UNIT I Essentials of XML

The Beginnings And Promises Of XML — Application Areas –XML Fundamentals –XML Technology Family- Validating XML – DTD And XSD –Transforming And Formatting XML – Xfiles: XPath, XLink, XPointer - Xquery – Voice XML.

No. of Hours:14

Unit – II Building XML Based Applications

Processing XML - DOM – SAX — XML and Content Management- Semantic Web Architecture – Role of XML And Metadata In Web Content Management – RDF– XML Standards – Standards Organizations. **No. of Hours:12**

Unit-III Architecting Web Services

Business Motivations For Web Services – B2B – B2C- Technical Motivations – Limitations Of CORBA And DCOM – Service Oriented Architecture (SOA) – Brief History Of REST - Understanding REST Services - Architecting Web Services – Implementation View – Web Services Technology Stack – Logical View – Composition Of Web Services – Deployment View – Application Server To Peer To Peer – Process View – Life In The Runtime. **No. of Hours:11**

Unit – IV Web Services Building Blocks

Transport Protocols For Web Services – Messaging With Web Services – Protocols – SOAP – Describing Web Services – WSDL – Anatomy Of WSDL – Manipulating WSDL – Web Service Policy – Discovering Web Services – UDDI – Anatomy Of UDDI- Web Service Inspection- Web Services

And E-Business (E-Com & Ebxml). Case Study : Integrating Web Services. **No. of Hours:11**

Unit - V XML Security

Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines for Signing XML Documents – XML in Practice. **No. of Hours:11**

Books for Study

1) Ron Schmelzer Et Al, "XML And Web Services",2008**,** Pearson Education**.**
2) Leonard Richardson, Sam Ruby, "Restful Web Services" , 2007,O'Reilly Media.
3) Frank P. Coyle, "XML, Web Services and The Data Revolution", 2002**,** Pearson Education**.**

Books for Reference

1) Sandeep Chatterjee And James Webber, "Developing Enterprise Web Services:
An Architect's Guide", 2008, Prentice Hall.
2) Keith Ballinger, ".NET Web Services Architecture And Implementation", 2004,Pearson Education.
3) Russ Basiura And Mike Batongbacal, "Professional ASP.NET Web Services", Apress.
4) Elliote Rusty Harold, "Processing XML With Java", 2002, Addison-Wesley.

16PCA4MC02 MOBILE COMPUTING

SEMESTER	**IV**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objective:

To introduce the basic concepts of mobile computing. To enable the students to develop mobile applications.

Unit I Introduction to mobile computing

Introduction - Wireless beginning- mobile computing, functions and devices - middleware and gateways - application

and services - architecture of mobile computing: 3 tier – design considerations for mobile computing. Cellular Systems—multiple access techniques: TDD—FDD – SDMA-FDMA—TDMA—CDMA. Satellite communication system.

Unit II Cellular Technologies

GSM: Mobile services - System architecture – Radio interface – Protocol - Localization – Handovers – Security – New data services – DECT: system architecture – protocol architecture – TETRA – UMTS and IMT-2000: release and standardization – architecture – radio interface – UTRAN – core network – Handover. GPRS: introduction - network architecture - network Operations - data services in GPRS – applications - limitations.

Unit III Short range wireless communication

Infra red Vs radio transmission – Infrastructure and ad-hoc network – IEEE 802.11: architecture – protocol architecture – physical layer – medium access control layers – MAC management – 802.11b 231 – 802.11a 234 – newer development – HIPERLAN: History – WATM – BRAN – HiperLAN2. Bluetooth: use scenarios – architecture – radio layer – baseband layer – Link manger protocol – security.

Unit IV Mobile network and transport protocol transport and protocols

Mobile IP: Goals, assumptions -& requirements - entities and terminologies – IP packet delivery – registration – tunneling – optimizations – reverse tunneling – IPv6 - IP micro Mobility support. Traditional TCP: Congestion control – slow start- fast transmit/recovery – implication of mobility – Classic TCP improvement: indirect – snooping – mobile TCP – fast retransmit/recovery – Transmission/time-out freezing – Selective retransmission – Transaction-oriented – TCP over 2.5/3G wireless.

Unit V Databases and Applications

Databases: Data organization—database transactional models - query processing—data recovery process - data catching - client server computing - adaptation software – power-ware mobile computing—context-aware mobile computing. Mobile application development platform: Operating System - Windows Mobile and CE – Windows phone - Android–Symbian.

Books for Study

1. Asoke K Talukder,Hasan Ahmed, Roopa R Yavagal, " Mobile Computing- Technology, Applications and Service Creation", 2nd edition ,2010,Tata McGraw Hill Eduction Private Limited.
2. Jochen H.Schiller," Mobile Communications", 2nd edition ,2003,Pearson Education India.
3. Raj Kamal,"Mobile Computing", 2nd edition ,2012,Oxford university press.

Books for Reference

1. Kumkum Garg," Mobile Computing –Theory and Practice", 2010,Pearson Eduction.
2. William Stallings,"Wireless Communication and Networks", 2003,Pearson Education.
3. William C.Y.Lee, "Mobile Communication Design Fundamentals",1993,John Wiley.

16PCA4MC03 OPEN SOURCE WEB TECHNOLOGIES

SEMESTER	**IV**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives

To learn User Interface design, Client-side and Server-side scripting languages To prepare students to do web related projects

UNIT I Web Architecture

Internet Standards -Introduction to WWW -WWW Architecture -Overview of HTTP, -HTTP request & response -Generation of dynamic web pages- SMTP -POP3 -File Transfer Protocol

UNIT II UI DESIGN Markup Language (HTML)

Introduction to HTML and HTML5 -HTML DOCTYPES -Formatting and Fonts -Commenting Code -Anchors -Backgrounds -Images -Hyperlinks -Lists -Tables -Frames -HTML Forms -HTML Layouts -HTML Responsive Web Design -HTML Graphics (Canvas & SVG) -HTML Media (Video & Audio) -HTML API (Geolocation, Local Storage, Web Workers & SSE)

UNIT III UI DESIGN Cascading Style Sheet (CSS)

The need for CSS, Introduction to CSS & CSS3 -Basic syntax and structure -Inline Styles
-Embedding Style Sheets -Linking External Style Sheets -Backgrounds -Manipulating text
-Margins and Padding -Positioning using CSS
CSS3: Rounded Corners -Gradients -2D Transforms -3D Transforms -Transitions -Animations -Box Sizing - Flexbox -Filters -Media Queries
CSS Responsive: RWD Viewport -RWD Grid View -RWD Media Queries -RWD Images -RWD Videos -RWD Frameworks

UNIT IV JAVASCRIPT for WEB DEVELOPMENT

Basics of JavaScript -Document Object Model -Event Handling -Controlling Windows & Frames and Documents -Form handling and validations.
JavaScript Advanced**:** Browser Management and Media Management -Classes -Constructors -Object-Oriented Techniques in JavaScript -Object constructor and Prototyping -Sub classes and Super classes -JSON - jQuery and AJAX -

JavaScript Cookies-JS HTML DOM- DOM Intro -DOM

Methods -DOM Document -DOM Elements -DOM HTML -DOM CSS -DOM Events -DOM EventListener -DOM Nodes -DOM Nodelist

UNIT V PHP

Introduction -Setting up the environment (LAMP server) -Programming basics
-Print/echo -Variables and constants -Strings and Arrays -Operators, Control structures and looping structures -Functions -Reading Data in Web Pages -Embedding PHP within HTML
-Establishing connectivity with MySQL database
PHP Advanced: PHP Multidimensional Arrays -PHP Include -PHP File Handling -PHP File Open/Read -PHP File Create/Write -PHP File Upload -PHP Cookies -PHP Sessions -PHP Error Handling -PHP Exception

Book for Study

1. Robert W. Sebesta, Programming the World Wide Web, 7/E, Pearson Education,
2. Harvey Deitel, Abbey Deitel, Internet and World Wide Web How To Program, 5/E, Printice Hall, 2012
3. W3Schools tutorial

Book for Reference

1. Steven M Schafer, HTML, CSS, JavaScript, Perl, Python, & PHP, Wiley-Dreamtech, Edition 2005
2. Achyut S.Godbole and Atul Kahate, "Web Technologies", 2/E, Tata McGraw Hill, 2012.
3. David Flanagan, "JavaScript: The Definitive Guide, 6/E, O'Reilly Media, 2011.
4. Ullman, "Modern JavaScript: Develop and Design", Pearson Education.
5. Mills, "Practical CSS3: Develop and Design", Pearson Education.

16PCA4MC04 XML AND WEBSERVICES LAB

SEMESTER IV CREDITS 2

CATEGORY MC(T) NO.OF HOURS/ WEEK 4

LAB EXERCISES

1) Simple XML file
2) Validating XML document using Internal DTD
3) Validating XML document using External DTD
4) Implementing Predefined Entity
5) External Entity
6) Demonstration of Parameterized Entity
7) Demonstration of Parameterized Entity – Importing definition from DTD
8) Merging and Validating two or more XML documents

XSD

9) Validating an XML document using XSD
10) Validating an XML document with attributes using XSD
11) XML with mixed contents
12) Validating an XML document using XSD that implements user defined data type
13) XSD Global attributes and elements.
14) Program to demonstrate the function of XSD Elements

XSLT

15) Demonstration of INCLUDE element.
16) Demonstration of IMPORT element.
17) Presenting an XML document using CSS
18) Presenting an XML file using XSLT elements

XPATH

19) Transforming XML using XSLT and implementing XPath – Nodeset functions
20) Transforming XML using XSLT and implementing XPath – number functions

21) Traversing XML file using DOM
22) Displaying contents of an XML document in a data grid.
23) Dynamically creating XML document during runtime
24) Dynamically accepting user input and creating an XML file.
25) Using XML for Creating Advertisements.

Web Services

26) Creating a Web Service.
27) Creating and invoking a Web Service

16PCA4ES01 .NET TECHNOLOGIES FOR ENTERPRISE MOBILITY

SEMESTER	**IV**	**CREDITS**	**4**
CATEGORY	**ES(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives

1. To instill the productivity of C#
2. To inculcate skills to develop enterprise mobile solutions using ASP.NET
3. To train students on cross-platform Mobile Apps development targeting iOS, Android, and Windows phone using Microsoft Visual Studio IDE and C#

Unit I Building-blocks of C# (12 Hours)

C# the Trailblazer and the Takeaways – Why C#? - Why not C#? – C# Defining Features, Basic Coding C# - Variables – Scope- Statements and Expressions – Pre-processing Directives, Intrinsic Data types, Operators, Control Structures, Types in C# - Classes – Static members – Static classes – Reference Types, Structs, members – Interfaces, Enums, Anonymous Types, Partial Types and Methods

Unit II Advanced Programming concepts in C# (16 Hours)

Generics, Collections, Inheritance, Object lifetime – Garbage collection – Destructors and finalization –Idisposabe –

Boxing, Exceptions – Exception Sources – Handling them –

Throwing Exceptions –Exception Types – Delegates Types – Lamda and Expression Trees – Events – Events vs. Delegates – Delegates vs. Interfaces, Standard LINQ Operators, PLINQ, LINQ to XML, Introduction to Reactive Extensions, and Assemblies, Reflection Types, Dynamic Typing, Introduction Attributes and Multithreading in C#

Unit III Features-rich Web Application Development using ASP.NET (12 Hours)

Introduction to ASP.NET - Advantages of ASP.NET - ASP.NET Architecture – Creating Websites with Visual Studio 2013, Working with Web Forms, Introduction to Server Controls – Types of Controls – The ASP.NET State Engine, Master Pages, Themes, User Controls, ASP.NET AJAX – Script Manager Control – Update Progress Control – jQuery in ASP.NET

Unit IV Data Connectivity and ADO.NET Entity Framework (10 Hours)

ADO.NET Entity Framework - Object Relational Mapper – Mapping from Data Model to Object Model – Introduction to ADO.NET – ADO Vs ADO.NET – Connected ADO.NET Architecture – Disconnected ADO.NET Architecture – Data Reader - Data Adapter – ADO.NET Classes – ADO.NET - Namespaces – Exception Handling, Debugging, and Tracing

Unit V Cross-platform Mobile Apps development using C# (10 Hours)

Mobile Application Development – Featured Phone Vs. Smart Phone – Smart Phone Oss. The Mobile Apps Ecosystem, Introduction to Xamarin.Forms, Anatomy of a Mobile App, Texts and Background Color, Font sizes and attributes, Scrolling the Stack, Button Clicks, Platform-specific API Calls

Study Books

1. Ian Griffiths, “Programming C# -Building Windows 8, Web, and Desktop Applications for the .NET 4.5 Framework”, Edition 2013, O'Reilly Media, Inc
ISBN: 978-1-449-32041-6

2. Imar Spaanjaars, “Beginning ASP.NET 4.5.1 in C# and VB”, Edition : 2014, John Wiley and Sons ISBN: 978-1-118-84677-3

3. Charles Petzold, “Creating Mobile Apps with Xamarin.Forms - Cross-platform C# programming for iOS, Android, and Windows Phone" Edition 2015, Microsoft Press ISBN: 978-0-7356-9723-2

Reference Books

1. Kogent Learning Solutions, “ASP.NET 4.0 Black Book”, Reprint 2012,
Dreamtech Press.
2. Matt J.Crouch, “ASP.NET and VB.NET Web Programming”, Edition 2012,
Pearson Education.
3. John Sharp, “Microsoft Visual C# 2010”, Reprint 2011, Dreamtech Press.
4. Stephen Walther, Kevin Hoffman, Nate Dudek, “ASP.NET 4 Unleashed”, Second
Impression 2013, Pearson Education.

16PCA4ES02 .NET TECHNOLOGIES FOR ENTERPRISE MOBILITY LAB

SEMESTER IV **CREDITS 2**
CATEGORY ES(T) **NO.OF HOURS/ WEEK 4**

Lab Exercises

1. Develop a control application to demonstrate the control structures in C#

2. Demonstrate Indexers and Properties

3. Demonstrate Interfaces, Structures, and Enumerations
4. Demonstrate Delegates, and Events
5. Demonstrate the working mechanism of PLINQ
6. Develop a web application to demonstrate various web server controls
7. Demonstrate the validation controls in ASP.NET
8. Demonstrate caching in ASP.NET
9. Demonstrate the intrinsic objects in ASP.NET
10. Develop a web application for students' information management with crystal reports
11. Demonstrate LINQ to an SQL application
12. Develop a basic Windows Phone Application

16PCA4ES03 ADVANCED JAVA PROGRAMMING

SEMESTER IV CREDITS 4
CATEGORY ES(T) NO.OF HOURS/ WEEK 4

Objectives

1. To enhance the knowledge in advanced features of Java
2. To hone programming skill as per the industry need
3. To acquire the real time project development skills in Java platform.

UNIT I - 11 hrs

J2EE Overview: Enterprise Architecture types- objectives- Features of Java EE Platform. Java EE: Architecture – Containers – developing applications –Application Servers. Web applications: HTTP protocol – Introduction to web applications – Web containers – web architecture models – MVC architecture. JDBC: Features—APIs—Classes and Interfaces—JDBC Processes.

UNIT II - 13 hrs

Servlets: Features – 3-Tier applications – Servlet API – Servlet life cycle - Creating sample servlet – working with ServletConfig , ServletContext, HttpServletRequest and HttpServletResponse – Request Delegation and Request scope

– servlet collaboration. Sessions: Introduction – Session

tracking Mechanisms - Java servlet API for session tracking —creating applicaton.Event Handling: Introduction—working with Servlet. Events:introduction – types of wrapper classes--working with wrappers.

UNIT III - 12 hrs

JavaServer Faces (JSF) : features – Architecture – elements – Request processing life cycle - Tag libraries – UI components – working with Backing Beans – Input validation—type conversion-- page navigation – resource bundles – configuring JSF applications - developing JSF application.

UNIT IV - 13 hrs

Enterprise java applications (EJB) Fundamentals--architecture – classifications – Session bean: introduction – implementation. Message Driven Bean (MDB): Characters – Structure – Life cycle - Implementation – Managing transactions in java EE applications. EJB timer services : introduction– Implementation. EJB interceptors: life cycle--interceptor classes - lifecycle callback methods-- Lifecycle Callback Interceptor Method in MDB – Lifecycle Callback Interceptor Method in Session Bean.

UNIT V - 11 hrs

Java Persistence API (JPA): Introduction – Introduction to Entities – Lifecycle of entity – Entity Relationship types – mapping collection based relationships – Entity Inheritance .The Java Persistence Query Language(JPQL): functions, statements - Clauses – conditional expressions --Query API - Creating a simple application – Configuring the application.

BOOK FOR STUDY

1. Kognet learning solutions Inc. “Java Server Programming Java EE6 BLACK BOOK” , Reprinted 2013, Dreamtech press.

BOOKS FOR REFERENCE

1. Jim Keogh, "The Complete reference to J2EE", reprint 2012, Tata McGraw-Hill edition.
2. Mike Keith and Merick Schincariol " Pro EJB 3.0 Java Persistence API" 2006, Apress.
3. David Geary, Cay S. Horstmann "Core JavaServer Faces" Third edition, 2010, Prentice Hall.
4. Hall Brown " Core Servlet and JavaServer pages", Second edition, reprint 2011, Pearson Education.
5. Andrew Lee Rubinger, Bill Burke " Enterprise JavaBeans 3.1" Sixth Edition. 2010, O'REILLY.

16PCA4ES04 ADVANCED JAVA PROGRAMMING LAB

SEMESTER IV CREDITS 2
CATEGORY ES(T) NO.OF HOURS/ WEEK 4

1. Creating simple JDBC application.
2. Creating servlet with simple objects.
3. Creation of login form servlet (Creating and managing session).
4. Creating online shopping application Session tracking.
5. Build a simple JSF based UserInterface.
6. Validations using JSF validators.
7. Working with stateless session Bean.
8. Working with Stateful Session Bean.
9. Simple application packing, deploying and running in MDB.
10. Package and deploy a simple JSF web application using Netbeans (or any otherIDE).
11. Creating a Simple JPA application.

16PCA5MC01 NETWORK SECURITY

SEMESTER V **CREDITS 4**
CATEGORY MC(T) **NO.OF HOURS/ WEEK 4**

Objectives:

1. Introducing the fundamentals of network security.
2. Imparting knowledge about the encryption algorithms which are the foundations of security.

Unit I Basics of Network Security

Introduction To Information Security, Need For Computer Security, Security Services, mechanisms and Security Attacks - Model For Internetwork Security, Internet Standards, Key Principles of Network Security. Overview of Security Threats, Attacks: Reconnaissance, Access, DDoS, Malicious Code, Security of Hard Drives. **No. of Hours:12**

Unit II Introduction to Encryption and Symmetric Cryptosystems

History of Cryptosystems, Cryptography Terminologies, Classical Encryption Techniques, Steganography, Cryptanalysis, Introduction to Symmetric Encryption – Block and stream Cipher Principles - Data Encryption Standard (DES), Key Strength of DES, Double DES, 3DES, Advanced Encryption Standard (AES). Stream Ciphers. **No. of Hours:13**

Unit III Public Key Cryptosystems and Hash Functions

Asymmetric Cryptosystem- RSA Algorithm - Modes of Operation of Cipher – Key Management: Diffie-Hellman Key Exchange - Authentication Codes and Hashing Algorithms, Whirlpool- Digital Signature and Authentication Protocols, Digital Signature Standard. **No. of Hours:12**

UNIT IV Network Security Applications

Authentication Applications: Kerberos, X.509, Electronic Mail Security: PGP, S/MIME – SSL & TLS, Public-Key Infrastructure – PKIX. **No. of Hours:11**

Unit V Network Defence

Firewalls – Types – Configurations - Rules – IPSec: Overview - Protocol Stack - Architecture – SA, AH, ESP - Transport And Tunnel Mode Encryption – Key Management : ISAKMP/Oakley , Phase – I and Phase – II ,VPN architecture, VPN Based On Digital Certificate, VPN Communities.

No. of Hours:12

Books for Study

1. William Stallings," Cryptography And Network Security- Principles And Practices"
,4th Edition.

Books for Reference

1. Sidnie Feit,"Tcp/Ip – Architecture, Protocols And Implementation With Ipv6 And Ip
2. Security" Mcgraw Hill Computer Communication Series.
3. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security – Private Communication In A Public World" ,Prentice Hall.

16PCA5MC02 NETWORK SECURITY LAB

SEMESTER V CREDITS 2
CATEGORY MC(L) NO.OF HOURS/ WEEK 4

LAB EXERCISES

1. Implementing a simple client/server application using sockets and TCP/IP
2. Using of open SSH
3. Port forwarding.
4. Sniffing .
5. Proactive filtering of weak pass words and salting passwords.
6. Using open SSH for communication confidentiality

and integrity.

7. Using open SSL to set up a simple certifying authority.
8. Issuing and verifying certificates to avoid MITM attacks.
9. Setting up of a firewall.
10. Setting up of IP Sec virtual private network (VPN).
11. Packet capturing and packet replay attack.
12. ARP spoof, DNS spoof attacks - man in the middle attacks demonstration.
13. Logic for brute force attacks.
14. Program that using hashing techinque. Encryption and decryption of files program.

16PCA5MC03 DATA MINING

SEMESTER	**V**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives:

1. To introduce the concept of Data Warehousing
2. To expose to various Data Mining techniques
3. To impart the knowledge of how Data Mining could be used to solve scientific and social problems.

UNIT I Introduction and Data preprocessing

Data Mining: Basics – Functionalities – Classification of Data Mining systems – TaskPrimitives-Data preprocessing: Data cleaning – Data Integration and Transformation –Data Reduction – Data Discretization Concept hierarchy generation – Association rule mining: Efficient and scalable frequent item set mining methods – Mining various kinds of Association Rules. 12 Hrs

UNIT II Classification and Prediction Techniques

Classification and Prediction: Issues Regarding Classification

and Prediction-Classification by Decision Tree Induction-

Bayesian Classification- Rule based classification – classification by Back propagation – Other Classification Methods-Prediction- Accuracy and Error Measures. 12 Hrs

UNIT III Cluster Analysis

Clusters Analysis: Types of Data in Cluster Analysis-Categorization of Major ClusteringMethods: Partitioning Methods: K-Means and K-Medoids–Hierarchical methods:Agglomerative and Divisive Hierarchical - BIRCH – Density based clustering: DBSCAN-Outlier Analysis 12 Hrs

UNIT IV Data Mining Technologies

Graph Mining – Social Network Analysis – Multi relational Data Mining-Mining object, spatial, multimedia, text and web data: Multidimensional analysis –Spatial Data mining – Multimedia data mining – Text Mining – Mining the World Wide Web. 12 Hrs

UNIT V Data Warehouse and Tools

Data Warehouse – Different types of schemas – OLAPOperations; Data Warehouse Architecture: Three-Tier Architecture – MetadataRepository;Applications of Data Mining - Social Impacts of Data Mining –Tools: implementation of Data preprocessing, Clustering – Association and Classification using R programming- Case Studies 12 Hrs

Books for Study

1. Jiawei Han, MichelineKamber, "Data Mining: Concepts and Techniques",Morgan Kaufmann Publishers, 2002.

Books for Reference

1. Richard J.Roiger and Michael W.Geatz“ Data Mining – A Tutorial-based Primer”,2003, Pearson education .
2. Alex Berson,Stephen J. Smith, “Data Warehousing, Data Mining,& OLAP”, 2004,Tata McGraw- Hill.
3. Usama M.Fayyad, Gregory Piatetsky - Shapiro,

Padhrai Smyth And RamasamyUthurusamy, "

Advances In Knowledge Discovery And Data Mining", 1996,The M.I.T Press.
4. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", 1998, John Wiley & SonsInc.,.
5. Sean Kelly, "Data Warehousing In Action", John Wiley & Sons Inc., 1997.
6. G.K.Gupta, “Introduction to Data Mining with Case Studies”, 2006, Eastern Economy
7. Edition, Prentice Hall of India.

16PCA5MC04 CLOUD COMPUTING

SEMESTER	**V**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives

1. To acquire the knowledge of tapping the existing resources and use them effectively.
2. To acquire the knowledge of minimizing the software resources and thereby reducing the cost of investment.
3. To impart the skills of making greener IT.

UNIT I COMPUTING TECHNOLOGIES

Introduction to Computing Trends - Distributed Computing: models and technologies – Grid computing- Peer to Peer Computing -cluster computing-comparison –-cloud computing: introduction—properties and characteristics—pros and cons of cloud development.

UNIT II SERVICE MODELS

Cloud Service Models: Infrastructure as a Service(IaaS): Introduction to IaaS, Resource Virtualization: Server-- Storage – Network-- Case studies. Platform as a Service(PaaS): Introduction -- Cloud platform & Management,

Computation—Storage -- Case studies. Software as a

Service(SaaS): Introduction -- Web services, Web 2.0-- Web OS – case studies. Anything as a service(XaaS).

UNIT III CLOUD INFRASTRUCTURES

Cloud platform architectures: Amazon web services – Microsoft Azure-- Google App Engine—emerging environments: Hadoop, Eucalyptus, Nimbus, Open Stack. Map Reduce paradigms: introduction—GFS architecture—HDFS architecture – Map Reduce —Hbase—Google big table—case study: map reduce programming

UNIT IV VIRTUALIZATION

Virtualization: introduction—types of virtualization—tools for virtualization—Levels of virtualization virtualization of CPU,memory,I/O devices—architecture of VMM-virtualization for cloud. Virtual Clusters and Resource management. – Virtualization for Data-center Automation.Cloud computing framework: Amazon EC3—S3 storage services—Aneka framework—IBM blue cloud

UNIT V CLOUD DEPLOYMENT

Cloud Deployment Models: Introduction – Public Deployment Model – Private Deployment Model – Virtual Deployment Model – Hybrid Deployment Model – Community Deployment Model—comparison. Security in cloud--legal issues in cloud—product readiness for cloud services. Case studies – simple application.

Books for Study

1. Rajkumar Buyya, James Broberg and Andrzej M.goscinski, "Cloud computing: Principles and Paradigms", September 2010, John Wiley & Sons.

2. Michael Miller," Cloud Computing: Web -Based Applications That change the way You Work and Collaborate Online", First Edition, 2008, Pearson Education.
3. Barrie Sosinsky,"cloud computing bible" John Wiley & Sons.

Books for Reference

1. Haley beard, " Cloud Computing best practices for managing and measuring processes for on-demand computing, applications and Data centers in the cloud with SLAs", July 2008, Emereo Pty Limit
2. Anthony T.Velte,Toby J.Velte and Robert Elsenpeter, " Cloud Computing: A Practical Approach", McGraw Hill,2010.
3. Liu M L ," Distributed Computing Principles and Applications", Pearson Education, New Delhi, 2006.
4. Kai Hwang,Geoffrey C. Fox and Jack J. Dongarra," Distributed and cloud computing from parallel processing to the internet of things", Morgan Kaufmann, Elsevier ,2012.

16PCA5MC05 SOFTWARE DEVELOPMENT LAB

SEMESTER V CREDITS 2
CATEGORY MC(T) NO.OF HOURS/ WEEK 4

Students will select a project based on their knowledge they gathered through four semester and submit the Abstract. It will be scrutinized by the staff-in-charge to check the validity. Once it is approved, then students will be asked to do their project using Software Development Life Cycle model. Two Reviews will be conducted to assess their performance and the marks will be taken for I and II Continuous Assessment Tests. At the end of the semester, project viva will be conducted and students have to show a demo of their project. It will be treated as Lab Paper

16PCA5MC06 SOFTWARE TESTING

SEMESTER	**V**	**CREDITS**	**4**
CATEGORY	**MC(T)**	**NO.OF HOURS/ WEEK**	**4**

Objectives:

I. Enable students to understand the various concepts of Software testing.
II. Train students on how to test a software, identify defects and report the same.
III. Expose students to the latest trends in software testing field.

UNIT I: Testing Methods 14 hrs.

Software development methodologies: Waterfall model - Agile methodologies – Scrum model, Testing Fundamentals – Introduction – Definitions – Software Testing Principles – STLC-Testing strategies and methods – Black box approach – Random Testing – Equivalence Class partitioning – Boundary Value Analysis – Other Black Box Approaches – Testing Commercial Components – White Box Approach – Test Adequacy Criteria – Coverage and Control flow graphs – Covering code logic – Paths – Data flow – Loop testing – Mutation testing

UNIT II: Levels of Testing 10 hrs.

Unit Testing – Integration Testing – System Test: Smoke Testing, Functional Testing, Performance Testing, Stress Testing, Configuration Testing, Security Testing, Recovery Testing – Regression Testing – Acceptance Testing

UNIT III: Web Application and Mobile Application10 hrs.

Sample Application – Functional and usability issues – Configuration and compatibility testing – Reliability – Performance – Security testing – end-to-end transaction

testing – database testing – Post-implementation testing.

Unit IV Emerging Trends in Testing 14 hrs.

Digital Assurance: Social, Mobility, Big data, Cloud, - Usability Testing – DevOps Overview of Mobile testing- Modern Mobile Operating Systems- Native, Web and Hybrid- Comparison, Mobile App Testing Challenges, Application Formats-Types of Mobile testing tools.

UNIT V: Software Quality, Process Control & Optimization, Defect Analysis & Prevention, 12 hrs.

Test Measurement Programme – TMM Levels – Quality Concepts – Defect Analysis & Prevention – Defect Causal Analysis –Quality Control – Metrics Introduction to Testing tools: Selenium (Automation) – Jmeter(Performance Testing) – Appium (Mobile Testing)

Books for Study

1. Ilene Bernstein, “Practical Software Testing”, First Edition, 2003, Springer International Edition.
2. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson education.

Books for Reference

1. Mark Garzone , “Software Testing: A Guide to Testing Mobile Apps, Websites, and Game”
2. Scott Tilley and Tauhida Parveen “Software Testing in the Cloud: Migration and Execution” (Springer Briefs in Computer Science)

3. Data Science for Business: What you need to know about data mining and data-analytic thinking Paperback – August 19, 2013
4. Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems Jun 27, 2003by Hung Q. Nguyen and Bob Johnson
5. AWS for Dummies by Bernard Golden Published October 2013 (Cloud)
6. Continuous Delivery and DevOps: A Quick start Guide- by Paul Swartout
7. Louise Tamres, "Introducing Software Testing"

16PCA5SOFTWARE PROJECT MANAGEMENT

SEMESTER	**V**	**CREDITS**	**4**
CATEGORY	**MC(L)**	**NO.OF HOURS/ WEEK**	**4**

Objectives:

1. To teach methods of s/w project planning.
2. To teach various controlling mechanisms used in s/w projects.

UNIT I INTRODUCTION

Project definition – Contract management – Activities covered by Software Project Management – Plans Methods and Methodologies – Stakeholders – Objectives – Project Success and Failure – Project Evaluation – Cost benefit evaluation and Risk Evaluation.

UNIT II PROJECT PLANNING AND SELECTION

Step wise Project Planning – Choosing Methodologies and Technologies – Software Processes and Models – Managing Iterative processes - Basis of Software Estimating –

Techniques – Function Point Analysis

UNIT III ACITIVITY PLANNING

Objectives – Project Schedules – Sequencing and Scheduling Activities – Network planning model – Forward pass – The Backward Pass – Activity Float - Risk Management – Risk Identification – Risk assessment and planning- Resource Allocation.

UNIT IV MONITORING AND CONTROL

Creating framework – Collecting data – visualizing progress – cost monitoring – earned value – prioritizing monitoring – getting the project back to target – change control - types of contract – stages in contract placement – typical terms of a contract – contract management.

UNIT V MANAGING PEOPLE AND ORGANIZING TEAM

Introduction – understanding behavior – organizing behavior – motivation – stress – health and safety – working in team: becoming team – decision making – organizing and team structures – communication - leadership – software quality – Case Studies

Books for Study

1. Bob Hughes , Mike cotterell and Rajib Mall "Software Project Management" 5th edition, 2012, Tata Mc Graw Hill.

Books for Reference

1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management",

2002,Pearson Education,.

2. Pankai Jalote "Software Project Management in Practice", 2002,Addison Wesley.

PROJECT WORK

SEMESTER	**VI**	**CREDITS**	**12**
CATEGORY	**MC(P)**	**NO.OF HOURS/ WEEK**	**30**

Students of VI semester have to do project throughout the semester in any application in a software company to gain practical knowledge of what they have studied in five semesters and they have to submit a report which will be evaluated by conducting project viva at the end of the semester. Their progress is monitored continuously. Three review meetings will be conducted to award the internal assessment marks.