MASTER OF SCIENCE IN INFORMATION TECHNOLOGY REGULATIONS

ELIGIBILITY:

Candidates for admission to the first year course leading to the Degree of Master of Science (M.Sc.) in INFORMATION TECHNOLOGY will be required to possess a pass with (Minimum) 50% of marks in B.Sc. Computer Science / B.C.A. /B.Sc. Computer Technology / B.Sc. Information Technology /B.Sc Information Sciences/B.Sc Information Systems/ B.Sc. Software Systems/B.Sc Software Sciences / B.Sc Applied Sciences (Computer Science/Computer Technology). In case of SC/ST candidates, a mere pass in the qualifying examination will be sufficient.

OBJECTIVE OF THE COURSE:

To develop the Post Graduates in Information Technology with strong knowledge of theoretical computer science and Applications subjects who can be employed in research and development units of industries and academic institutions

SCHEME OF EXAMINATIONS

Course	Subject	Hrs of Instruction	Exam Duration (Hrs)	Max Marks			Credit Points
				CA	CE	Total	
First Semester							
15PIT13A	Paper I : Object Oriented Analysis and Design	5	3	25	75	100	4
15PIT13B	Paper II : Advanced Computer Architecture	5	3	25	75	100	4
15PIT13C	Paper III : Struts and Hibernation	4	3	25	75	100	4
15PIT13D	Paper IV : Introduction to Open Source Tools	4	3	25	75	100	4
	ELECTIVE I	4	3	25	75	100	4
15PIT13P	Lab I : Struts and Hibernation Lab	4	3	40	60	100	4
15PIT13Q	Lab II : Introduction to Open Source Tools Lab	4	3	40	60	100	4
		30				700	28
Second Semester							
15PIT23A	Paper V : Analysis and Design of Algorithm	5	3	25	75	100	4
15PIT23B	Paper VI : Advanced Networks	5	3	25	75	100	4
15PIT23C	Paper VII : Advanced RDBMS	4	3	25	75	100	4
15PIT23D	Paper VIII : Programming in C# and Dot NET frame work	4	3	25	75	100	4
	Elective – II	4	3	25	75	100	4
15PIT23P	Lab III : C# and Dot Net Programming LAB	4	3	40	60	100	4
15PIT23Q	Lab IV : Oracle Lab	4	3	40	60	100	4

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		30				700	28
Third Semester							
15PIT33A	Paper IX: Big Data and Cloud Computing	5	3	25	75	100	4
15PIT33B	Paper X: Cyber Security Management Techniques	5	3	25	75	100	4
15PIT33C	Paper XI: ANDROID	4	3	25	75	100	4
15PIT33D	Paper XII : Software Testing	4	3	25	75	100	4
	Elective - III	4	3	40	60	100	4
15PIT33P	Lab V: ANDROID LAB	4	3	40	60	100	4
15PIT33Q	Lab VI : Software Testing LAB	4	3	25	75	100	4
		30				700	28
Fourth Semester							
15PIT43V	Project and Viva Voce			50	100	150	6
						150	6
					Grand Total	2250	90

ELECTIVE – I

(Student shall select any one of the following subject as Elective in First semester)

S.No	Subject Code	Name of the Subject
1.	15PIT1EA	A. Digital Image Processing
2.	15PIT1EB	B. Data Mining and Ware Housing
3.	15PIT1EC	C. Web Technology
4.	15PIT1ED	D. Neural Networks & Fuzzy Logic

ELECTIVE - II

(Student shall select any one of the following subject as Elective in Second semester)

S.No	Subject Code	Name of the Subject
1.	15PIT2EA	A. Mobile Computing
2.	15PIT2EB	B. AI and Robotics
3.	15PIT2EC	C. Wireless Application Protocol
4.	15PIT2ED	D. Management Control Information System

ELECTIVE - III

(Student shall select any one of the following subject as Elective in Third semester)

S.No	Subject Code	Name of the Subject
1.	15PIT3EA	A. Bioinformatics
2.	15PIT3EB	B. Software Project Management
3.	15PIT3EC	C. Distributed Operating System
4.	15PIT3ED	D. Embedded System

15PIT13A	PAPER I: OBJECT ORIENTED ANALYSIS AND DESIGN	SEMESTER - I

Total Credits: 4
Hours Per Week: 5

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To acquire knowledge on trends and principles of object oriented methodologies.
2. Gained problem solving skills using object based models.

CONTENTS

UNIT - I

Object Oriented System Development: Introduction- Object Oriented Systems Development Methodology- Why an Object Orientation. Object Basics: Introduction – Objects – Attributes – Object Behavior and Methods – Encapsulation and Information Hiding – Class Hierarchy – Object Relationships and Associations – Polymorphism – Aggregations and Object Containment. Static and Dynamic Binding.

UNIT - II

Object Oriented System Development: Analysis – Design – Prototyping. Methodologies: The Booch Methodology: The Macro Development – The Micro Development Process. The Jacobson et al Methodologies: Use cases- Object Oriented Software Engineering – Object Oriented Business Engineering. Patterns: Generative and Non generative patterns- Pattern Templates- Anti patterns- capturing patterns. Unified approach: Analysis – Design – Modeling based on Unified Modeling Language.

UNIT – III

Unified Modeling Language: Introduction – Static and Dynamic Models – UML Diagrams – UML Class Diagram: Class Notation – Object Diagram – Class Interface Notation- Binary Association Notation- Association Rule – Qualifier- Multiplicity- OR Association- N-Ary Association – Aggregation and composition-Generalization – Use Case Diagram – UML Dynamic Modeling: UML Interaction Diagrams – Sequence diagrams – collaboration diagrams – state chart diagram – Activity diagram.

UNIT - IV

OO Design axioms: Design axioms. Designing Classes: Introduction – Design philosophy – UML Object Constraint Language- The process – Class visibility: Private and protected protocol Layers – Public Protocol Layer- Refining attributes: Attribute types – UML Attribute Presentation. Designing Methods and Protocols: Design Issues - UML Operation presentation. Access layer: Introduction – OODBMS: OOD Vs Traditional Databases- Object Relational Systems: Mapping – Table class Mapping – Table Multiple class Mapping-Table Inherited Classes Mapping- Keys for Instance Navigation. View layer: Introduction – Designing view layer classes.

UNIT - V

Quality Assurance testing: Quality assurance tests- Testing Strategies- Impact of Inheritance in testing – Test Cases: Guidelines for developing Quality Assurance Test cases. Test Plan: Guidelines for Developing test plans. Usability testing: Guidelines for developing Usability Testing. User Satisfaction Testing: Guidelines for developing a User Satisfaction Testing

REFERENCE BOOKS:

1. *Ali Brahmi,* 2013. **Object Oriented System Development**, Tata McGraw-Hill International Edition, [Unit I to V].

2. *Addison-Wesley, Grady Booch,* 2010. **Object-Oriented Analysis and Design,** [Second Edition]. Pearson Education Asia

3. *James Rumbaugh, Micheal Blaha, 2001.* **Object Oriented Modeling and Design,** [Tenth Edition], Prentice Hall of India.

15PIT13B	**PAPER II: ADVANCED COMPUTER ARCHITECTURE**	**SEMESTER - I**

Total Credits: 4
Hours Per Week: 5

OBJECTIVE:

The subject aims to build the concepts regarding:

1. Major components of Advanced Computer Architecture emphasizing parallel processing, solving problems in parallel and SIMD processors, SIMD arrays.

CONTENTS

UNIT - I

Introduction to parallel processing – Trends towards parallel processing – Parallelism in uni processor Systems – Parallel Computer structures – Architectural Classification schemes – Flynn' Classification – Feng's Classification – Handler's Classification – Parallel Processing Applications

UNIT - II

Solving Problems in Parallel: Utilizing Temporal Parallelism – Utilizing Data Parallelism – Comparison of Temporal and Data Parallel Processing – Data parallel processing with specialized Processor – Inter-task Dependency. Instructional Level Parallel Processing – Pipelining of Processing Elements – Delays in Pipeline Execution – Difficulties in Pipelining

UNIT - III

Principles Linear Pipelining – Classification of Pipeline Processors – General Pipeline and Reservation tables – Arithmetic Pipeline – Design Examples – Data Buffering and Busing structure – Internal forwarding and Register Tagging – Hazard Detection and Resolution – Job sequencing and Collision prevention – Vector processing requirements – Characteristics – Pipelined Vector Processing methods

UNIT - IV

SIMD Array Processors – Organization – Masking and Data routing – Inter PE communications – SIMD Interconnection Networks – Static Vs

Dynamic – Mesh connected Iliac – Cube interconnection network – Shuffle-Exchange and Omega networks - Multiprocessor Architecture and programming Functional structures – interconnection Networks.

UNIT - V

Parallel Algorithms: Models of computation – Analysis of Parallel Algorithms Prefix Computation – Sorting – Searching – Matrix Operations.

REFERENCE BOOKS:

1. *Kai Hwang, Faye A. Briggs,* 1985. **Computer Architecture and Parallel Processing,** MGH, [Unit I, III, IV].

2. *Rajaraman.V, C. Siva Ram Murthy***,** 2004. **Parallel Computers Architectures and Programming**, [Third Edition], PHI, [Unit II, V].

3. *Kai Hwang,* 2011. **Advanced Computer Architecture – Parallelism, Scalability, Programmability**, Tata McGraw Hill.

4. *Michael J. Quinn,* 2009. **Parallel Computing Theory and Practice**, [Second Edition], TMH.

15PIT13C	**PAPER III: STRUTS AND HIBERNATION**	**SEMESTER - I**

Total Credits: 4
Hours Per Week:4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To understand the concept of MVC design pattern.

2. To study the concept of ORM.

CONTENTS

UNIT- I

The Struts Framework: An Introduction to Struts: - A Brief History of Web Application Development - Two Development Models - A Closer Look at the Model-View-Controller Architecture - Enter Struts - Basic Components of Struts - Acquiring Struts.

UNIT- II

The Model Layer: Struts and the Model. The View Layer: Struts and the View Layer - The Controller Layer: Struts and the Controller Layer - The Action Servlet Class – The Request Processor Class - The Action Class – The Action Forward Class.

UNIT- III

The Struts Configuration File: Configuring the web.xml Deployment Descriptor - The Struts Configuration File Tags. The Struts Tag Libraries: The HTML Tag Library.

UNIT- IV

Understanding object/relational persistence: Persistence -Understanding SQL - Using SQL in Java -Persistence in object-oriented applications - Persistence layers and alternatives: Layered architecture - Hand-coding a persistence layer with SQL/JDBC.

UNIT -V

Understanding object/relational persistence: Object/relational mapping: Definition of ORM - Generic ORM problems. Introducing Hibernate, EJB3, and JPA- Starting a project: Starting a Hibernate project - Selecting a

development process - Setting up the project – Hibernate configuration and startup – Running and testing the application.

TEXT BOOKS:

1. *James Holmes,* 2007. **The Complete Reference - Struts**. [Second Edition],

   McGraw Hill/Osborne. New Delhi. [UNIT - I, II, & III]

2. *Christian Baver and Gavin King,* 2007**. Java Persistence with Hibernate Revised Edition of Hibernate In Action,** [Second Edition], Manning. U.S. [UNIT - IV &V]

REFERENCE BOOKS:

1. *Donald Brown, Chad Michael Davis and Scott Stanlick,* 2008. **Struts 2 in Action**. [First Edition], Manning. U.S.

2. *Dave Minter and Jeff Linwood*, 2006. **Beginning Hibernate from Novice to professional** [First Edition]. A press. Bangalore.

15PIT13D	**PAPER IV: INTRODUCTION TO OPEN SOURCE TOOLS**	**SEMESTER – I**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Introduction to Linux, UNIX Network Programming.

2. An overview of PHP and also it helps in understanding PHP as a powerful server-side scripting language for creating dynamic and interactive websites.

3. To gain knowledge on Perl, MySQL Programming.

CONTENTS

UNIT - I

Introduction to Linux – What every Linux users knows- The shell-The X windows system –Files and Directories. Viewing Text – Editing Text – Pattern matching, VI, Ex and Vim editors.

UNIT - II

UNIX Network Programming-Introduction to TCP/IP: Introduction – The Transport Layer TCP and UDP. **Elementary sockets**: Sockets Introduction, Elementary TCP sockets – I/O multiplexing – Socket options

UNIT - III

PHP Programming Basics: PHP - Introduction, PHP Basics: - Syntax-Variables- Controls and functions passing information between pages - Strings. Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays.

UNIT – IV

Perl Programming Perl - Introduction, Perl Basics: - Syntax, Variables, Strings, Numbers, Operators, and Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays, and Chop, Length, and Sub string. Hashes, Arguments, Logic, Looping, Files, Pattern Matching, Environment Variables, Using cgi-lib for Forms.

UNIT - V

File Management PERL: - File Handling, Reading from Files, Appending Files, Writing to Files, File Checking, Reading Directories. Databases PERL: - DBI Module, DBI Connect, DBI Query, MySQL Module, MySQL Connect, MySQL SelectDB, MySQL Query

REFERENCE BOOKS:

1. *Ellen sivever, Aarom weber, Stephen Figgins, Robers Love and Arnold Robbins O'Reilly,* **Linux Ina Nutshell – A desktop Quick Reference**, [Fifth Edition.

2. *Michael Stutz,* 2004. **Linux CookBook,** [Second Edition], SPD Pvt.ltd.

3. *Elizabeth Naramore et al*, 2006. **Beginning PHP5, Apache, MySQL Web   Development**, Wiley dream tech publishing. Chris Ullman Press Ltd Publications.

4. *Tom Christiansen & Nathan Torkington, O'Relliy,* 2006. **Perl CookBook**, SPD Pvt ltd.

15PIT1EA	ELECTIVE I: DIGITAL IMAGE PROCESSING	SEMESTER - I

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To learn the basics of image processing and its types features like transformation, Image Compression, Image Restoration and Image Segmentation.

CONTENTS

UNIT - I

Introduction: What is Digital Image Processing? – Examples of Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System - Digital Image Fundamentals: Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels.

UNIT - II

Intensity Transformation and Spatial Filtering: Some basic Intensity Transformation Functions – Histogram Processing – Fundamentals of Spatial Filtering – Smoothing and Sharpening Spatial Filters. Filtering in Frequency Domain – Preliminary Concepts – Some Properties of the 2D Discrete Fourier Transform – The Basic of Filtering in Frequency Domain – Image Smoothing and Sharpening using Frequency Domain Filters - Implementation.

UNIT - III

Image Restoration: A Model of the Image Degradation / Restoration Process- Noise Models- Restoration in the Presence of Noise Only–Spatial Filtering - Estimating the Degradation Function- Inverse Filtering- Minimum Mean Square Error (Wiener) Filtering. Color Image Processing: Color Fundamentals - Color Models - Pseudo color Image Processing- Basics of Full-Color Image Processing- Color Transformations - Smoothing and Sharpening - Image Segmentation Based on Color - Noise in Color Images - Color Image Compression.

UNIT - IV

Image Compression: Fundamentals – Some Basic Compression Methods – Digital Image Watermarking. Morphological Image Processing: Preliminaries – Erosion – Dilation – Opening and Closing –The Hit-or-Miss Transformation – Some Basic Morphological Algorithms- Gray Scale Morphology.

UNIT - V

Image Segmentation: Fundamentals – Point, Line and Edge Detection – Thresholding – Region-Based Segmentation – Segmentation Using Morphological Watersheds – The use of Motion in Segmentation. Representation and Description: Representation – Boundary Description – Regional Descriptors – Use of Principal Components for Descriptors-Object Recognition.

TEXT BOOK:

1. *Rafael C. Gonzalez, Richard E. Woods*, 2008. **Digital Image Processing**, [Third Edition], Prentice Hall.

REFERENCE BOOK:

1. *Anil K. Jain*, 2008. **Fundamentals of Digital Image Processing**, Prentice Hall of India Pvt. Ltd.

15PIT1EB	ELECTIVE I : DATA MINING AND WAREHOUSING	SEMESTER - I

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Introduction to Mining tasks, classification, clustering and Data Warehousing.

2. To enable the students to learn the Data mining tasks& Data warehousing techniques.

3. Understood the Association rules, Clustering techniques and Data warehousing.

CONTENTS

UNIT - I

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

UNIT - II

Classification: Introduction – Statistical – based algorithms - distance – based algorithms – decision tree - based algorithms - neural network – based algorithms –rule - based algorithms – combining techniques.

UNIT - III

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

UNIT - IV

Data warehousing: introduction - characteristics of a data warehouse – data marts – other aspects of data mart. Online analytical processing: introduction - OLTP & OLAP systems – data modeling –star schema for multidimensional view –data modeling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

UNIT - V

Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

TEXT BOOKS:

1. *Gupta.G.K*, 2008. **Introduction to Data mining with case studies**, PHI Private limited, New Delhi.

2. *Alex Berson, Stephen J. Smith,* 2007. **Data Warehousing, Data Mining & OLAP**, Tata McGraw-Hill Edition, Tenth Reprint.

REFERENCE BOOKS:

1. *Margaret H. Dunham,* 2006. **Data mining introductory and advanced topics**, Pearson education, [Unit I, II, III].

2. *Prabhu.C.S.R,* **Data warehousing concepts, techniques, products and an application**, PHI, Second Edition, [Unit IV, V].

3. *Arun K.Pujari,* 2003. **Techniques**, Universités Press (India) Pvt. Ltd.,

4. *Alex Berson, Stephen J. Smith,* 2001. **Data warehousing, data mining, & OLAP**, TMCH.

5. *Jiawei Han & Micheline Kamber*, 2001. **Data mining Concepts & Techniques**, Academic press.

15PIT1EC	ELECTIVE I : WEB TECHNOLOGY	SEMESTER - I

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To enable the students to learn the concepts of HTML, DHTML, JAVA SCRIPT and XML

2. To gain knowledge on web technologies and its applications.

CONTENTS

UNIT - I

Introduction to computers and the Internet: history of the world wide web -Introduction to HTML: Introduction - markup language - editing HTML common tags-headers – text styling – linking – images - formatting text with <FONT>special characters, horizontal rules and more line breaks-internet and www resources. Intermediate HTML: Introduction-unordered lists-nested and ordered lists basic HTML tables-intermediate HTML tables and formatting-basic HTML forms-more complex html forms-internal linking-creating and using image maps <META>tags<FRAMESET>tags-internet and www resources.

UNIT - II

Java script-Introduction to scripting: Introduction-memory concepts arithmetic-decision making-java script Internet & www resources. Java script Arrays: Passing arrays to functions-Multiple Subscripted arrays. Java script objects: Introduction-Thinking about objects-Math strings, Data book and number objects.

UNIT - III

Dynamic HTML: CSS: Introduction-Inline Styles-Creating style sheets with the Style element-Conflicting Styles-Linking External Style Sheets-Positioning Elements-Backgrounds-Element Dimensions-text flow and the box model-user style sheets-Internet and www resources. Dynamic HTML: event model: Introduction-event ON CLICK-event ON LOAD error handling with ON ERROR-Tracking the mouse with event ON MOUSE.MOVE-rollovers with ON MOUSE OVER and ONBLUR-more

form processing with ON SUBMIT and ON RESET-event bubbling more DHTML events.

UNIT - IV

Active Server Pages (ASP): Introduction-How ASP works-client side scripting versus server side scripting-Using personnel web server or Internet Information Server-server-Side ActiveX Components-File System Objects-Session tracking and cookies-accessing a database from an ASP-Internet and www resources.

UNIT - V

Active XML: Introduction –Structuring data – XML name space – DTDs and Schemas – XML vocabularies – document object model (DOM) – DOM methods – simple API for XML – Extensible style sheet language (XSL) –simple object access protocol (SOAP) – Web services – Web resources.

TEXT BOOK:

1. *Deitel, Neito,* 2009. **Internet and World Wide Web-How to program**, Pearson Education Asia, [UNIT I to V].

REFERENCE BOOKS:

1. *Thomas A.Powell,* 2004. **The Complete Reference HTML and XHTML**, [Fourth Edition], Tata McGraw Hill pub. Company Ltd, New Delhi.

2. *Achyut S. Godbole, Atul Kahate,* 2003. **Web Technologies-TCP/IP to Internet Application Architectures**, Tata McGraw- Hill Pub. Company Ltd.

15PIT1ED	ELECTIVE I: NEURAL NETWORKS AND FUZZY LOGIC	SEMESTER - I

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To cater the knowledge of Neural Networks

2. To understand Fuzzy Logic Control and use these for controlling real time systems.

CONTENTS

UNIT - I

Fundamentals Of Neural Networks - Basic concepts of Neural Networks - Human Brain - Model of an Artificial Neuron - Neural Network Architectures – Characteristics - Leaning Methods – Taxonomy – History - Early Neural Network Architectures.

UNIT - II

Back propagation Networks - Architecture of a Back propagation Network - Back Propagation Learning – Application - Effect of Turning Parameters of the Back Propagation Neural Network - Selection of Various Parameters in BPN - Variations of Standard Back Propagation Algorithm.

UNIT - III

Associative Memory - Autocorrelators – Heterocorrelators - Wang et al.'s Multiple Training Encoding Strategy - Exponential BAM - Associative Memory for Real-coded pattern pairs -Applications. **Adaptive Resonance Theory -** ART1 - ART2 - Applications.

UNIT - IV

Fuzzy Logic - Fuzzy Set Theory - Fuzzy Sets - Crisp Relations - Fuzzy Relations.

UNIT - V

Fuzzy Systems - Crisp Logic – Predicate Logic - Fuzzy Logic - Fuzzy Rule Based System -Defuzzification Methods. **Genetic Algorithms -** Genetic Algorithms - Basic Concepts - Creation of Off springs - Working Principle – Encoding - Fitness Function - Reproduction.

TEXT BOOK:

1. *S.RajaSekaran, G.A. Vijayalakshmi Pai,2003.* **Neural Networks, Fuzzy Logic and Genetic Algorithms – Genetic Algorithms**, [Seventh Edition], Prentice Hall of India, New Delhi.

REFERENCE BOOK:

1. *Chenna Kesava R. Alavala,* 2008. **Fuzzy logic and Neural Networks – Basic Concepts and Applications**, [First Edition], New Age International Publishing, NewDelhi.

15PIT13P	**LAB I: STRUTS AND HIBERNATION LAB**	**SEMESTER - I**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Understood the trends and principles of JAVA.

2. Gained problem solving skills Jap and Struts.

LIST OF PRACTICALS:

1. Program to receive Http Request Parameter from JSP page and process the
   Same in Servlet.
2. Program to use JSP custom tag.
3. Program to design MVC using JSP, Servlet and POJO or Java class.
4. Program to use Struts framework.
5. Program to validate user request using Struts framework.
6. Program to use struts form tag library.
7. Program to use Exception Handling Mechanism provided by the struts.
8. Program to use struts framework that should use tiles struts tag library.
9. Program to use Hibernate framework and implement Many-to-One mapping.
10. Program to use Hibernate framework and implement One-to-One mapping.

15PIT13Q	**LAB II: INTRODUCTION TO OPEN SOURCE TOOLS LAB**	**SEMESTER - II**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Practical knowledge of PHP and various methods to implement

rich internet applications using PHP.

LIST OF PRACTICALS:

1. Program to print given numbers and find sum of all digits using Shell script.
2. Program to print line number to the next given number of lines using Shell script.
3. Program to use variables and control structures.
4. Program to use PHP loops.
5. Program to use PHP arrays.
6. Program to pass variables between pages.
7. Creating a table and insert records to the table in MySQL.
8. Program to Delete and update records in MySQL table.
9. Program to Connect PHP to MySQL database.
10. Program to View MySQL table data through PHP.
11. Program to Manipulate MySQL database through PHP.
12. Program to check the User login Validation through PHP.
13. Program to upload a file in PHP.
14. Creating a Pay slip for an employee using PHP and MySQL.
15. Creating a program for String Manipulation in PERL.
16. Creating a program for Environment Variables in PERL.
17. Program to Read a data from a file and write the data to another file using PERL.

15PIT23A	**PAPER V: ANALYSIS AND DESIGN OF ALGORITHM**	**SEMESTER - II**

Total Credits: 4
Hours Per
Week: 5

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To understood the various design and analysis of the algorithms

2. To understood different types of searching and sorting techniques.

CONTENTS

UNIT - I

Introduction:- algorithm definition and specification – performance analysis –
Elementary Data structures:- stacks and queues – trees – dictionaries – priority queues – sets and disjoint set union – graphs – basic traversal and search techniques

UNIT - II

Divide – and – conquer: - General method – binary search – merge sort – quick sort – The Greedy method:- General method – knapsack problem – minimum cost spanning tree – single source shortest path

UNIT - III

Dynamic Programming - general method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – traveling salesman problem – flow shop scheduling

UNIT - IV

Backtracking:- general method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem – Branch and bound:- The method – 0/1 Knapsack problem – traveling salesperson.

UNIT - V

Parallel models:- Basic concepts, performance Measures. Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel

Multiplication and division, Parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence

REFERENCE BOOKS:

1. *Ellis Horowitz*, 1999.**Computer Algorithms**, Galgotia Publications.

2. *S. Lakshmivarahan, Sundarshan K.Dhall,1990.* **Analysis and Design of Parallel Algorithms.**

3. *Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman,1983.* **Data Structures and Algorithms**.

4. *Goodrich,2004.* **Data Structures & Algorithms in Java**, Wiley, [Third Edition].

15PIT23B	PAPER VI: ADVANCED NETWORKS	SEMESTER - II

Total Credits: 4
Hours Per Week: 5

OBJECTIVE:

The subject aims to build the concepts regarding:

1. To inculcate knowledge on networking concepts and protocols.

CONTENTS

UNIT - I

Introduction and Overview: Network Technologies – Internetworking Concepts and Architectural Model – Internet Addresses – ARP – RARP.

UNIT - II

Internet Protocol: Connectionless Datagram Delivery – Forwarding IP Datagram's – Error and Control Messages (ICMA) – Protocol Layering - CIDR.

UNIT - III

UDP, TCP, Routing – Cores, Peers and Algorithms – Exterior Gateway Protocols and Autonomous Systems (3GP) –In an autonomous System (RIP, OSPF, HELLO).

UNIT - IV

Internet Multicasting – TCP/IP Over ATM Networks – Mobile IP – Private Network Interconnection – Internet Management (SNMP) – Client Server Model of Interaction.

UNIT - V

DNS – Remote Login – File Transfer and Access – Email – World Wide Web (Http) – Voice and Video over IP (RTP).

TEXT BOOK:

1. *Douglas E.Comer,* 2006. **Internetworking with TCP/IP, Vol-I - Principles, Protocols and Architecture,** [Fifth Edition], Prentice Hall of India, New Delhi.

REFERENCE BOOK:

1. *Andrew S.Tananbaum*, 2011. **Computer Networks**, [Fifth Edition], Pearson   Education Publishing as Prentice Hall, USA.

15PIT23C	PAPER VII: ADVANCED RDBMS	SEMESTER - II

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Basic understanding of the concepts, techniques, and applications of the database management technology.

2. Students will have the hands-on experience to use an existing database management system to develop a database application system.

CONTENTS

UNIT - I

Database system architectures: Centralized systems – Client/Server systems – Parallel and Distributed systems. Advanced Querying and Information Retrieval: Decision-support systems – Data mining – Data warehousing – Information Retrieval system: Relevance ranking using Terms – Relevance using Hyperlinks - Directories and Categories.

UNIT - II

Storage and File Structure: File Organization – Organization of Records in Files – Data Dictionary storage – Database Buffer. Indexing and Hashing: Basic concepts - Ordered Indices- Static Hashing - Dynamic Hashing.PL/SQL: Triggers- Procedures- Functions-Packages-Cursors.

UNIT - III

Transactions: Concept – A simple Transaction Model – Storage structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability - Transaction Isolation and Atomicity. Recovery System: Failure Classification – Storage - Recovery and Atomicity Recovery Algorithm – Buffer Management – Failure with loss of Non-volatile storage – Early lock release and Logical Undo operations.

UNIT - IV

Parallel Databases: I/O Parallelism - Interquery Parallelism – Intraquery Parallelism –Interoperation Parallelism - Interoperation Parallelism – Design of Parallel Systems. Distributed Databases: Homogeneous and Heterogeneous Databases – Distributed Data Storage –Distributed Transactions – Commit Protocols – Concurrency control in Distributed database –Availability – Distributed Query Processing – Cloud-based Databases.

UNIT - V

Advanced Application Development: Performance Tuning. Advanced Transaction Processing: Transaction Processing Monitors – Transactional Workflows – Main Memory Databases – Real-time Transaction System – Long-Duration Transactions.

REFERENCE BOOKS:

1. *Abraham Silberchatz, Henry F.Korth, S.Sudharshan, 2011.* **Database System Concepts**,[Sixth Edition], McGraw Hill. (Unit I – Unit V)

2. *Kevin Loney, George Koch,* 2008. **ORACLE 9i-The Complete Reference**, Tata McGraw Hill.

15PIT23D	PAPER VIII: PROGRAMMING IN C# AND DOT NET FRAMEWORK	SEMESTER - II

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Understood the trends and principles of .Net framework

2. Gained problem solving skills using C#.

CONTENTS

UNIT - I

Introduction to .NET frame work - . NET objects - ASP .NET - .NET Web services - Windows forms

UNIT - II

Introduction to C# - Characteristics of C# - Applications of C# - Understanding C# in .NET - .Net Framework – Common Language Runtime – Framework base classes - .Net Languages – Benefits of .Net approach - Overview of C# - Literals, variables and data types.

UNIT - III

Operators – Expressions – Decision Making and branching - Decision Making and looping – Methods in c# - Handling arrays – Manipulating strings.

UNIT - IV

Structures – struct with methods – Nested structures – difference between classes and structs - Enumerations – Classes and Objects – Inheritance and Polymorphism - Multiple Inheritances.

UNIT - V

Operator overloading – Delegates and Events – Managing console I/O operations - Managing Errors and Exceptions.

REFERENCE BOOKS:

1. *Balagurusamy.E,* 2010. **Programming in C# - A Primer,** Tata McGraw-Hill.

2. *Christian Nagel, Bill Evjen,* 2010. **Professional C# 4 and .Net 4**, Wiley India Pvt.Ltd.

3. *Andrew Stellman, Jennifer Greene*, 2013. **Head First C#**, [Third Edition], O'Reily.

15PIT2EA	ELECTIVE II: MOBILE COMPUTING	SEMESTER - II

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To Understood the concept of wireless mobile computing.

2. To Understood World Wide Web and its applications.

CONTENTS

UNIT - I

Introduction – Vertical and applications of Wireless Networking – Positioning of Wireless networking relative to wired networks – Wireless LAN and Wireless WAN – Wireless PBXs map – The Radio Spectrum cell size and achievable throughput. Wireless transmission – Frequencies for radio transmission – Regulations – Signals, Antennas, Signal propagation, path loss of radio signals, Additional signal propagation effects- Multi-path propagation – Multiplexing.

UNIT - II

Space division multiplexing – Frequency division multiplexing – time division multiplexing – Code division multiplexing. Spread spectrum – Direct sequence spread spectrum – Frequency hopping spread spectrum – Cellular systems. Medium access control – Hidden and exposed terminals – Near and far terminals – SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access– Reservation TDMA – Multiple access with collision avoidance – Polling – CDMA – Spread Aloha multiple access

UNIT – III

Comparison of S/T/F/CDMA.GSM – Mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – Location Management for Mobile Cellular Systems – GPRS – Mobile services – System Architecture.

UNIT - IV

UMTS and IMT – 2000.Wireless LAN – Infra red vs. radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 – System architecture – Protocol architecture – Physics layer – Medium access control layer – MAC management – Blue tooth. Mobile network layer – Mobile IP – Goals, assumptions and requirements – entities and terminology – packet delivery – Agent discovery – Registration – Tunneling and encapsulation Recent technologies

UNIT - V

World Wide Web - WAP – Architecture – wireless datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script – Mobile computing applications using J2ME.

REFERENCE BOOKS:

1. *John Schiller,* 2003. **Mobile Communications**, Addison Wesley.

2. *Rifaat A. Dayen*, 1997. **Mobile Data & Wireless Lan Technologies**, Prentice Hall.

3. *Steve Mann and Scoot Schibli*, **The Wireless Application Protocol**, John Wiley &Sons, inc.

4. *Steve Mann*, 2000. **Programming Applications With The Wire Less Application Protocol**, John Wiley & Sons, Inc.

15PIT2EB	ELECTIVE II : AI AND ROBOTICS	SEMESTER - II

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To understand the concept of AI like Heuristic, Hill Climbing , Planning , etc.,
2. To gain knowledge about robotics and their applications.

CONTENTS

UNIT - I

The AI Problems – AI technique – Criteria for success – Define the Problem as a state space search – Production System – Characteristics – Problem Characteristics.

UNIT - II

Heuristic Search Techniques: Generate and Test – Hill climbing –Best First Search – Problem Reduction – Constraints Satisfactions – Means End Analysis.

UNIT - III

Knowledge Representation Issues: Approaches to knowledge Representation – The Frame Problem – Computable Functions & Predicates – Resolution – Procedural versus Declarative Knowledge.

UNIT - IV

Fundamentals of Robotics: Introduction, classification of Robots, History of Robots, Advantages and Disadvantages of Robot, Robot components, Robot degree of freedom, Robot joints and coordinates, Robot workspace, Robot reach, Robot languages.

UNIT - V

Sensors: Introduction to internal and external sensors of the robot, Position sensors, Velocity sensors, Acceleration sensors, SONAR and IR sensors, Touch and tactile sensors. **Applications of**

Robots: Applications of robots, selection of robots, economic factors and justification for robotic application; safety requirements.

TEXT BOOKS:

1. *Elaine Rich and Kevin Knight,* 1991. **Artificial Intelligence,** [Second Edition], Tata McGraw Hill.

2. *Craig J J,* 2004. **Introduction to Robotics, Mechanics and Control**, Pearson Education, New Delhi.

3. *Saeed B Niku,* 2003. **Introduction to robotics**, Pearson Education, New Delhi.

15PIT2EC	**ELECTIVE II: WIRELESS APPLICATION PROTOCOL**	**SEMESTER - II**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. To learn the Mobile Concepts.

2. Wireless Markup Language and its Applications.

CONTENTS

UNIT - I

The Rise of Mobile Data - Market Convergence Enabling Convergence – Key Services for the Mobile Internet - Overview of the Wireless Application Protocol - The Origins of WAP –Overview of the WAP Architecture – Components of the WAP Standard – Network Infrastructure Services Supporting WAP Clients – WAP Architecture Design Principles –Relationship to Other Standards.

UNIT - II

The Wireless Markup Language - Overview – The WML Document Model – WML Authoring – URLs Identify Content – Markup Basics – WML – Basics – Basic Content –Events, Tasks and Bindings.

UNIT - III

Variables – Controls – Miscellaneous Markup – Sending Information – Application Security – Other Data - The Meta Element – Document Type Declarations – Errors and Browser Limitations – Content Generation – WML Version Negotiation.

UNIT - IV

User Interface Design - Making Wireless Applications - Easy to Use - Web Site Design -Computer Terminals Vs Mobile Terminals – Designing a Usable WAP Site – Structured Usability Methods – User Interface Design Guidelines – Design Guidelines for Selected WML Elements.

UNIT - V

Wireless Telephony Applications - Overview of the WTA Architecture – WTA Client Framework – WTA Server & Security – Design Considerations – Application Creation Toolbox – Future WTA Enhancements. The Mobile Internet Future: Better Content, Easier Access – Beyond Browsing – Beyond Cellular – Mobile Data Unleashed.

TEXT BOOKS:

1. *Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan, Stefan Hild,* 2007. **The Wireless Application Protocol**, Pearson Education.

2. *Sandeep Singal et al. 2001.***WAP writing applications for Mobile Internet,** Pearson Education

3. *Data Bubrook, 2001.***WAP: A beginner's guide**, Tata McGraw Hill.

15PIT2ED	**ELECTIVE II: MANAGEMENT CONTROL INFORMATION SYSTEM**	**SEMESTER - II**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. The basic concepts of MIS, importance of MIS for an organization and will be able to contribute effectively in the development.

2. Implementation of MIS in different types of organizations.

CONTENTS

UNIT - I

Introduction to Information and Management: Definition of Information, Types of Information – Sources, Values and Control of Information – Implications of Information in Business & MIS Need for Information Systems – Examples of Information Systems – Impact of IT on organizations and society – Impact of IT on organizations and society – Impact of IT on organizations and society

UNIT - II

Basics of MIS : Decision-making – Process and Modeling – MIS and Decision-Making – Classification of Information, Methods of Data and Information Collection – Model of Human as Information Processor – Knowledge & Knowledge Management Systems – Knowledge & Knowledge Management Systems – Business Intelligence – System Concept & Control – Types of system, handling complexity of system – Efficiency and effectiveness, post implementation problems, classes of systems – General Model of MIS

UNIT - III

Developing MIS: Development Process of MIS – Implementation of MIS - Decision Support System – Group Decision Support System – Knowledge Based Expert Systems, Benefits of DSS

UNIT - IV

MIS in Functional Areas of Manufacturing & Service Sectors: Application of MIS in various Manufacturing Sectors – Personnel Management – Financial Management – Production Management – Raw Materials Management – Marketing Management – Introduction to Service Sector – Creating distinctive service – Service concept – Service process cycle and analysis – Customer service design – Service Management System – MIS Applications in Service Industry – MIS in Service Industry

UNIT - V

New Concepts in MIS : e-Business – Information Security – Computer Crime & Cyber terrorism – Computer Forensics – Information Life Cycle Management.

TEXT BOOKS:

1. *V. Rajaraman,* 2006. **Analysis and Design of Information Systems**, PHI Publication.

2. *Waman S. Jawadekar*, 2009. **Management Information Systems – Text & Cases**, [Fourth Edition], Tata McGraw-Hill Publication.

3. *Ken Laudon, Jane Laudon, Rajanish Dass,* 2010. **Management Information Systems Managing the Digital Firm**, [Eleventh Edition], Pearson Education.

4. **Chapter wise Coverage from the Text Books:**

5. Book # 1 : Chapter 1 & 2; Book # 2 : Chapter 5, 6, 7, 8.1 – 8.6, 9, 12, 13, 14;   Book # 3 : Chapter 8

REFERENCE BOOKS:

1. *Robert G. Murdick, Joel E. Ross, James R. Claggett,* 2005. **Information Systems for Modern Management**, [Third Edition], PHI Publication.

2. *Stephen Haag, Maeve Cummings, Amy Philips,* 2010. **Management Information Systems for the Information Age**, [Sixth Edition], McGraw-Hill Publication.

3. *Sanjay Mohapatra,* 2009. **Cases in Management Information Systems**, PHI Publication.

15PIT23P	**LAB III: C# AND DOT NET PROGRAMMING LAB**	**SEMESTER - II**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Understood the trends and principles of .Net Framework
2. Gained problem solving skills using C#.

LIST OF PRACTICALS:

1. Program to display Floyd's Triangle.
2. Program to implement all types of method parameters.
3. Program to implement array list methods.
4. Program to implement array with string methods.
5. Program to use overload binary operators and comparison operator.
6. Program to implement Delegates and Event using Inheritance.
7. Program to display student's details using structures.
8. Program to find factorial and prime number using windows form application.
9. Program to Design a registration page using the validate controls.
10. Program to Design a web site that makes use of Master Pages.

15PIT23Q	**LAB IV: ORACLE LAB**	**SEMESTER - II**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the concepts regarding:

LIST OF PRACTICALS:

1. Creating of databases Writing SQL queries to manipulate information for the following databases.
2. Hospital Management System
3. Payroll Processing System
4. Customer Service Automation
5. Hotel Management System
6. Banking system various schemes
7. Online reservation system.
8. Personal information.
9. Student mark processing system (Internal and Extern al marks).

The following can be done on the above systems.

1. Sub Queries, Nested Sub Queries.
2. Assertions
3. PL/SQL functions and procedures.
4. Triggers.
5. Exception Handling.
6. Embedded SQL Structures

15PIT33A	**PAPER IX: BIG DATA AND CLOUD COMPUTING**	**SEMESTER - III**

Total Credits: 4
Hours Per Week:5

OBJECTIVES:

The subject aims to build the concepts regarding:

1. Overview about big data and introduces the technology behind it.

2. The core issues of cloud computing, infra structure and virtualization.

CONTENTS

UNIT - I

Big Data: Characteristics of Big Data- The volume of Data- the Variety-the Velocity of Data-Data in the Warehouse and Data in Hadoop. Why Data is Important? – When to consider a Big Data Solution- Big Data Use cases: Patterns for Big Data Deployment- IT for IT Log Analytics.

UNIT - II

Big Data: From the Technology Perspective-All about Hadoop: The Big Data Lingo Chapter-The history of Hadoop- Components of Hadoop-Application Development in Hadoop-Getting your data into Hadoop-Other Hadoop Components.

UNIT - III

First Drive: Introduction-Essentials-Benefits- Business and IT perspective-Cloud and Virtualization-Cloud Services Requirements-Cloud and Dynamic Infrastructure-Cloud Computing Characteristics-Cloud Adoption-Cloud Rudiments. Cloud Deployment Models- Introduction-Cloud Characteristics-Measures Service- Cloud Deployment Models-Security in Public Cloud-Public versus Private Cloud-Cloud Infrastructure Self-Service.

UNIT - IV

Cloud as a service: Introduction- Gamut of Cloud Solutions-Principal Technologies-Cloud Strategy- Cloud Design and Implementation Using SOA-Conceptual Cloud- Cloud Service Defined. Cloud Solutions: Introduction-Cloud Eco system-Cloud Business Process Management-Cloud Service Management-On-Premise Cloud Orchestration and Provisioning Engine-Computing on Demand(CoD)-Cloud sourcing Cloud offerings: Introduction-Information storage, Retrieval, Archive and Protection-Cloud Analytics-Testing Under cloud-Information Security-Virtual Desktop Infrastructure- Storage Cloud.

UNIT - V

Cloud virtualization technology-Virtualization defined-Virtualization Benefits-Server Virtualization- Virtualization for x86 Architecture-Hypervisor Management Software- Virtual Infrastructure Requirements Cloud Infrastructure: Introduction-Storage Virtualization-Storage Area Networks-Network Attached Storage-Cloud Server Virtualization-Networking Essential to Cloud

TEXT BOOKS:

1. *Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, 2012.* **Understanding Big Data, Analytics for Enterprise Class Hadoop and Streaming Data**, Tata Mc GrawHill, (ebook) (Unit-I and II) (Refer e-book repository)

2. *Dr.Kumar Saurabh, 2012.* **Cloud Computing**, Wiley India, [Second Edition], Reprint.

15PIT33B	**PAPER X : CYBER SECURITY MANAGEMENT TECHNIQUES**	**SEMESTER - III**

Total Credits: 4
Hours Per Week: 5

OBJECTIVE:

The subject aims to build the concepts regarding:

1. Cyber security, cooperative security at various management levels**.**

CONTENTS

UNIT - I

Why worry about security: Threats to personal security – Fraud and Theft – Employee sabotage – Infrastructure attacks – Malicious hackers – Malicious code – Industrial Espionage- Network security management basics : Foundations of information assurance – Defense-in-depth strategy – Privacy standards and regulations – Password management- Incident handling – Information warfare and information operations- Web security overview- Security Foundations

UNIT - II

Firewalls and Perimeters: Firewall environments - Perimeter concepts – How intruders break in – What is firewall – Static packet filtering – Edge, or boundary, routers and packets filters.- VPN's and Remote access : Historical evolution of the VPN – VPN Basics – Why is VPN Basics – VPN security essentials – VPN tunneling and protocols – Business benefits of VPN – A Case study- Intrusion Detection in Depth : Basic intrusion detection concepts – Types of IDS- IDS detectable attack types – Understanding TCP/IP for intrusion detection – TCP dump overview

UNIT - III

Securing communications : Cryptography – Cryptographic techniques – Cryptographic keys – Cryptographic hash functions - Digital signatures – Secret-key cryptography- Public-key cryptography – Open PGP - Cryptanalysis and cryptographic attack techniques – Steganography- Keys, Signatures , Certificates, and PKI : Key cryptography – Digital signatures – Certificates – Public-key Infrastructure

UNIT - IV

Hackers Exploits: Hacking defined – Script kiddies versus hackers – Hacking groups and clubs – Cyber activism – Language – Social engineering – Reconnaissance- IDS evasion – General hacker exploits – Tracing hackers Incident Handling Basics: Why incident response is necessary – What purpose does incident response serve – Common terms – Organizational planning for incident handling – Creating a computer security- incident response team – Organizational roles – Procedures for responding to incidents – Types of incidents- Stages of incident response – Incident prevention and detection – Response to various attack types - Incident reporting procedures – Incident response support organizations

UNIT - V

Forensics, Investigations and Response: What is cyber forensics? – Cyber forensics and the law – Cybercrime examples – What is forensic evidence- Auditing fundamentals : The auditor's role in writing security policies – Auditing standards and groups – Audit oversight committee – Auditing and assessment strategies – Prerequisites for developing an auditing strategy – Basic auditing methods and tools- General information audit process – Perimeter audits – Using N Map – Mapping the network with N Map – Analyzing the N Map scan results – Penetration testing using Nesses

REFERENCE BOOKS:

1. *John Rittinghouse, William M Hancock*, 2005. **Cyber Security Operations Handbook**, Elsevier Digital Press.
2. *James Graham, Ryan Olson, Rick Howar, 2011.* **Cyber Security Essentials,** CRC Press.
3. *V.K. Pachghare,* 2009. **Cryptography and Information Security**, PHI.
4. *Marie-Helen Maras,* 2011. **Computer Forensics: Cybercriminals, Laws, and Evidence**, Jones & Bartlett Learning Publication.
5. *E. Hacking Forensic Investigator Group*, *Ec-Council*, 2009. **Computer Forensics: Investigating**
6. **Network Intrusions and Cybercrime**, CENGAGE Learning.

15PIT33C	PAPER - XI: ANDROID	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concepts:

1. To introduce basic concepts of Android Programming.

2. To introduce Building Mobile Application using Android.

3. To introduce cutting edge technology to the students.

CONTENTS

UNIT - I

Introduction to Android History of Mobile Software Development - The Open Handset Alliance - The Android Platform - Android SDK - Building a sample Android application. **Android Application Design Essentials:** Anatomy of an Android applications **-** Android terminologies **–** Application Context, Activities, Services, Intents.

UNIT - II

Android Application Design Essentials: Receiving and Broadcasting Intents **-** Android Manifest File and its common settings **-** Using Intent Filter, Permissions **-** Managing Application resources in a hierarchy **-** Working with different types of resources

UNIT - III

Android User Interface Design Essentials: User Interface Screen elements - Designing User Interfaces with Layouts - Drawing and Working with Animation

UNIT - IV

Using Common Android APIs: Using Android Data and Storage APIs **-** Managing data using SQ Lite **-** Sharing Data between Applications with Content Providers **-** Using Android Networking APIs **-** Using Android Web APIs **-** Using Android Telephony APIs

UNIT - V

Deploying Android Application to the World: The Mobile Software Development Process - Testing Android Applications - Selling your Android application**.**

TEXT BOOK:

1. *Lauren Darcey and Shane Conder*, 2011. **Android Wireless Application Development**, [Second Edition], Pearson Education.

REFERENCE BOOKS:

1. *Reto Meier*, 2011. **Professional Android 2 Application Development**, Wiley India Pvt Ltd.

2. *Mark L Murphy,* 2009. **Beginning Android**, Wiley India Pvt Ltd.

3. *Sayed Y Hashimi and Satya Komatineni*, 2009. **Pro Android**, Wiley India Pvt Ltd.

4. **Chapter wise Coverage from Text Book: Chapters:**

   1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 29

   Note: In Practical, Eclipse Mobile edition will be allowed to be used as an IDE.

15PIT33D	PAPER XII: SOFTWARE TESTING	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concepts:

1. To understood the concepts of Software testing.

2. To got the skill of software testing.

3. Exposed to software testing tools.

CONTENTS

UNIT - I

Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible –The Consequence of bugs – Taxonomy of Bugs.

UNIT - II

Software testing Fundamentals – Test case Design –Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics - Predicates, Path Predicates and Achievable Paths - Path Sensitizing – Path Instrumentation – Implementation and Application of Path Testing.

UNIT - III

Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing – Why, What, How – Grammar for formats – Implementation – Tips.

UNIT - IV

Logic Based Testing – Motivational Overview – Decision tables – Path Expressions – KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity

UNIT - V

Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing – Validation testing – System testing – The art of Debugging.

REFERENCE BOOKS:

1. *Boris Beizer,* 2003. **Software Testing Techniques**, Dreamtech Press, [Second Edition].

2. *Myers and Glenford.J.*, 1979. **The Art of Software Testing**, John-Wiley & Sons.

3. *Roger.S.Pressman*, 2001. **Software Engineering – A Practitioner's Approach** ,Mc-Graw Hill, [Fifth Edition].

4. *Marnie.L. Hutcheson,* 2007. **Software Testing Fundamentals**,Wiley-India.

15PIT3EA	ELECTIVE III: BIOINFORMATICS	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concepts:

1. To impart knowledge on basic techniques of bio informatics.

2. DNA Sequence Analysis and Gene Structure.

CONTENTS

UNIT - I

Bioinformatics **T**he Dawn Of Sequencing – Biological Sequence/Structure Deficit – Genome Projects – Bioinformatics Importance – Pattern Recognition And Prediction – Folding Problem – Role Of Chaperones – Sequence Analysis – Homology And Analogy – Devil Is In The Detail - **Information Networks** Internet – Computer Finding Each Other – Facilities Used On The Internet – WWW – Web Browsers – HTP, HTML And URL's – European Molecular Biology Network – National Center For Biotechnology Information – Bioinformatics Programme In India – Virtual Tourism

UNIT - II

Protein Information Resources Biological Databases – Primary Sequence Databases – Composite Protein Sequence Databases – Structure Classification Databases – **Genome Information Resources -** DNA Sequence Databases – Specialized Genomic Resources

UNIT - III

DNA Sequence Analysis DNA - Gene Structure And DNA Sequences – Feature Of DNA Sequence Analysis – Issues In The Interpretation Of EST Searches – Two Approaches To Gene Hunting – Expression Profile Of A Cell – Cdna Libraries And Ests – Different Approaches To EST Analysis – Effects Of EST Data On DNA Databases– **Pair wise Alignment Techniques** Pair wise Alignment Techniques - Introduction - Database Searching - Alphabets And Complexity - Algorithms And Programs - Comparing Two Sequences-A Simple Case - Sub-Sequences - Identity And Similarity - The Dot plot - Local And Global Similarity - Global

Alignment: The Needleman And Wunsch Algorithm - Local Alignment: The Smith-Waterman Algorithm - Dynamic Programming Pair wise Database Searching.

UNIT - IV

Multiple Sequence Alignment The Goal Of Multiple Sequence Alignment - Multiple Sequence Alignment: A Definition - The Consensus - Computational Complexity - Manual Methods - Simultaneous Methods - Progressive Methods - Databases Of Multiple Alignments - Searching Databases With Multiple Alignments – **Secondary Database Searching** Bothering With Secondary Database Searches - Inside A Secondary Database – **Building A Sequence Search Protocol** A Practical Approach - Believing A Result – Structural And Functional Interpretation

UNIT - V

Analysis Packages Commercial Databases - Commercial Software - Comprehensive Packages - Packages Specializing In DNA Analysis - Intranet Packages - Internet Packages - Laboratory Information Management System (LIMS)– **Probability And Statistics** Modern Probability Theory – Chance Risk – Degrees Of Certainty – Death Of The Concept Of The Rational Person – End Of The Concept Of The Mathematically Credible Judgment - Concept Of The Average Person – Post-Script The Non Average Person – Bayesian Logic

TEXT BOOK:

1. *T K Attwood, D J Parry-Smith, Samiron Phukan,* 2007. **Introduction to Bioinformatics**, Pearson Education.

15PIT3EB	ELECTIVE III: SOFTWARE PROJECT MANAGEMENT	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concept:

1. Understood the trends and principles of software project management.

CONTENTS

UNIT - I

Product life cycle: Introduction – idea generation – prototype development phase – alpha phase – beta phase – protection phase – Maintenance and obsolescence phase. Project Life cycle models – What is it? A framework for studying different life cycle models – waterfall model, prototype model, RAD model, spiral model. Matrices: Metric roadmap- metric strategy- why to measure- set target, track them, understand and minimize variability, Act on data- Common fit falls

UNIT - II

Software configuration management: Basic definitions and terminology-The process and activities of Software configuration audit – software configuration management in geographically distributed teams- metrics in software configuration management – tools and automation. Software quality assurance Defining quality, importance of quality, quality control and assurance – cost and benefits of quality – software quality analyst's functions, SQA tools, measures for SQA success- pitfalls. Risk management

UNIT - III

Requirement gathering; inputs and start criteria for requirements, dimensions for requirement gathering, steps, to be followed, output and quality records, skill sets Estimation – what is estimation, when and why is it needed, three phases of estimation – estimation methodology-models for size estimation-converting effort to schedule

UNIT - IV

Design and development phase: Some differences in chosen approach – salient features of design- evolving an architecture, blueprint- design for reusability- technology choices/ constraints – design standards – design for portability- user interface issues – design for testability – design for diagnosability-design for maintainability- designs for installbility and interoperability.

UNIT - V

Project management testing and maintenance: Testing– activities that make testing- test scheduling and types of tests – people issues in testing management structures for testing – metrics. Introduction to management phase- configuration management, skill sets, estimating size, effort, and people resources for maintenance, metrics

REFERENCE BOOKS:

1. *Gopalswamy Ramesh,2005*. **Managing Global software projects**, Tata McGraw Hill.

2. *Kelkar.S.A,* 2003. **Software project management – a concise study**, PHI.

15PIT3EC	**ELECTIVE III : DISTRIBUTED OPERATING SYSTEM**	**SEMESTER - III**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concepts:

1. To gain more knowledge about advanced operating system principles, explore new ideas and research possibilities in future operating systems design.

2. Characteristics and design issues of Distributed Systems (DS),DS architecture, network, operating system, applications, design and implementation of DS, performance, security, reliability issue and some case studies.

CONTENTS

UNIT - I

Distributed Operating Systems - Distributed computing system models- Issues in designing a distributed OS. Message passing - Synchronization - Buffering - failure handling.

UNIT - II

Remote Procedure calls - The RPC model - Transparency of RPC - Implementing RPC – Stub generation and RPC messages - Marshalling arguments & results - Server management and parameter passing semantics– Communication protocols for RPC - Client Server binding - Lightweight RPC.

UNIT - III

Distributed shared memory - General architecture - Design and Implementation issues-Granularity - Structure of shared memory space - Consistency models - Replacement strategy-Thrashing.

UNIT - IV

Synchronization - Mutual exclusion – Deadlock - Election algorithms. Process management-Process migration. Distributed file systems – Features - File models - File sharing semantics -File caching schemes - File replication – Fault tolerance.

UNIT - V

Case Studies: Amoeba - Design goals & main features – System Architecture- Objects and their management – Process management - File Management – Inter process communication.

REFERENCE BOOKS:

1. *Pradeep K Sinha,* 2012. **Distributed Operating Systems Concepts and Design**, Prentice Hall of India Pvt. Ltd (Unit I – Unit V)

2. *D M Dhamdhere*, 2012. **Operating Systems**, Tata McGraw-Hill Publishing Company Limited.

15PIT3ED	ELECTIVE III : EMBEDDED SYSTEM	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

The subject aims to build the following concepts:

1. Understood the RTOS concepts.

2. Understood the Embedded software Development

CONTENTS

UNIT - I

Introduction to Embedded Systems: Embedded System – Processor in the system – Other hardware units – software embedded into a system – Exemplary Embedded systems – On chip and in VLSI Circuit. Processor and Memory selection for an embedded system.

UNIT - II

Devices and Buses for Device Networks: I/O devices – Timer and counting Devices. Device Drivers and Interrupts Servicing Mechanism: Device drivers – Parallel Port device drivers in a system – Serial Port device in a system – Device drivers for internal programmable timing devices – Interrupt servicing mechanism – context and the periods for context-switching, deadline and interrupt latency.

UNIT - III

Program modeling concepts in single & Multiprocessor systems software-Development Process: Modeling Processes for Software analysis before software Implementation – Programming models for event controlled or response time constrained real time programs –Modeling for microprocessor systems.

UNIT - IV

Inter – process communication & Synchronization of processes, Tasks and threads: Multiple processes in an application – Problem of sharing data by multiple tasks and routines – Inter Process communication.

REAL TIME OPERATING SYSTEM:- Real time and Embedded systems operating systems – Interrupt routines in RTOS environment – RTOS Task scheduling models, Interrupt latency and Response times of the Tasks as performance Metrices – performance Metric in scheduling models for periodic, sporadic and A periodic Tasks.

UNIT - V

Hardware – Software co-design in an embedded System: Embedded System Project Management – Embedded system design and co-design issues in system development processes – Design cycle in the development phase for an Embedded system – Uses of Target system, or its Emulator and In-circuit Emulator – Use of software tools for development of an embedded system – Use of scopes and logic analysis for system hardware tests – Issues in Embedded system design.

REFERENCE BOOKS:

1. *Raj Kamal,* 2003. **Embedded Systems – Architecture, Programming and Design**, Tata Mcgraw – Hill.

2. *David E. Simon,* 2003. **An Embedded Software primer**, Pears on Education Asia.

15PIT33P	LAB V: ANDROID LAB	SEMESTER - III

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

1. The main objectives to give hands on experience in Mobile Application Development using Android by introducing basic concepts of Android Programming.

2. Building Mobile Application in Android and to introduce cutting edge technology to the students.

LIST OF PRACTICALS:

1. Creating "Hello World" application. That will display "Hello World" in the middle of the screen in the red color with white background.
2. To understand Activity, Intent
    a. Create sample application with login module. (Check username and password)
    b. On successful login, go to next screen. And on failing login, alert user using Toast.
    c. Also pass username to next screen.
3. Creating login application where you will have to validate Email ID (User Name). Till the username and password is not validated, login button should remain disabled.
4. Creating and Login application as above. On successful login, open browser with any URL.
5. Creating an application that will pass some number to the next screen and on the next screen that number of items should be display in the list.
6. Program to Understand resource folders:
    a. Create spinner with strings taken from resource folder (res >> value folder).
    b. On changing spinner value, change image.
7. Program to Understand Menu option. : Create an application that will change color of the screen, based on selected options from the menu.

8. Creating an application that will display toast (Message) on specific interval of time.
9. Creating a background application that will open activity on specific time.

10. Creating an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayed below.
11. Program to Understanding of UI:
    a. Create an UI such that, one screen have list of all the types of cars.
    b. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.
12. Program to Understanding content providers and permissions:
    a. Read phonebook contacts using content providers and display in list.
13. Program to Read messages from the mobile and display it on the screen.
14. Creating an application to call specific entered number by user in the Edit Text
15. Creating an application that will create database with table of User credential.

15PIT33Q	**LAB VI: SOFTWARE TESTING LAB**	**SEMESTER - III**

Total Credits: 4
Hours Per Week: 4

OBJECTIVES:

1. Various S/W testing can be done related to the methods given below using any of the s/w testing tools.

LIST OF PRACTICALS:

1. Program to use Design Phase testing
2. Program to use Phase Testing.
3. Program to use Debug Techniques
4. Program to Evaluation of test results
5. Program to use Installation phase testing & Acceptance testing

15PIT43V	PROJECT AND VIVAVOCE	SEMESTER - IV

Total Credits: 6

OBJECTIVES:

On successful completion of the project the students are:

1. Enable to enhance their research skills for the software development.

CONTENTS

PROJECT AND VIVA VOCE

Major Project

1. Each Student in the M.Sc IT Final Year must compulsorily undergo Project work in the 4th SEMESTER.
2. Projects shall be done on Individual Basis. The Project Coordinator will allocate the project title and the Guide for each student. The Project Work Should be done Inside the College.
3. Three Project Reviews will be conducted in which the Progress of Project work will be strictly evaluated by Respective Project Guide and Project Coordinator. Viva Voce will be conducted only in the presence of Industrialists or Academicians.
4. In the total of 150 Marks, 60% of marks are allocated for CIA and 90% for ESE Viva Voce.

Course Inputs:

➢ Project is an integral and important component in the last semester (4th semester) and passing the M.Sc Project is mandatory for all students.
➢ Project is basically meant for the implementation of the various technologies learned during the three semesters in the real life scenario.

Following guidelines are hereby enlisted for all the students based on the necessity and importance of the project

Basic framework

The stages in Project Work are given below:

- The student has to select a project in a related field of Computer Science / Information Technology.
- Students can opt various types of organizations for their major project. But before the training actually starts, profile of the organization must be submitted for evaluating the various parameters of the company like *Turnover of the organization, No. of employees and Location of the organization(Major Project Only)*
- *If Mini Project the students should do the project in Lab Hours Only .(The Students can get data from an organization but only develop the project in the College lab Hours only)*
- After obtaining the approval from project guide, the student has to carry out the project work.

Student has to maintain the **project work diary**. The Project Work carried out should be in accordance with the approved project proposal.

- All communication must be in writing. No verbal communication will be accepted.
- Student should adhere to the timings for submission of various reports as mentioned in the guidelines. No excuse will be entertained in any case.
- Student should prepare a Project Report at the end of his/her work, which his /her supervisor would certify and approve for submission (the Project Report should conform to the Standard Format laid down for Project Report).

The student should submit the Project Report to the college

Guide for the Project:

- Project guide will be allotted by the department to each student
- Each student will be working under a Project Guide for the project to be done.
- Student must report to his/her project guide regularly.

The student can also have a guide who could be the person under whose supervision the student is doing the project in the industry.

Selection of Project:

- The selection of the project can be done in consultation with the project guide.
- The maximum number of students who can join one company for training is **one per location**.(Major Project Only)
- No student will change organization and change the project topic during the training period. (Major Project Only)
- Group of the students are not allowed to do a single project at a time.

It is possible that a group of student is doing different modules of the same project. In such cases, the student is required to do 3-5 modules of the large project

Submission of project proposal:

- Students are expected to submit an initial project proposal or broad outlines of the project area to the respective guide, who will then forward it to the head of the department.
- All students must submit a synopsis/abstract, preferably, of about 1-2 pages, as project proposal. The content should be as brief as is sufficient enough to explain the objective and implementation of the project.
- Confirmation Letter from the organization is required along with the project proposal.

A three member committee from the department will approve the project topic

Submission of project report:

- The student will submit his/her project report in the prescribed format.
- Project Report will be submitted in triplicate (Hard Bound Copies) with the proper certification by the organization concerned in the specified format and color. None of copies of the project report will be returned to the student.
- The project reports along with a CD should be submitted to the HoD/Supervisor / Controller of examinations twenty days prior to the final semester examination.

A certificate from the supervisor should also be enclosed in the Project Report as provided in the format for project report.

Fields for Project:

- **GUI Tools (Front End)** - Visual Basic, Power Builder, X-Windows (X/lib, X/motif, X/Intrinsic), Oracle Developer 2000,VC++, Jbuilder
- **RDBMS(Back End) -** Oracle, Ingres, Sybase, Progress, SQL Plus, Versant, MY SQL, SQL Server, DB2
- **Languages -** C, C++, Java, VC++, C#
- **Scripting Languages -** PERL, SHELL Scripts (Unix), TcL/TK, PHP
- **.NET Platform –** Dya log APL, VB.Net, C#.Net, Visual C#.Net, Net, ASP.Net, Delphi
- **Middle Ware (Component) Technologies -** COM/DCOM, Active-X, EJB, WINCE, MSMQ, BEA, Message Q, MTS, CICS
- **Unix Internals -** Device Drivers, RPC, Threads, Socket programming
- **Architectural Concepts -** CORBA, TUXEDO, MQ SERIES
- **Internet Technologies -** DHTML, Java script, VB Script, Perl & CGI script, HTML, Java, Active X, RMI, CORBA, SWING, JSP, ASP, XML, EJB, Java Beans, Servlets, Visual Age for JAVA, UML, VRML, WML, Vignette, EDA, Broad vision, Ariba, iPlanet, ATG, Big Talk, CSS, XSL, Oracle ASP server, AWT, J2EE, LDAP, ColdFusion, Haskell 98
- **Wireless Technologies -** Blue Tooth, 3G, ISDN, EDGE
- **Real time Operating System/ Embedded Skills -** QNX, LINUX, OSEK, DSP, VRTX, RTXC, Nucleus
- **Operating Systems -** WINDOWS 2000/ME, WINDOWS NT, WINDOWS XP, UNIX, LINUX, IRIX, SUN SOLARIS, HP/UX, PSOS, VxWorks, AS400, AIX, DOS
- **Application Areas -** Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming.

NOTE:

I.   **Projects should not be developed using the packages like Dbase III Dbase IV, FoxPro, Visual FoxPro, CYBASE and MS-Access. Also, projects should not be developed using the**

combination of Visual Basic as the front end and MS-Access as the back end.

Students can also develop applications using tools/languages/software not listed above, if they are part of latest technologies

Phases of Training Period:

- At the time of Review – I, students should present Title, Synopsis/Abstract of the project and module description.
- Students should present the Mid Term Report at the time of Review – II.
- Students should present the Development and Testing Report at the time of Review – III.
- Students should submit the complete Project Report at the time of Model Viva-Voce./
 The external Viva-Voce will be conducted for all the students.

Formatting of Project:

- The whole project report should be nicely composed and presented.
- The dimension of the project report should be in A4 size only.
- Page Specification : (Written paper and source code)
 Left margin - 3.0 cms/1.18 inches
 Right margin- 2.0 cms/0.78 inches
 Top margin 2.54 cms/1 inch
 Bottom margin 2.54 cms/1 inch
- The project report should be typed in good word processor and should avoid spellings and grammatical mistakes.
- The impression on the typed copies should be black in color.
 Normal Body Text: Font Size: 12, Times New Roman, 1.5 lines Spacing, Justified.
 Paragraph Heading Font Size: 14, Times New Roman, Left Aligned. 12 points above & below spacing.
 Chapter Heading Font Size: 16, Times New Roman, Centre Aligned, 30 points above and below spacing.
 Coding Font size: 10, Courier New, Normal
- Students should use only one side of paper for printing.
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the page.

Cover Page - Attractive and appealing cover page containing the Project Title, program details, Student & Guide details, month of submission etc.

COLOR - Cover Page Color is silver Gray

Letter of Authentication - To be submitted by students declaring that the Project Report is the original work of student and no reward had been attained for same project ever before. Students are advised not to **COPY** the project report from other students.

Authorization from Organization where such Project have been implemented with certificate showing the student name, register number and project name.

Certificate from Project Guide - Certificate from the Project Guide certifying the project work done under his/her guidance along with course, student, and project details complete in all respects.

Draft of Project Report

The size of the project report can be approximately **130 - 150** pages, which include the following details:

Certificate of the project guide
Certificate of the Organization
Acknowledgement
Synopsis / Abstract
Table of Contents
       1. Introduction
      1.1 About Organization
          1.2   Problem Definition
          1.3   System Configuration
               1.3.1 Hardware configuration
               1.3.2   Software configuration
       2. System Study
      2.1 Existing System with limitations
      2.2Proposed System with objectives
      2.3 Problem description
       3. System Design & Development
      3.1 System Flow Diagrams / Control Flow Diagrams
      3.2 E-R Diagrams / Use Case Diagrams
      3.3 Data Flow Diagram / Activity Diagrams
      3.4 Input Design

3.5 File / Database Design

3.6 Output design (includes Report Design)

3.7 User Interface Design (if Needed)

4. **System Testing**

   Unit Testing

   Integration Testing

   System Testing

5. **System Implementation and Maintenance**

   System Security Measures

6. **Conclusion**

   Scope for Future Prospects

Bibliography and Web References

Appendices

Forms (input screen shots)

Sample Source Code

Output Screen shots

Reports

Sample Coding / Abstract Coding

- Along with it, if the student feels to add on any other topics as per the demand of the project or want to include the functionalities as per the SDLC(Software Development Life Cycle) or the Software Engineering model used, that can be done and included in the Project Report.

The project report must include all the components as per the SDLC. It is highly recommended to follow the approaches of Software Engineering methodology.

Arrangement of Contents:

- Cover Page & Title Page
- Bonafide Certificate
- Synopsis / Abstract
- Table of Contents
- Chapters
- List of Tables
- List of Figures
- List of Symbols, Abbreviations and Nomenclature
- Appendices
- References

The table and figures shall be introduced in the appropriate places

- **List of Symbols, Abbreviations and Nomenclature** – One and a half spacing should be adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.
- **Chapters –** The chapters may be broadly divided into 3 parts. Introductory chapter, Chapters developing the main theme of the project work and Conclusion.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

- ❖ Each chapter should be given an appropriate title.
- ❖ Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.
- ❖ Footnotes should be used sparingly. They should be typed with single space and placed directly underneath in the very same page, which refers to the material they annotate.
- **Appendices –** Appendices are provided to give supplementary information, which is included in the main text as they may serve as a distraction and cloud the central theme.
- ❖ Appendices should be numbered using Arabic numerals.
- ❖ Appendices, Tables and References appearing in appendices should be numbered and referred to an appropriate place just as in the case of chapters.
- ❖ Appendices shall carry the title of the work reported and the same title shall be made in the contents page also.
- **List of References** –The listing of references should be typed 4 spaces below the heading "REFERENCES" in alphabetical order in single spacing and left justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details.

A typical illustrative list given below relates to the citation example quoted above.

REFERENCE BOOKS:

1. *Roger S Pressman,* 2012. **Software Engineering – A Practitioner's Approach,** [Sixth Edition, Fifth Reprint], Tata McGraw Hill.

2. *Richard Fairley,* 2006. **Software Engineering Concepts,** [Twenty Third Reprint], Tata McGraw Hill.

3. William. E. Perry, 2006. **Effective Methods for Software Testing,** [Third Edition] Willey India.

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