VELLALAR COLLEGE FOR WOMEN

(AUTONOMOUS)

ERODE – 12

Department of Computer Science (PG)

Course contents, Scheme of Examination, Credits and Syllabus

(for students admitted during 2015-2016 and onwards)

Question Paper Pattern

Components of CIA Marks

Tests (I & II)	Assignment / Seminar / Subject Viva	Model Examination	Total
10	**5**	**10**	**25**

CIA

Section	Choice	Marks	Total
A	Compulsory (MCQ-2, Fill ups-2)	4 x 1 = 4	30
B	Either / Or	2 x 5 = 10	
C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examination

Section	Choice	Marks	Total
A	Compulsory (MCQ-5, Fill Ups-5)	10 x 1 = 10	75
B	Either / Or	5 x 5 = 25	
C	Open Choice (5 out of 8)	5 x 8 = 40	

Vellalar College for Women (Autonomous), Erode - 12.									
Master of Science in Computer Science									
2015 - 2016 onwards									
Course Content and Scheme of Examinations (CBCS Pattern)									
Semester I									
Part	**Study Component**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**Credits**
						CIA	**ESE**	**Total**	
III	Core	15CSPC101	Advanced Computer Architecture	4	3	25	75	100	4
		12CSPC102	Analysis and Design of Algorithms	5	3	25	75	100	4
		15CSPC103	Advanced Software Engineering	4	3	25	75	100	4
		15CSPC104/ 15CAPC309	Advanced Operating System	5	3	25	75	100	4
		15CSPC105	Advanced Relational Database Management System	4	3	25	75	100	4
	Practical	12CSPCP01	Analysis and Design of Algorithms Lab	5	3	40	60	100	3
IV	Skill Based Subject I	15CSPSP01	RDBMS Lab	3	3	40	60	100	3
							Total	700	26
Semester II									
III	Core	15CSPC206	Advanced Java	6	3	25	75	100	5
		15CSPC207	Digital Image Processing	6	3	25	75	100	5
	Practical	15CSPCP02	Java Programming Lab	5	3	40	60	100	3
		13CSPCP03	Digital Image Processing Lab	5	3	40	60	100	3
	Elective I	15CSPE211 /15CAPE544	Mobile Computing	5	3	25	75	100	5
		15CSPE221	Object Oriented Analysis and Design						
		15CSPE231/ 11CAPE412	Soft Computing						
IV	Skill Based Subject II	13CSPS202/ 13CAPS403	Advanced Multiskill Paper	3	1 *	40	60	100	3
							Total	600	24

* Online Examination

Semester III									
Part	**Study Component**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**Credits**
						CIA	**ESE**	**Total**	
III	Core	15CSPC308	SOA and Web Services	5	3	25	75	100	5
		15CSPC309/ 15CAPC514	VB.NET Programming	4	3	25	75	100	4
		15CSPC310	Data Mining	5	3	25	75	100	5
	Practical	15CSPCP04/ 15CAPCP09	VB.NET Programming Lab	5	3	40	60	100	3
	Elective II	11CSPE312/	Network Security /	5	3	25	75	100	5
		15CSPE322/ 15CAPE524	Cloud Computing and Big Data Analytics						
		11CSPE332	Principles of Compiler Design						
IV	Skill Based Subject III	15CSPSP03	Web Designing Tools lab	3	3	40	60	100	3
	Skill Based Subject IV	13CSPSP04	Software Testing Lab	3	3	40	60	100	3
							Total	700	28
Semester IV									
III	Project	11CSPC4PV	Major Project (Project Report Evaluation– 80% Viva-Voce – 20%)	30	-	-	200	200	12
							Total (I - IV Semesters)	**2200**	**90**

CIA - Continuous Internal Assessment Marks

EOS - End of Semester Examinations

SKILL BASED SUBJECTS		
S. No.	**Subject Code**	**Title of the Paper**
1	15CSPSP01	RDBMS Lab
2	13CSPS202/ 13CAPS403	Advanced Multi Skill Paper
3	15CSPSP03	Web Designing Tools lab
4	13CSPSP04	Software Testing Lab

SELF-LEARNING PAPERS (Optional)					
S.No.	**Subject Code**	**Title of the Paper**	**Exam. Dur. Hrs.**	**Max. Marks**	**Credits**
1	13CSPSL01	IT Enabled Services	3	100	5
2	13CSPSL04	Green Computing	3	100	5

SEMESTER - I

Core Paper – 1

ADVANCED COMPUTER ARCHITECTURE

Instructional Hrs: 60 **Sub. Code: 15CSPC101**

Max.Marks: CIA-25; ESE-75 **Credits: 4**

Objective: To enable the students to learn about parallel processing and gain knowledge about problem solving skills using parallel algorithms.

UNIT I **12 Hrs.**

Introduction to parallel processing: Evolution of Computer Systems– Parallelism in uniprocessor Systems – Parallel Computer structures – Architectural Classification schemes –Flynn' Classification – Feng's Classification – Handler's Classification – *Parallel Processing Applications*.

UNIT II **12 Hrs.**

Principles of Pipelining and Vector Processing: Pipelining: An Overlaped Parallelism – Principles of Designing Pipelined Processors - Instruction Prefetch and Branch Handling - 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 III **12 Hrs.**

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 IV **12 Hrs.**

Structure of Parallel Computers: A Generalized Structure of Parallel Computers- Classification of parallel Computers- Vector Computers- A Typical Vector Supercomputers- Vector Computer on a CHIP-IRAM- Array Processors- Shared memory Parallel Computers.

UNIT V **12 Hrs.**

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

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Kai Hwang, Faye A. Briggs**, *Computer Architecture and Parallel Processing* Mc Graw – Hill Book Company, 1985.
2. **V. Rajaraman, C. Siva Ram Murthy**, *Parallel Computers Architectures and Programming*, PHI, 2012.

REFERENCE BOOKS

1. **Michael J. Quinn**, *Parallel Computing Theory and Practice*, TMCH, Second Edition, 2002.
2. **Barry Wilkinson, Micheal Allen**, *Parallel Programming: Techniques and Applications*, Prentice Hall, 1999.

SEMESTER – I

Core Paper – II

ANALYSIS AND DESIGN OF ALGORITHMS

Instructional Hrs: 75 **Sub. Code: 12CSPC102**

Max.Marks: CIA-25; ESE-75 **Credits: 4**

Objective: To enable the students to learn the Elementary Data Structures and algorithms and also to understand the various design and analysis of the algorithms.

UNIT I **15 Hrs.**

Introduction: Algorithm Definition and Specification – Performance Analysis. **Elementary Data structures:** Trees – *Dictionaries* – Priority Queues – Sets and Disjoint Set Union – Graphs. **Divide – And – Conquer: -** General method – Binary Search – Finding the Maximum and Minimum – Merge Sort – *Quick Sort*.

UNIT II **15 Hrs.**

The Greedy Method: General Method – Knapsack Problem – Minimum Cost Spanning Tree : Prim's Algorithm and Kruskal's Algorithm – Single Source Shortest Path.

UNIT III **15 Hrs.**

Dynamic Programming : General Method – Multistage Graphs – All Pair Shortest Path –0/1 Knapsack – *Traveling Salesman Problem* .

UNIT IV **15 Hrs.**

Backtracking: General Method – 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – *Knapsack Problem*.

UNIT V **15 Hrs.**

Basic Traversal and Search Techniques – Branch and Bound Method – 0/1 Knapsack Problem – *Traveling Salesperson*.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

Ellis Horowitz, Sartaj sahni,Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, Galgotia Publications, 2006.

REFERENCE BOOKS

1. Vinod K.Rajput, Analysis and Design of Algorithms, S.K.Kataria and Sons, 2012.

2. **Goodrich**, *Data Structures & Algorithms in Java*, Wiley 3 edition.

SEMESTER – I

Core Paper - III

ADVANCED SOFTWARE ENGINEERING

Instructional Hrs: 60 **Sub. Code: 15CSPC103**

Max.Marks: CIA-25; ESE-75 **Credits: 4**

Objective: To help students to develop skills that will enable them to construct software of high quality that is reliable and reasonably easy to understand, modify and maintain.

UNIT I **12 Hrs.**

Introduction to Software Engineering : The evolving role of software – The changing nature of software . A Generic View of Process – Process Models – Agile Process Models – Software Engineering practice- *planning and modeling practice*.

UNIT II **12 Hrs.**

Requirement Engineering: Requirement Engineering tasks - Initiating the Process - Eliciting Requirements- *Developing Use Cases* - Negotiating Requirements -Validating Requirements – Building the Analysis Models:Data Modeling Concepts-Flow-Oriented Modeling-Class-Based Modeling.

UNIT III **12 Hrs.**

Design Engineering: Design Process-Design Concepts – Design Models – Pattern Based Design – Software Architectural – *Data Design* – Component – Designing class based components.

UNIT IV **12 Hrs.**

Testing Strategies: Software Testing Strategies -Strategic Issues -Test Strategies for conventional software -Strategies for object oriented software - Validation testing - System testing – . **Testing Tactics**: Testing Fundamentals – Black Box – White Box – Basis Path-Control Structure.

UNIT V **12 Hrs.**

SCM and Quality Assurance: Product Metrics. Estimation: Empirical Estimation models – Risk Management – Quality Management: Concepts-SQA-Software Reviews-Formal Technical Reviews-Statistical Software Quality Assurance – Change Management -Software Configuration Management-*The SCM Process*.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

Roger S. Pressman, *Software Engineering – A practitioner's Approach*, Sixth Edition, 2007.

REFERENCE BOOKS

1**. Carlo Ghezzi, Mehdi Jazayari, Dio Mandrioli,** *Fundamentals of Software Engineering*, Prentice Hall of India 1991**.**

2. **Fleeger.p,** *Software Engineering*, Prentice Hall, 1999**.**

3. **Sommerville,** *Software Engineering*, Addison Wesley, 5th Edition 1996.

SEMESTER – I

Core Paper - IV

ADVANCED OPERATING SYSTEM

Instructional Hrs: 75 **Sub Code: 15CSPC104/ 15CAPC309**

Max.Marks: CIA-25 ; ESE -75 **Credits: 4**

Objective: To enable the students to understand the concepts of Distributed Operating System using UNIX.

UNIT I **15 Hrs.**

Fundamentals: What is a Distributed Computing System? Distributed Commuting System Models – What is Distributed Operating system – *Issues in Designing a Distribued Operating System* – Introduction to Distributed Computing Environment. Remote Procedure Calls: Introduction – The RPC Model – Transparency of RPC – Implementing RPC Mechanism – Stub Generation – RPC Messages – Server Management – Parameter Passing Semantics – Call Semantics – Communication Protocols for RPCs.

UNIT II **15 Hrs.**

Distributed Shared Memory: Introduction – General Architecture of DSM Systems – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory Space – Consistency Models – *Replacement Strategy* – Thrashing – Advantages of DSM.

Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock.

UNIT III **15 Hrs.**

Resource Management: Introduction – Desirable Features of a Good Global Scheduling Algorithm – Task Assignment Approach – Load Balancing Approach – Load Sharing

Approach. **Process Management:** Introduction – Process Migration – Threads – **Distributed File System :** Introduction – Desirable Features of a Good Distributed File System – File Models – *File Accessing Models* – File Sharing Semantics – File Caching Schemes – File Replication.

UNIT IV **15 Hrs.**

Introduction to the Kernel : Architecture of the Unix operating system – introduction to system concepts – kernel data structures. **Internal Representation of Files :** Inodes – structure of a regular file – directories – conversion of a path name to an inode – superblock – inode assignment to an new file – *allocation of disk blocks*. **The structure of processes:** process states and transitions – layout of system memory – the context of a process.

UNIT V **15 Hrs.**

Process Control: Process creation – process termination – awaiting process termination – invoking other programs – system boot and the init process. **Process scheduling and time:** Process scheduling – *system calls for time*.

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Maurice J.Bach**, *The Design of the Unix Operating System*, PHI Private Limited, 2006.
2. **Pradeep K, Sinha**, *Distributed Operating System – Concepts and Design*, Prentice Hall of India Private Limited, 2006.

REFERENCE BOOKS

1. **Andrew S.Tanenbaum, Maarten Van Steen**, *Distributed Systems: Principles and Paradigms*, Prentice Hall of India, 2003.
2. **Colulouris, G.Dollimore Timkindberg**, *Distributed System: Concepts and Design*, Addition Wesley, 2000
3. **Sumitabha Das**, *Unix Concepts and Design*, TMH, Third Edition.

SEMESTER – I

Core Paper – V

ADVANCED RELATIONAL DATABASE MANAGEMENT SYSTEM

Instructional Hrs: 60 **Sub. Code: 15CSPC105**

Max.Marks: CIA-25; ESE -75 **Credits: 4**

Objective: To enable the students to gain knowledge on Advanced RDBMS, Object oriented databases and Data modeling.

UNIT I **12 Hrs.**

Databases and Database Users: Introduction – Characteristics of Database Approach - Advantages of using a DBMS – App*lications of the Database*. **Database System Concepts:** Data Models, Schemas and instances – Three schema Architecture and Data Independence – Database Languages and Interfaces – Database System Environment - Classification of DBMS.

UNIT II **12 Hrs.**

Data Modeling Using ER Model: Entity Types, Entity Sets, Attributes and Keys – Relationships, Relationship Types, Roles and Structural Constraints – Weak Entity Types – ER Diagrams, Naming Conventions and Design issues - Enhanced Entity-Relationship (EER) Modeling. **Relational Data Model and Relational Database Constraints:** Relational Model Concepts – Constraints and Schemas – Update Operations and dealing with Constraint Violations.

UNIT III **12 Hrs.**

The Relational Algebra: Unary Relational Operations – Set Theory – Binary Operations – Additional Operations – *Examples of Queries*. **Schema Definition, Basic Constraints and Queries:** SQL Data Definition – Basic Constraints – Change Statements – Basic Queries – Complex Queries – Insert, Delete and Update Statements.

UNIT IV **12 Hrs.**

Relational Databases Design: Informal Design Guidelines – Functional Dependencies - Normal Forms Based on Primary Keys – Definitions for Second and Third Normal Forms – Boyce – Codd Normal Form – Multivalued Dependencies and Fourth Normal Form – Join Dependencies and fifth Normal Form.

UNIT V **12 Hrs.**

File Organizations and Indexes: Buffering of Blocks - Placing File Records on Disk - *Operations on Files* – Files of Unordered and Ordered Records - Parallelizing Disk Access using RAID Technology - Index Structures for File.

Advanced Features: Objects, Transactions and Data Control: Views. **PL/SQL Cursors and Exceptions:** Cursors – Implicit Cursors – Explicit Cursors – Explicit Cursors Attributes - Implicit Cursors Attributes – Cursor FOR Loops – SELECT …FOR UPDATE Cursor – WHERE CURRENT OF Clause – Cursor with Parameters – Cursor Variables: An Introduction – Exceptions – Types of Exceptions. **PL/SQL Named Blocks**: Procedures- Functions – Packages – Triggers.

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Elmasri, Navathe, Somayajulu, Gupta**, *Fundamentals of Database System*, Pearson Education, Fourth Edition, 2008
2. **Nilesh Shah**, *Database System Using Oracle*, Pearson Education, Second Edition.

REFERENCE BOOK

C.J.DATE, *An Introduction To Database System*, Addition Wesley Publications, Seventh Edition.

SEMESTER - I

PRACTICAL I

ANALYSIS AND DESIGN OF ALGORITHMS LAB

Instructional Hrs: 75 **Sub.Code: 12CSPCP01**

Max. Marks: CIA-40; ESE -60 **Credits: 3**

Objective: To make the students understand the concepts of Analysis and Design of Algorithms.

Data Elementary Structures

1. Perform Stack Operations for the finite number of elements.
2. Perform the Queue Operations for the finite number of elements.

Divide and Conquer Method

3. Search an element in the array of elements using Binary Search Method.
4. Sort the array of elements using Quick Sort Method.

Basic Search Tree Traversal

5. Search the Path for a given nodes using Birth First Search and Depth First search Method.

Greedy Method

6. Solve the Knapsack problem and find the optimal solution using Greedy Method
7. Compute Minimum Cost Spanning Tree - Prim's Algorithm for any given graph using Greedy Method.

Dynamic Programming Method

8. Construct the shortest path using Multistage graph in dynamic programming
9. Determine the shortest path from source to destination for any given Matrix using All Pair Shortest Path method.

Backtracking Method

10. Solve the N-Queens Problem using Backtracking Method.
11. Color any given number of nodes (no two edges carries same color) using Graph Coloring Method.

Branch and Bound Method

12. Solve the Traveling Sales Person problem using Branch and Bound Method.

SEMESTER – I

Skill Based Subject I

RDBMS LAB

Instructional Hrs: 45 **Sub.Code: 15CSPSP01**

Max.Marks: CIA-40; ESE-60 **Credits: 3**

Objective: To enable the students to implement the concepts of Relational Data Base Management System.

i. SQL

1. Table Management.
2. Aggregate Functions.
3. Set Operations.
4. Triggers.
5. Views.

ii. PL / SQL

1. Functions.
2. Procedure.
3. Cursor.
4. Packages.
5. Exception Handling

SEMESTER – II

Core Paper – VI

ADVANCED JAVA

Instructional Hrs: 90 **Sub.Code: 15CSPC206**

Max.Marks: CIA-25; ESS-75 **Credits: 5**

Objective: To make the students understand the advanced concepts of JAVA.

UNIT I **12 Hrs.**

Introducing Classes – A closer look at methods and classes – Inheritance.

UNIT II **12 Hrs.**

Packages and interfaces – Multithreading – I/O, Applets and other Topics .

UNIT III **12 Hrs.**

Applet Class – Event handling – *Introducing the AWT* : Working with windows, Graphics and Text.

UNIT IV **12 Hrs.**

Using AWT controls, Layout Managers, Menus – Introducing Swing.

UNIT V **12 Hrs.**

Introduction to Servlets: Why Servlets? – *Servlet Basics* – Servlet API Basics – Writing your first servlet – Running servlets. Database Access with JDBC: JDBC Architecture – Accessing a DataBase – Sample JDBC Servlet.

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Herbert Schildt**, *The complete Reference Java*. TMH New Delhi, Seventh Edition, Eleventh Reprint, 2010. (Unit I to IV)
2. **Dustin R.Gallaway**, *Inside Servlets server side programming for the Java Platform*, Pearson Edition, 2009. (Unit V)

REFERENCE BOOKS

1. **Herbert Schildt,** *Swing a Beginners Guide*, TMH Edition, Second Reprint 2009.
2. **R.Krishnamoorthy, S.Prabhu**, *Internet and Java Programming*, New Age International Private Ltd., NewDelhi, 2009.
3. **M.P.Bhave & S.A.Patekar**, *Programming with Java*, Pearson Education, First Edition, 2009.

SEMESTER – II

Core Paper –VII

DIGITAL IMAGE PROCESSING

Instructional Hrs: 90 **Sub.Code: 15CSPC207**

Max.Marks: CIA-25; ESE-75 **Credits: 5**

Objective : To make the students understand the basic concepts of digital image processing.

UNIT I **18 Hrs.**

Introduction: What is Digital Image Processing – the origin of DIP – Examples of fields that use DIP – Fundamentals Steps in DIP – Components of an Image Processing System. **Digital Image Fundamentals:** Elements of Visual Perception – Light and the Electromagnetic Spectrum – Image Sensing and Aacquisition – Image Sampling and Quantization – *Some Basic Relationship Between Pixels* – Linear& Nonlinear Operations.

UNIT II **18 Hrs.**

Intensity Transformations and Spatial Filtering: Background – Some Basic Intensity Transformations Functions – Histogram Processing – Fundamentals of Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters – Combining Spatial Enhancement Methods.

UNIT III **18 Hrs.**

Image Restoration: A Model of the Image Degradation / Restoration Process – Noise Models – Restoration is the Process of Noise only – Spatial Filtering – Periodic Noise Reduction by Frequency Domain Filtering – Linear, Portion – Invariant Degradations – Estimating the Degradation Function – Inverse Filtering– Geometric Mean Filter.

UNIT IV **18 Hrs.**

Image Compression: Fundamentals. **Some Basic Compression Methods**: Huffman Coding – Arithmetic Coding – LZW Coding – Run-Length Coding – Bit-Plane Coding – Wavelet Coding. Digital Image Watermarking.

UNIT V **18 Hrs.**

Image Segmentation: Fundamentals – Point, Line, Edge Detection – Thresholding – Region – Based Segmentation – Segmentation by Morphological Watersheds.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

1. **Rafael C. Gonzalez, Richard E. Woods**, *Digital Image Processing*, PHI / Pearson Education, New Delhi, Third Edition, 2012.

REFERENCE BOOKS

1. **Chanda B, Dutta Majumder D**, *Digital Image Processing and Analysis*, PHI, New Delhi, 2003.
2. **Nick Efford**, *Digital Image Processing a practical introducing using Java*, Pearson Education, New Delhi, 2004.

SEMESTER -II

Practical II

JAVA PROGRAMMING LAB

Instructional Hrs: 75 **Sub.Code: 15CSPCP02**

Max. Marks: CIA -40; ESE -60 **Credits: 3**

Objective: To make the students understand the concepts of JAVA

Program using following Concepts:

1. Classes and objects
2. Inheritance
3. Packages
4. Interfaces
5. Multithreading
6. Applets
7. AWT controls
8. Event Handling
9. Menu
10. Layout Managers
11. Swing Controls and Trees
12. JDBC

SEMESTER –II

Practical III

DIGITAL IMAGE PROCESSING LAB

Instructional Hrs: 75 **Sub.Code: 13CSPCP03**

Max.Marks: CIA-40; ESE-60 **Credits: 3**

Objective: To make the students understand the concepts of Digital Image Processing using MATLAB.

1. Image Enhancement (Contrast manipulation, Histogram Equalization, Gray-level Slices, Threshold operation.
2. Filtering Techniques.
3. Image Arithmetic.
4. Edge Detection.
5. Image Compression.
6. Binary Image Processing (Morphological Operations)
7. Color Image Processing

SEMESTER - II

Elective – I

MOBILE COMPUTING

Instructional Hrs: 75 **Sub.Code: 15CSPE211/ 15CAPE544**

Max.Marks: CIA-25; ESE-75 **Credits: 5**

Objective: To enable the students to gain knowledge on Mobile communication Techniques, Wireless LAN and devices involved in Mobile Computing.

UNIT I **15 Hrs.**

Introduction: Wireless the beginning – Mobile Computing – networks – Middleware and gateways – security in mobile computing – standard bodies. **Mobile computing architecture:** Architecture – *Three tire architecture* – Mobile computing through Internet. Emerging Technologies.

UNIT II **15 Hrs.**

Global System for Mobile Communications - Short Message Service – **General Packet Radio Service:** GPRS and Packet Data Network – GPRS Network Architecture – Operations – Data Services – *Applications* – Limitations.

UNIT III **15 Hrs.**

Wireless Application Protocol : Introduction – WAP – MMS. **CDMA & 3G**: IS-95 – CDMA versus GSM – Third Generation networks – *Application on 3G*. **Wireless LAN:** Introduction – IEEE 802.11 standards – Wireless LAN Architecture – Mobility and Deploying Wireless LAN – Mobile Adhoc network and sensor network.

UNIT IV **15 Hrs.**

Intelligent Networks and Interworking: SS#7 Signaling – IN Conceptual Model - Client Programming. **J2ME:** J2ME Technology.

UNIT V **15 Hrs.**

Wireless Devices with Windows CE: Architecture – Development Environment. **Voice Over Internet Protocol and Convergence:** Convergence Technologies – call routing – Voice over IP Applications – *IP Multimedia Subsystems* – Mobile VoIP. **Security Issues in Mobile Computing:** Introduction – Security Frameworks for Mobile environment.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

Asoke K Talukder, Roopa R Yavagal, *Mobile Computing Technology Applications and Services*, TMH Publishing Company Ltd, Second Edition, 2012.

REFERENCE BOOK

Jochen Schiller, *Mobile Communication*, Pearson Education, Second Edition, 2003

SEMESTER – II

Elective – I

OBJECT ORIENTED ANALYSIS AND DESIGN

Instructional Hrs: 75 **Sub.Code: 15CSPE221**

Max.Marks: CIA-25; ESE-75 **Credits: 5**

Objective: To enable the students on to understand the object oriented programming concepts and gain knowledge of UML.

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UNIT I **15 Hrs.**

The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying Object Model. **Classes and Objects:** *The nature of an Object* – Relationships among objects.

UNIT II **15 Hrs.**

Classes and Objects: The nature of the class- Relationships among classes- the interplay of Classes and Objects – On building quality classes and Objects. **Classification:** The importance of proper classification – *Identifying proper Classes and Objects* – Key Abstraction Mechanism.

UNIT III **15 Hrs.**

UML – Meta Model – Purpose of Analysis and Design – Overview of the Process – Inception – Elaboration – *Construction* – Refactoring – Transition – Iterative Development – Use Cases.

UNIT IV **15 Hrs.**

Class Diagrams: *Essentials* – Interaction Diagram – Class Diagram: Advanced Concepts.

UNIT V **15 Hrs.**

Packages and Collaborations – *State Diagram* – Activity Diagram – Physical Diagram – UML and Programming.

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Grady Booch**, *Object Oriented Analysis and Design*, Pearson Education, Pvt Ltd, New Delhi, Second Edition, 2008.
2. **Martin Fowler, Kendall Scoutt**, *UML Distelled, A Brief Guide to the Standard Object Modeling Languages*, Pearson Education, Second Edition 2004.

REFERENCE BOOKS

1. **Erich Gamma, Richard Helm, Raiph Johnson, John Vilssides,** *Design Patterns: Elements of Resuable Object Oriented Software*, Pearson Education, Pvt Ltd, New Delhi, 2009.
2. **James Rumbaugh et al,** Object Oriented Modeling and Design, Pearson Education, 2005.
3. **Ivar Jacobson,** *Object Oriented Software Engineering: A Use Case Driven Approach*, Pearson Education, 1995.
4. **Eriksson**, *UML Tool Kit*, Pearson Education, 2012.

SEMESTER II

Elective – I

SOFT COMPUTING

Instructional Hrs: 75 **Sub.Code: 15CSPE231 / 11CAPE412**

Max. Marks: CIA -25; ESE -75 **Credits: 5**

Objective: To make the students understand the basic concepts of soft computing

UNIT I **15 Hrs.**

Introduction to Artificial Intelligence Systems – Fundamentals of Neural Networks: Basic Concepts of Neural Networks – Human Bran – Modal of an Artificial Neuron – Neural Network Architectures – Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architectures – History of Neural Network Research – Early Neural Network Architectures – Some Application Domains.

UNIT II **15 Hrs.**

Back propagation Networks: Architecture of a Back Propagation Network – Back Propagation Learning – Illustration – Applications – Effect of Tuning Parameter of the Back Propagation Neural Network – Selection of Various Parameters in BPN – Variations of Standard Back Propagation Algorithm – Research Directions.

UNIT III **15 Hrs.**

Fuzzy Set Theory: Fuzzy Versus Crisp – Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations.

UNIT IV **15 Hrs.**

Fuzzy System: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Methods – Applications.

UNIT V **15 Hrs.**

Fundamentals of Genetic Algorithms: History of Genetic Algorithms – Basic Concepts – Creation of Off Springs – Working Principle – Encoding – Fitness Function – Reproduction.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

Rajasekaran S, Vijalakshmi Pai G.A, *Neural Networks, Fuzzy Logic, and Genetic Algorithms, Synthesis and Applications*, Prentice-Hall of India Private Limited, New Delhi, 2005.

REFERENCE BOOK

Samir Roy, *Introduction to Soft Computing: Neuro - Fuzzy and Genetic Algorithms***,** Pearson Education, First edition, 2013.

SEMESTER II

Skill Based Subject II

ADVANCED MULTISKILL PAPER

Instructional Hrs: 45 **Sub Code: 13CSPS202 / 13CAPS403**

Max. Marks: CIA - 40; ESE -60 **Credits: 3**

OBJECTIVE: To familiarize the students with various types of tests that is employed by the diverse examining bodies.

UNIT I **9 Hrs**

Communication: Question tags - Gerund and Infinitives - Spotting the errors – Synonyms – Antonyms - One word substitution – Sentence completion –Prepositions – Articles. **General Awareness and Scientific Aptitude:** Socio - Economic - Banking – Basic Sciences. People and Environment - Politics and Current Affairs - Higher Education - Information and Communication Technology - Teaching Aptitude - Research Aptitude.

UNIT II **9 Hrs**

Logical Reasoning : Syllogism – Statement Conclusions – Statement Arguments – Statement Assumptions – Statement Courses of Action – Inference – Cause and Effect – Visual Reasoning – Direction Sense Test – Blood Relation – Coding and Decoding – Deductive Reasoning.

UNIT III **9 Hrs**

Numerical Reasoning and Quantitative Aptitude: Age – speed – Heights and Distance – Time and Distance - Ratio and Proportion – Percentage – Fraction – Profit and Loss – Interest – Average – Calendar – Clocks– Probability – Series – Venn Diagram - Data Interpretation.

UNIT IV **9 Hrs**

Overview of Research Methodology :- Introduction – Mathematical tools for analysis-Research problems in management – types of research – research process.

Algorithmic Research: - Algorithmic Research problems – **Types of Algorithmic Research problems**: polynomial Algorithm for polynomial problem – **Types of solution procedure/ Algorithm**: Branch and Bound method – Heuristics – **Steps of Algorithmic Research.**

UNIT V **9 Hrs**

Algorithmic Research: Meta Heuristics for Combinatorial problems – **Report writing and Presentation** : Introduction – Types of Report – Guidelines for Reviewing draft – Report format – Typing instructions – Oral Presentation. **Hands on Tools**: SPSS / MATLAB / NS2 / LATEX.

REFERENCE BOOKS

1. **Agarwal.R.S,** *Quantitative Aptitude*, S. Chand and Company, Reprint 2012.
2. **Chopra.J.K,** *Bank Probationary Officers' Examination*, Unique Publishers, 2010.
3. **Datason. R.P, Manish Arora and Gulati.SW.L**, *Clerical Cadre Recruitment in State Bank of India*, Newlight Publishers, 2013.
4. **Davinder Kaur Bright**, *Railway Recruitment Board*, Bright Publications, 2010.
5. **Lal, Jain and Vashishtha, K.C**, *UGC NET/JRF/SET Teaching and Research Aptitude*, Upkar Prakashan Publishers, 2012.
6. **Pratyogita Darpan**, *UGC NET/JRF/SET Teaching and Research Aptitude*, Upkar Prakashan Publishers, 2012
7. **Sharma.J.K,** *IBPS Recruitment of Bank Clerical Cadre Examination*, Unique Publishers, 2013.

8. **Tara Chand**, *General Studies for Civil Services Preliminary Examinations*, Paper – I, Tata Mc Graw Hill Education Private Ltd, 2013.

9. **Hari Mohan Prasad and Uma Rani Sinha**. 2011. *Objective English for Competitive Examinations*. New Delhi: Tata McGraw Hill Education Private Ltd.

10. **Jain T.S**. *Upkar's SBI Clerical Cadre Recruitment Examination*. Agra: Upkar Prakashan

11. **Panneerselvam.R**, *Research methodology*, PHI Learning Private Ltd, New Delhi, 2010.

SEMESTER – III

Core Paper – VIII

SOA AND WEB SERVICES

Instructional Hrs: 75 **Sub.Code: 15CSPC308**

Max. Marks: CIA -25; ESE -75 **Credits: 5**

Objective: To make the students understand the concepts of SOA and web services.

UNIT I **15 Hrs.**

INTRODUCTION: Role of XML - *XML and The Web* - XML Language Basics - SOAP - Web Services - Revolutions of XML - Service Oriented Architecture (SOA) – Creating Markup with XML : Introduction to XML Markup – Parsers and Well Formed XML documents – parsing an XML document with MS XML – characters – Markup - Cdata Sections – XML Namespaces.

UNIT II **15 Hrs.**

DTD : Parsers, Well-Formed and Valid XML Documents – Document Type Declaration – Element Type Declarations – Attribute Declarations – Attribute Types – Conditional Sections. Schemas : Introduction – Schema vs DTDs – Microsoft XML Schema : Describing Elements - Describing Attributes – Data types.

UNIT III **15 Hrs.**

DOM : Introduction – DOM Implementation – DOM with Java Script - DOM Components. XSLT: Introduction – Templates – Creating Elements and Attributes – Iteration and Sorting – Conditional Processing – Copying Notes – Combining Style Sheets – Variables.

UNIT IV **15 Hrs.**

SOAP: Overview Of SOAP - *HTTP* - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns And Faults - SOAP With Attachments.

UNIT V **15 Hrs.**

WEB SERVICES: Overview - Architecture - Key Technologies - UDDI - WSDL - ebXML - SOAP And *Web Services in E-Com* - Overview Of .NET And J2EE.

Note: Self study topics are denoted in *Italics*

TEXT BOOK

1. **Deitel, Deitel, Nieto, Lin, Sadhu,** *XML How to Program,* Pearson Education, 2009.
2. **Frank P. Coyle,** *XML, Web Services And The Data Revolution,* Pearson Education, 2008.

REFERENCE BOOKS

1. **McGovern, et al.,** *Java Web Services Architecture,* Morgan Kaufmann Publishers, San Fransisco, 2005.
2. **Mike Mcgraph,** *XML in easy Steps,* Dream Tech, 2006.
3. **Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh,** *Developing Java Web Services,* Wiley Publishing Inc., New Delhi, 2004.
4. **Sandeep Chatterjee, James Webber,** *Developing Enterprise Web Services,* Pearson Education, New Delhi, 2004.

SEMESTER III

Core Paper - IX

VB.NET PROGRAMMING

Instructional Hrs: 60 **Sub Code: 15CSPC309 / 15CAPC514**

Max.Marks: CIA-25; ESS-75 **Credits: 4**

Objective: To understand the structure of .NET Framework and to gain the practical working knowledge of the VB.NET.

UNIT I **12 Hrs.**

Essential VB .NET : What' New in VB.NET- Upgrading from VB 6.0- The .NET framework and CLR- Building VB.NET applications – The VB.NET IDE. **The VB language:** constants- variables- data types- arrays- strings-operators- conditionals- loops.

UNIT II **12 Hrs.**

Sub procedures- Functions - Scope - Structured exception handling- **Windows Forms:** Windows forms- adding controls to form MDI forms – Handling events- Mouse events- Keyboard events – Msg box- Input box. Text Boxes: Multiline-Word wrap-accessing- Rich text box: Accessing text- text Style- Labes: Formatting- Aligning

UNIT III **12 Hrs.**

Buttons: caption – color- handling button clicks - tab order Check box: Checkbox states- three states Radio buttons: states- toggle- List box: Adding, removing items – Index- events combo box: Simple- drop down – Drop down combo list – adding, removing items – current selection- sorting –clearing- number of items. Menus: creating menus – sub menus - context menus- Menu items- access keys- shortcut – separators Built in Dialog boxes : Open file dialog – save dialog – font dialog color dialog.

UNIT IV **12 Hrs.**

Data Access with ADO. NET : what are databases?- Accessing data with the server explorer – data adaptors and datasets- working with ADO.NET - ADO.NET objects – Using explorer – New data connection – creating a dataset – populating a dataset – displaying data in a data grid – data provider – data adapters – dataset properties- connecting MS Jet databases : Using data binding property -Simple binding – binding text boxes – binding check boxes – Complex data binding – binding combo boxes – binding listboxes - display member, value member properties – data grid class – data grid class- binding data grid

UNIT V **12 Hrs.**

Handling database in code: OleDbConnection class- sqlconnection class- oledbcommand class – sqlcommand class- dataadapter class – dbdataadapter class – oledbdatareader class – datatable class – datarow class- datacolumn class – datarelation class – creating dataset, connection, command object, data adapter – accessing individual data items – using data reader

Note: Self study topics are denoted in *Italics*

TEXT BOOK

Steven Holzner, *Visual Basic .NET Programming*, Dreamtech Press, 2013.

REFERENCE BOOKS

1**. David I.Schneider**, *An Introduction to Programming using VB.NET*, First Edition, Prentice Hall of India Private Ltd., New Delhi.

2. **Vikas Gupta & Kogent Solutions Inc**, *Comdex .NET Programming Course Kit*, Dreamtech Press 2007.

SEMESTER - III

Core Paper – X

DATA MINING

Instructional Hrs: 75 **Sub. Code: 15CSPC310**

Max. Marks: CIA – 25; ESE – 75 **Credits: 5**

Objective: To enable the students to gain knowledge on Data Mining techniques.

UNIT I **15 Hrs.**

Introduction: Fundamentals of data mining – Data Mining functionalities – Classification of Data Mining – Task Primitives- Integration of a Data Mining system with a database or Data Warehouse system – Major Issues.

UNIT II **15 Hrs.**

Data Preprocessing: Need for Preprocessing – Descriptive Data Summarization - Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III **15 Hrs.**

Classification and Prediction: Issues – Decision tree Induction – Bayesian classification – Back propagation – Support Vector machine. Prediction – Other classification methods. Prediction: Accuracy and error measure – Evaluating the accuracy of a classifier or predictor – Ensemble methods - Model selection.

UNIT IV **15 Hrs.**

Clustering Analysis: Cluster analysis Introduction - Types of data in cluster analysis- Hierarchical methods – Density-Based Method - Outlier Analysis – Mining Frequency Patterns, Associations, and Correlations: Efficient and Scalable Frequent Itemset Mining Methods - Mining Various Kind of Association Rules - Constraint-Based Association Mining.

UNIT V **15 Hrs.**

Social Network Analysis - Spatial Data Mining – Text Mining – Mining the World Wide Web.

TEXT BOOK

Jiawei Han and Micheline Kamber, *Data Mining Concept and Techniques*, Morgan Kaufmann Publishers, Second Edition, 2008.

REFERENCE BOOKS

1. **Arun K. Pujari**, Data Mining Techniques, Universities Press (India) Pvt. Ltd., Third Edition, 2013.
2. **Margaret H. Dunhan**, Data Mining : Introductory and Advanced Topics, Pearson Education, 2013.

SEMESTER – III

Practical III

VB.NET PROGRAMMING LAB

Instructional Hrs: 75 **Sub.Code: 15CSPCP04/ 15CAPCP09**

Max. Marks: CIA-40; ESE -60 **Credits: 3**

Objective: To make the students understand the concepts of Software Project using .NET &UML.

1. Create a simple application using controls (Any one of Calculator or Drawing Pictures using GDI)
2. Preparation of Electricity Bill.
3. Develop an application for Inventory.
4. Develop an application for Employee Payroll System.
5. Develop an application for Student Information System.
6. Develop an application for Library Management System.

SEMESTER – III

Elective – II

NETWORK SECURITY

Instructional Hrs: 75 **Sub.Code: 11CSPE312**

Max.Marks: CIA-25; ESE-75 **Credits: 5**

Objective: To know and apply the theory and practice of modern cryptographic systems, the theory and practice of protocols for secured electronic communication.

UNIT I **15 Hrs.**

Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard

UNIT II **15 Hrs.**

Advanced Encryption Standard – Contemporary Symmetric Ciphers

UNIT III **15 Hrs.**

Public-Key Cryptography and RSA – Message Authentication and Hash Functions – Digital Signatures and Authentication Protocols.

UNIT IV **15 Hrs.**

Authentication Applications – Electronic Mail Security – Web Security.

UNIT V **15 Hrs.**

Intruders – Malicious Software – *Firewalls.*

Note: Self study topics are denoted in *Italics*

TEXT BOOK

William Stallings, *Cryptography and Network Security – Principles and Practices*, Pearson Education, Fourth Edition, 2006.

REFERENCE BOOKS

1. **Atul Kahate,** *Cryptography and Network Security*, Tata McGraw Hill, 2003.
2. **Bruce Schneier**, *Applied Crptography*, John Wiley & Sons Inc, 2001.
3. **Charles B. Pfleeger, Shari Lawrence Pfleeger**, *Security in Computing*, Fourth Edition, 2007.
4. **Stewart S.Miller**, *Wi-Fi Security*, McGraw-Hill, 2000.

SEMESTER – III

Elective – II

CLOUD COMPUTING AND BIGDATA ANALYTICS

Instructional Hrs: 75 **Sub. Code: 15CSPE322/ 15CAPE524**

Max. Marks: CIA -25; ESE -75 **Credits: 5**

Objectives: To enable the students to understand about the current challenges in cloud computing, designing cloud systems and implement cloud-based applications.

UNIT I **15 Hrs.**

Cloud computing – History of Cloud Computing – Cloud Architecture –Cloud Storage – Advantages of Cloud Computing – Disadvantages of Cloud Computing –Cloud Services. Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – *IBM Clouds*.

UNIT II **15 Hrs.**

Centralizing Email Communications – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – *Cloud Computing for the Corporation.*

UNIT III **15 Hrs.**

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management — Collaborating on Project Management – *Collaborating on Word Processing* – Collaborating on Databases – Storing and sharing Files.

UNIT IV **15 Hrs.**

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – *Collaborating via Blogs and Wikis.*

UNIT V **15 Hrs.**

Introduction – Concepts behind the Internet of Things: The IoT paradigm- Smart objects-Bits and atoms-Goal orientation-Convergence of technologies, Internet in general and Internet of Things. **Big Data:** Data mining and predictive analytics - The behavior and benefits of predictive models - Reaping the benefits, avoiding the pitfalls - What is Big Data? - How much value does Big Data add?

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Michael Miller**, *Cloud Computing: Web-Based Applications that Change the Way You Work and Collaborate Online,* Que Publishing, August 2008.
2. **Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning,** *The Internet of Things: From RFID to the Next – Generation Pervasive Networked Systems*, 2008.
3. **Steven Finlay,** *Predictive Analytics, Data Mining and Big Data: Myths, Misconceptions and Methods*, Macmillan Publishers Limited, First Edition, 2014.

REFERENCE BOOKS

1. **George Reese**, *Cloud Application Architectures: Building Applications and Infrastructurein the Cloud*, Orelly's, First Edition, April 2009.
2. **Haley Beard**, *Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*, Emereo Pvt. Ltd, July 2008.

SEMESTER – III

Elective – II

PRINCIPLES OF COMPILER DESIGN

Instructional Hrs: 75 **Sub. Code: 11CSPE332**

Max.Marks: CIA-25; ESE-75 **Credits: 5**

Objective:. To make the students understand the principles of compiler design.

UNIT I **15 Hrs.**

Introduction to Compiling: Compilers – analysis of the source program – phases of compiler - cousins of the compiler – grouping of phases – compiler construction tools. A simple one pass compiler: overview – syntax definition – syntax directed translation – parsing – A translator for simple expressions. **Lexical analysis:** Role of lexical analyzer – input buffering – *specifications of tokens* – recognition of tokens.

UNIT II **15 Hrs.**

Syntax analysis : Role of parser – context free grammar – top down parsing – bottom up parsing – shift reduce parsing – operator precedence parsing . **Type checking:** Type systems – specification of a simple type checker. Runtime Environments: Source language issues – storage organization – *storage allocation strategies* –symbol tables - access to non local names – parameter passing.

UNIT III **15 Hrs.**

Intermediate code generation: Intermediate languages - declarations – assignment statements – *Boolean expressions* – case statements – back patching – procedure calls.

UNIT IV **15 Hrs.**

Code Generation: Issues in the design of code generator – target machine – run time storage management - basic blocks in flow graphs – next use information – a simple code generator – DAG representation of basic blocks – peephole optimization.

UNIT V **15 Hrs.**

Code Optimization and Runtime Environments: Introduction – principle sources of optimization – optimization of basic blocks – loops in flow graphs – introduction to global data flow analysis.

Note: Self study topics are denoted in *Italics*

TEXT BOOKS

1. **Alfred Aho, Ravi Sethi, Jeffery D. Ullman**, *Compiler Principles, Techniques and Tools*, Pearson Education Asia 2003.

REFERENCE BOOKS

1. **Alfred Aho, Jeffery D. Ullman**, *Principles of Compiler Design*, Narosa Publishing House, Indian Student Edition, 2002.
2. **Santanu Chattopadhyah**, *Compiler Design*, PHI Learning Private Limited, New Delhi, 2009.

SEMESTER – III

Skill Based Subject III

WEB DESIGNING TOOLS LAB

(DHTML, Java Script, XML)

Instructional Hrs: 45 **Sub. Code: 15CSPSP03**

Max. Marks: CIA -40; ESE -60 **Credits: 3**

Objective: To make the students understand the concepts of advanced tools using Dreamweaver, flash, Photoshop, Java Script and XML.

1. Create a web page using Dreamweaver.
2. Animation using flash.
3. Design a Web page using Photoshop.
4. Form validation using Java Script.
5. Animation using Java Script.
6. XML document for Product Catalog.
7. XML document to store book information using Schema.
8. XML document to store student information using DTD.

SEMESTER – III

Skill Based Subject IV

SOFTWARE TESTING LAB

Instructional Hrs: 45 **Sub. Code: 13CSPSP04**

Max.Marks: CIA-40; ESE-60 **Credits: 3**

Objective To make the students understand the concepts of Software Testing.

Various software testing can be done related to the methods given below using any one of the software testing automated tools or manually.

(Win runner, Silk Test, SQA Robot, Load Runner, J Meter, and QTP)

1. Design Phase Testing.
2. Program Phase Testing.
3. Debugging.
4. Evaluation of Test Results.
5. Acceptance Testing.
6. Unit Testing.
7. System Testing.
8. Stress Testing.

SELF LEARNING PAPER

IT ENABLED SERVICES

Sub. Code: 13CSPSL01

Max. Marks: ESE -100 **Credits: 5**

Objective: To gain the knowledge about the various process in out sourcing.

UNIT I

Introduction to Business Process Outsourcing – Introduction to Offshore BPO – Career Opportunities in the BPO Industry.

UNIT II

Introduction to the Call Center Industry – Classification, Functioning, Work Environment.

UNIT III

Computer Skills : Call Center Software – Customer Relationship Management – Technologies used in ECRM.

UNIT IV

Selling over the Telephone – Delivering Customer Service over Telephone – Handling Complaints and Tricky Situations.

UNIT V

The Agent: Eligibility, Recruitment, Training – Personality Development for becoming a Professional – Managing Stress.

TEXT BOOKS

1. **Sarika Kulkarni, "***Business Process Outsourci",*, Jaico Publishing House, Mumbai, 2005.
2. **Vikas Gupta, "***Call Center Training Course Ki"t*, Dreamtech Press, New Delhi, 2003.

REFERENCE BOOKS

1. **Deepak Shil Kapur, "***BPO Diges"t,* Ameya Publications, 2004.
2. **Real Bergevin,"** *Call Centers for Dummies",* Wiley Publications, 2006.

SELF LEARNING PAPER

GREEN COMPUTING

Sub. Code : 13CSPSL04

Max. Marks : ESE -100 **Credits: 5**

Objective : To gain the knowledge about green computing.

UNIT I

What Is Green Computing?: Knowing What Green Computing Means - Getting Started with Green Computing - Speaking Green Jargon. **Checking Out Your Carbon Footprint**: Knowing Your Carbon Footprint ABCs - Facing the Facts - Reducing Your Footprint. **Assessing What You've Got**: Starting an Inventory of Your Computing Equipment - Understanding How You Use Devices - Working Better with What You Have- Developing computer habits that save energy - Making the Case for a New Purchase.

UNIT II

Giving Your Computer a Green Makeover:Weighing Your Makeover Possibilities - Shrinking the Elephant on Your Desktop - Gaming and More with a Greener Video Card -Adding Memory without Ginseng - What's a Terabyte among Friends? Improving Your Laptop Battery - Greening Your Power Supply. **Buying a Green Computer**: Understanding what makes a computer green- Matching a computer to your needs- Researching Your Options - Checking Out Small, Green, Niche Computers - Making Your Purchase.

UNIT III

Choosing Earth-Friendly Peripherals: Planning Your Purchases of Green Peripherals - Sharing Peripherals - Picking Printers - Seeing Some Specialty Drives - Selecting Keyboards and Mice - Calling Router Rooter - Making the Purchase — and What to Do Afterward.

UNIT IV

Recycling Your Computer: Facing the e-Waste Facts - Exporting the e-Waste Problem -Seeing Reasons to Recycle Computers - Planning Your Computer's Retirement - Wiping Your System Clean - Finding Great New Uses for an Old Computer - Going Back to the Source (Almost) - Recycling Computer Supplies, Too - Taking Local Action to Clean Up Global Computer Waste.

UNIT V

Print Less, Breathe More - Seamless Sharing across Systems: Sharing at Home - Benefits of networking - Types of networks - Setting Up a Home Network -Securing the wireless airwaves - Sharing the Easy Stuff - Sharing printers - Sharing media files - Figuring out what it is: hardware, software, or both? - Keeping Your Footprint Low at Home - Working with backups - Cleaning things up- Monitoring your resources **Ten Best Ways to Make Your Computer Greener**

TEXT BOOK

Woody Leonhard and Katherine Murray, *Green Home Computing for Dummies,* John Wiley & Sons, 2009.

REFERENCE BOOKS

1. **John Lamb**, *The Greening of IT* , IBM Press, 2009.
2. **Jason Harris,** Green *computing and Green IT Best Practices,* Emereo Publishing, 2008.