E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited **(3rd Cycle)** with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF INFORMATION TECHNOLOGY

CBCS CURRICULUM

MASTER OF SCIENCE

PROGRAMME CODE - PI

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

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DEPARTMENT OF INFORMATION TECHNOLOGY-PG
COURSE STRUCTURE - SEMESTER WISE
(w.e.f.2017 – 2018 onwards)

Sem	Sub. Code	Title of the Paper	Teaching Hours / Week	Duration of exams (hrs)	Marks Allotted			credits
					C.A	S.E	Total	
I	17PI11	**Core 1:** Computer Architecture	5	3	25	75	100	4
	17PI12	**Core 2:** Object Oriented Programming with C++	5	3	25	75	100	4
	17PI13	**Core 3:** Data Structure and Algorithms	5	3	25	75	100	5
		Elective-I						
	17PIE1A	Discrete Mathematics	5	3	25	75	100	5
	17PIE1B	System Analysis and Design						
	17PIE1C	Digital Image Processing						
	17PI11P	**Core Lab 4:** Object Oriented Programming with C++ Lab	5	3	40	60	100	4
	17PI12P	**Core Lab 5:** Data Structure and Algorithms Lab	5	3	40	60	100	4
II	17PI21	**Core 6:** Relational Database Management System	5	3	25	75	100	4
	17PI22	**Core 7:** Theory of Computation	5	3	25	75	100	4
	17PI23	**Core 8:** System software and Operating System	5	3	25	75	100	5
		Elective-II						
	17PIE2A	Compiler Design	5	3	25	75	100	5
	17PIE2B	Resource Management Techniques						
	17PIE2C	Data Mining and Warehousing						
	17PI21P	**Core Lab 9 :** RDBMS Lab	5	3	40	60	100	4
	17PI22P	**Core Lab 10:** Dynamic Web Programming Lab	5	3	40	60	100	4

Sem	Sub. Code	Subject Title	Teaching Hours / Week	Duration of exams (hrs)	CA	SE	Total	credits
III	17PI31	**Core 11:** Advanced Software Engineering	5	3	25	75	100	4
	17PI32	**Core 12:** Advanced JAVA	5	3	25	75	100	4
		Elective-III						
	17PIE3A	Computer Networks	5	3	25	75	100	5
	17PIE3B	Mobile computing						
	17PIE3C	Artificial Intelligence						
		Elective-IV						
	17PIE3D	Big Data Analytics	5	3	25	75	100	5
	17PIE3E	Cyber Security						
	17PIE3F	Pattern Recognition						
	17PI31P	**Core Lab 13:** Advanced JAVA Lab	5	3	40	60	100	4
	17PI32P	**Core Lab 14:** Web Technology Lab	5	3	40	60	100	4
IV	17PIPR4	**Core 15:** Project – Viva Voce	-		20	80	100	12
		Total	90					90

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(w.e.f.2017 – 2018 onwards)

Title of the Paper : **Computer Architecture**
Semester : **I**   **Contact Hours :5**
Sub Code : **17PI11**   **Credits** **:4**

Objectives:

1. To introduce the fundamental concepts underlying modern computer organization and architecture.

2. To comprehend the importance of the hardware-software interface.

3. To familiarize about hardware design of basic structure and behavior of the various functional modules of the computer.

UNIT-I:

Digital Logic Circuits: Digital Computers- Logic Gates –Boolean Algebra- Map Simplification- Combinational Circuits- Flip-flops- Sequential Circuits. **Digital Components:** Integrated Circuits-Decoders – Multiplexer – Registers – Shift Registers – Binary Counters – Memory Unit. **Data Representation**: Data Types-Complements-Fixed Point Representation-Floating Point Representation – other Binary Codes-Error Detection Codes.

UNIT-II:

Register Transfer and Micro operation: Register Transfer Language-Register Transfer – Bus and Memory Transfer – Arithmetic Micro Operation – Logic Micro Operation – Shift Micro operation- Arithmetic Logic Shift Unit. **Basic Computer Organization and Design:** Instruction Codes-Computer Registers-Computer Instructions- Training – Timing And Control- Instruction Cycle-Memory Reference Instructions – Input And Output And Interrupt.

UNIT-III: Micro programmed Control: Control Memory – Addressing Sequencing – Micro Program Example – Design of Control Unit. **Central Processing Unit:**

Introduction – General Register Organization – Stack Organization – Instruction Formats- Addressing Modes- Data Transfer And Manipulation – Programmed Control.

UNIT-IV: Computer Arithmetic: Introduction- Addition and Subtraction – Multiplication Algorithm – Division Algorithm.

UNIT-V: Input Output Organization: Peripheral Devices – Input Output Interfaces Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access, Input Output Processor, Serial Communication. **Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory Virtual Memory.

Text Book:

Morris Mano.M, *Computer System Architecture*, Prentice Hall India, New Delhi, 3rd Edition, 2006.

Chapters:

Unit I	: Chapters 1, 2, 3
Unit II	: Chapters 4, 5 (5.1 – 5.7)
Unit III	: Chapters 7, 8 (8.1 – 8.7)
Unit IV	: Chapters 10 (10.1 – 10.4)
Unit V	: Chapters 11 (11.1 -11.4, 11.6 - 11.8), 12 (12.1 – 12.6)

Reference Books:

1. Alan Clements , *Computer Organization and Architecture* , Prentice Hall of India, New Delhi, 2nd Edition , 2007.

2. Carl Hamacher, Zvonko Vranesic, SafwatZaky, *Computer Organization-* Mc Graw Hill , America ,Newyork , Fifth Edition , 2002.

3. David,Patterson, John,Hennery , *Computer Organization and Design The Hardware and Software Interface*, Elsevier India, New Delhi , 3rd edition , 2007.

4. Rajaraman.V,Radhakrishnan.T , *Digital Logic and Computer Organization*, Prentice Hall Of India , New Delhi , 1st edition , 2006.

5. William Stallings , *Computer Organization & Architecture* , Prentice Hall of India , New Delhi , 7th edition , 2007.

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Title of the Paper : Object Oriented Programming with C++
Semester : I   **Contact Hours : 5**
Sub Code : 17PI12   **Credits : 4**

Objectives:

1. Arm the students with the basic programming concepts.

2. Introduce different techniques pertaining problem solving skills.

3. Arm the students with the necessary constructs of C++ programming and to emphasis on guided practical sessions.

UNIT-I:

Software Crisis – Software Evolution – Basic Concepts of Object-Oriented Programming – Benefits of OOP – Object-Oriented Languages - Applications of OOP – Application of C++ - Structure of a C++ Program – Tokens – Keywords – Identifiers – Basic Data Types – User-defined Data types – Derived data types – Symbolic constants – Type compatibility – Declaration of variables – Dynamic initialization of variables –Reference variables – Operators in C++ - Manipulators – Type cast operator – Expressions and their types-Implicit conversions – Control structures – The main function – Function prototyping – inline functions – Function overloading.

UNIT-II:

Specifying a class – Defining member functions – Making an outside function inline – Nesting of member functions – Private member functions – Array within a class – Memory allocation for objects – Static data members – Static member functions – Array of objects - Objects as function arguments – Friendly functions – Returning objects – Constant member functions – Constructors – Parameterized constructor – Multiple constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Destructors.

UNIT-III:

Defining operator overloading – Overloading unary operators – Overloading binary operators– Overloading binary operators using friend function – Rules for overloading operators - Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance - Virtual base classes – Constructors in derived class – Member classes: Nesting of classes.

UNIT-IV:

Pointer to objects – this pointer – Pointers to derived classes – Virtual functions – Pure virtual functions – C++ Stream classes – Unformatted I/O operations – Managing output with manipulators.

UNIT-V:

Classes of file stream operations – Opening and Closing files – Detecting end of file – More about open() function – File modes, File pointers and their manipulation – Sequential input and output operations – Command-line arguments- Templates: class templates and function templates.

Text Book:

Balagurusamy. E, *Object Oriented Programming with C++,* McGraw Hill Education (India) Private Limited, New Delhi, Sixth Edition, 2013.

UNIT I –	Chapter 1 (Except 1.3, 1.4),
	Chapter 2 (Only 2.6),
	Chapter 3 (Except 3.20, 3.21, 3.22), Chapter 4
UNIT II –	Chapter 5 (Except 5.18, 5.19), Chapter 6 (Except 6.8, 6.9, 6.10)
UNIT III –	Chapter 7, Chapter 8
UNIT IV –	Chapter 9, Chapter 10
UNIT V –	Chapter 11 (Except 11.8),
	Chapter 12 (Only 12.2, 12.3 and 12.4)

Reference Books:

1. Alok Kumar Jagadev, Amiya Kumar Rath and Satchidananda Dehuri, *Object-Oriented Programming Using C++*, Prentice-Hall of India Private Limited, New Delhi, 2007.

2. Ashok N.Kamthane, *Object Oriented Programming with ANSI & Turbo C++*, Pearson Education, 2006.

3. John R.Hubbard , *Programming with C++* , Tata McGraw Hill Publishing Company Private Limited , New Delhi , Second Edition , 2007.

4. Paul Deitel, Harvey Deitel, *C++ How to Program*, PHI, U.S.A, Ninth edition, 2014.

5. Poornachandra Sarang, *Object-Oriented Programming With C++,* 2nd Edition, PHI Learning Private Limited, New Delhi, 2009.

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Title of the Paper : Data Structure and Algorithms
Semester : I   **Contact Hours : 5**
Sub Code : 17PI13   **Credits : 5**

Objectives:

1. To study the systematic way of solving problems, various methods of organizing large amounts of data.

2. To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, binary search trees, and graphs and writing programs for these solutions.

3. To employ the different data structures to find the solutions for specific problems.

UNIT- I:

Basic Concepts: Overview : System life cycle - object oriented design – data abstraction and encapsulation - basics of C++ - algorithm specification performance analysis and measurements. **Arrays:** Abstract data types and the C++ class - the array as an abstract data type - representation of arrays - the string abstract data type. **Stacks & Queues:** Templates in C++ - the stack abstract data type - the queue abstract data type - subtyping and inheritance in C++.

UNIT-II:

Linked Lists: Singly linked lists and Chains - representing chains in C++ - The Template Class chain - circular lists - linked stacks & queues-Polynomials - doubly linked lists - generalized lists.

UNIT-III:

Trees: Introduction - binary trees - binary tree traversal and tree iterations - threaded binary trees - heaps - binary search trees- Selection Trees – Forests.

UNIT-IV:

Graphs: The Graph Abstract Data Type – Elementary Graph Operation – Minimum Cost Spanning Tree – Shortest Paths and Transitive Clousure. **Hashing:** Introduction – Static Hashing – Dynamic Hashing – Bloom Filters.

UNIT-V:

Efficient Binary Search Trees: Optimal Binary Search Trees - AVL trees - Red Black trees - Splay trees. **Multiway Search Trees:** m-way Search Trees – B Trees – B+ Trees.

Text Book:

1. Elis Horowitz, Sartaj Sahni, Dinesh Mehta, *Fundamentals of Data structures in C++*, Universities Press (India) Private Limited, Hyderabad, Second Edition, 2013.

UNIT I	-	Chapters 1 (1.1 - 1.5, 1.7), 2 (2.1, 2.2, 2.5, 2.6) and 3(3.1 – 3.4)
UNIT II	-	Chapter 4 (4.1 -4.5), 4.7, 4.10, 4.11
UNIT III	-	Chapter 5 (5.1, 5.3- 5.10)
UNIT IV	-	Chapters 6 (6.1 – 6.5) and 8(8.1 -8.4)
UNIT V	-	Chapters 10(10.1-10.4) , 11(11.1 -11.3)

Reference Books:

1. Aaron M. Tenenbaum, Moshe J. Augenstein & Yedidyah Langsam , *Data Structure using C & C++* , Prentice Hall of India Private Limited , New Delhi , Second Edition , 2005.

2. Ashok N.Kamthane , *Object Oriented Programming with Ansi & Turbo C++* , Pearson Education , New Delhi , First Edition , 2003.

3. Easwara Kumar K. S. , *Object Oriented Data Structure using C++* , Vikad Publishing House Private Limited , New Delhi , First Edition , 2000.

4. Ellis Horowitz, Sartaj sahni & Dinesh Metha , *Fundamentals of Data Structures in C++* , Universities Press (India) Private Limited , Hyderabad, Second Edition , 2007.

5. Mark Allen Weiss, *Data Structures and Algorithms Analysis in C*, Pearson Education Inc. and Dorling Kindersley Publishing Inc., New Delhi, Second Edition, 2010.

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Title of the Paper	: Discrete Mathematics		
Semester	: I	**Contact Hours : 5**	
Sub Code	: 17PIE1A	**Credits**	: 5

Objectives:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and the properties of logic.

2. Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, graphs and trees.

3. Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

UNIT-I: Set Theory: Introduction – Sets – Notation and Description of sets – Subsets – Venn – Euler Diagrams – Operation on sets – Properties of set operations – Verification of basic laws and algebra by Venn diagram. **Relations**: Relations – Representation of a relation – Operations on relations – equivalence relation – Closures & Warshalls Algorithm – Partitions and Equivalence Classes.

UNIT-II: Recurrence relations and Generating functions: Recurrence relation – an introduction– Polynomial and their evaluations – Recurrence relations – Solutions of finite order homogeneous (linear) relations – Solutions of non-homogeneous(linear) relations – Solutions of non-homogeneous relations – Generating functions (For all the theorems consider the statements without proofs).

UNIT-III: Coding Theory : Introduction- Hamming Distances- Encoding a Message-Group Codes –Procedure for Generating Group Codes-Decoding and Error Correction.

UNIT –IV: Logic: Introduction – IF statements – Connectives – Truth table of a formula – Tautology - Tautological implications and Equivalence of formulae –

Quantifiers.

UNIT-V: Lattices : Lattices-Some Properties of Lattices- New Lattices –Modular and Distributive Lattices . **Graph Theory:** Basic concepts – Matrix representations of graphs – Trees – Spanning tree – shortest path problem.

Text Book:

Venkataraman.M.K,   Sridharan.N   and   Chandrasekaran.Z   ,   *Discrete Mathematics*, National Publishing company , Chennai , India , Third Edition , Jan 2011.

Unit I : Chapter 1.1 to 1.8 and 2(2.2 to 2.6)

Unit II: Chapter 5 (5.1 to 5.6)

Unit III: Chapter 8(8.1 to 8.8)

Unit IV: Chapter 9 (9.1 to 9.3, 9.6 to 9.8, 9.15)

Unit V : Chapter10 (10.1 to 10.4) and 11 (11.1 to 11.5)

Reference Books:

1. Edgar G. Goodaire, Michael,M.Parmenter , *Discrete Mathematics with Graph Theory* , PHI Learning Private Limited , New Delhi ,Third Edition , 2011.

2. Kolman ,Busby,Ross , *Discrete Mathematical Structures* , PHI Learning private Limited , New Delhi , Sixth Edition , 2009.

3. Liu . C L, D P Mohapatra , *Elements of Discrete Mathematics* , Tata Mcgraw Hill Education private Limited , New Delhi , Fifth Reprint , 2010.

4. Semyour Lipschutz / Marc Lipson – *Discrete Mathematics* - Tata Magraw Hill Education private Limited – New Delhi,India - II Edition - 2006.

5. M.K.Sen, B.C.Chakraborty – *Introduction to Discrete Mathematics* - Books And Allied (P) Ltd –Kolkata, India – III Edition - 2008 .

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Title of the Paper	**: System Analysis and Design**		
Semester	**: I**	**Contact Hours : 5**	
Sub Code	**: 17PIE1B**	**Credits**	**: 5**

Objectives:

1. This course introduces established and evolving methodologies for the analysis, design, and development of an information system.

2. Emphasis is placed on system characteristics, managing projects, prototyping and systems development life cycle phases.

3. Upon completion, students should be able to analyze a problem and design an appropriate solution using a combination of tools and techniques.

UNIT-I :

The Systems Concept – Characteristics of System–Elements of a System–Types of Systems –System Models– System Development Life Cycle (SDLC).

UNIT-II :

The System Analyst Definition – Role of the Analyst – Analyst/User Interface – Analyst in the MIS Organization – The Bases for Planning in Systems Analysis – Initial Investigation.

UNIT-III :

Information Gathering Introduction –Information Gathering Tools – The Tools of Structured Analysis – System Performance Definition – Feasibility Study – Data Analysis – Cost/Benefit Analysis.

UNIT-IV:

The Process of Design –Design Methodologies – Major Development Activities – Audit considerations – Input/Output and Forms Design – File Organization and Data Base Design.

UNIT-V:

System Testing – The Test Plan –Quality Assurance – Role of the Data Processing Auditor – Post Implementation Review – Software Maintenance – The Computer Industry – The Software Industry – Hardware/Software Selection – Financial considerations in selection.

Text Book:

1. Elias M.Awad, *Systems Analysis and Design*, Tata McGraw Hill , NewDelhi , Second Edition , 2007.

Chapters:

Unit I	- Chapter 1, 2
Unit II	- Chapter 3, 4
Unit III	- Chapter 5,6,7,8
Unit IV	-Chapter 9,10,11
Unit V	-Chapter 12 to 14

Reference books:

1. Awad.M, *System Analysis and Design ,* Galgotia Publishers, New Delhi, First Edition, 2006.

2. Gary B.Shelly,ThomasJ.Cashman,HarryJ.Rosenblatt, *Systems Analysis And Design*, Thomas Course Technology , 6th Edition , NewDelhi , 2006.

3. ISRD Group , *Structured System Analysis and Design*, Tata McGrawHill , NewDelhi, First Edition , 2007.

4. Kock, *Systems Analysis & Design Fundamentals*, Saga Publications India Pvt.Ltd, NewDelhi ,1st Edition , 2005.

5. Rajesh Nalk & Swapna Kishor, *System Analysis & Business Applications*, Wheeler Publishing, 1st Edition , 1994.

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Title of the Paper	: Digital Image Processing		
Semester	: I	**Contact Hours : 5**	
Sub Code	: 17PIE1C	**Credits**	: 5

Objectives:

1. Understand image formation and the role human visual system plays in perception of gray and color image data.

2. Get broad exposure to and understanding of various applications of image processing in industry, medicine, and defense.

3. Acquire an appreciation for the image processing issues and techniques and be able to apply these techniques to real world problems.

UNIT- I:

Digital Image Processing: Origins of Digital Image Processing, Steps in Digital Image Processing, Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationships between Pixels, Mathematical Tools used in Digital Image Processing.

UNIT-II:

Image Transformation & Filters: Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filter, Sharpening Spatial Filters, Combining Spatial Enhancement methods, Fuzzy techniques for Intensity Transformation and Spatial Filtering. Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transforms of Sampled Functions, The Discrete Fourier Transform (DFT), Properties of the 2-D DFT, Filtering in the Frequency Domain, Image Smoothing and Sharpening using Frequency Domain Filters, Selective Filtering.

UNIT- III:

Image Restoration, Reconstruction and Image Segmentation: Image Degradation/Restoration process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Functions, Inverse Filtering, Wiener Square Error Filtering, Constrained Least Square Filtering, Geometric Mean Filter, Image Reconstruction from Projections. Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds, Use of Motion in Segmentation.

UNIT- IV:

Color Image Processing: Color Fundamentals, Color Models, Pseudo color Image Processing, Full Color Image Processing, Color Transformation, Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images. Wavelets and Multi resolution Processing: Multi resolution Expansion, Wavelet Transforms in One Dimension, The Fast Wavelet Transforms, Wavelet Transforms in Two Dimensions, Wavelet Packets. Image Compression: Fundamentals, Basic Compression Methods, Digital Image Watermarking.

UNIT-V:

Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology. Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Structural Methods.

Text Books:

Rafael C. Gonzalez, Richard E. Woods, *"Digital Image Processing"*, 3rd Edition, Pearson Education, 2008.

UNIT I	-	chapter 1 and 2
UNIT II	-	chapter 3 and 4
UNIT III	-	chapter 5 and 10
UNIT 1V	-	chapter 6 and 7
UNIT V	-	chapter 9 and 12

Reference Books:

1. Chanda B., Dutta Majumdar .D, *Digital Image Processing and Applications*, Prentice Hall of India, New Delhi, Second Edition, 2007.

2. Jain A.K., *Fundamentals of Digital Image Processing*, Pearson education References, New Delhi, Second Edition, 2004.

3. Millman Sonka, Vaclav Hlavac, Roger Boyle, Broos Colic, *Image Processing Analysis and Machine Vision* , Thompson Learning, USA, Low Price Edition, 2002.

4. Rafael C Gonzalez, Richard E Woods, *Digital Image Processing*, 2nd Edition, Pearson Education , New Delhi, Second Edition, 2003.

5. William K Pratt, *Digital Image Processing*, John Willey & Sons Inc – New Delhi - Third Edition -2002.

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Title of the Paper : **Object Oriented Programming with C++ Lab**
Semester : **I** **Contact Hours : 5**
Sub Code : **17PI11P** **Credits** : **4**

1. Program for solving m power n using default arguments.

2. Swapping of two values using functions.

3. Maximum of two numbers using Friend function.

4. Inline function.

5. Function Overloading

6. Program for Constructor.

7. Number manipulation using Operator Overloading

8. Program for Single, Multiple, Multilevel, Hybrid Inheritance

9. Program for Polymorphism and virtual functions.

10. Program for Type conversion.

11. Program for I/O manipulators.

12. Program to implement Stack using pointers.

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Title of the Paper : **Data Structure and Algorithms Lab**
Semester : **I**   **Contact Hours : 5**
Sub Code : **17PI12P**   **Credits** : **4**

1. Implementation of Stack and Queue using Array.

2. Implementation of Stack and Queue using Linked List

3. Evaluations of Postfix Expression.

4. Single Linked List / Double Linked List

5. Circular Linked List

6. Binary Tree Traversal

7. Hashing

8. Bubble Sort

9. Insertion Sort

10. Selection Sort

11. Merge Sort

12. Quick Sort

13. Heap Sort

14. Linear Search

15. Binary Search

16. Breadth First Search

17. Depth First Search

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Title of the Paper	: Relational Database Management System	
Semester	: II	**Contact Hours : 5**
Sub Code	: **17PI21**	**Credits : 4**

Objectives:

1. To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.

2. To make a study of SQL and relational database design.

3. To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.

UNIT- I : Introduction:

Purpose of Database System – View of Data – Database languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators – Structure of Relational Databases – Fundamental Relational-Algebra Operations- Additional Relational-Algebra Operations – Extended Relational Algebra Operations – Null Values – Modification of Data Base.

UNIT- II : SQL:

SQL Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub queries – Complex queries – views –Modification of the Database – **Other Relational Languages:** The Tuple Relational Calculus – The Domain Relational Calculus – Query By Example – Data log.

UNIT- III :Database Design and The Entity – Relationship Model:

The Entity-Relationship Model – Constraints – Entity-Relationship Diagrams – Entity-Relationship Design Issues – Weak Entity sets – Extended E-R Features – **Relational Database Design:** Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition Using Functional Dependencies –

Functional-Dependency Theory – Decomposition Using Functional Dependencies – Decomposition using Multivalue Dependencies.

UNIT- IV: Storage and File Structure: Overview of Physical Storage media – Magnetic Disks – RAID - Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data-Dictionary Storage – **Indexing and Hashing:** Basic Concepts – B+- Tree Index Files – B- Tree Index Files - Multiple-Key Access – Static Hashing – Dynamic Hashing.

Unit- V: Query Processing: Selection Operation – Sorting – Join Operation – Other Operation – **Query Optimization:** Transformation of Relational Expression – Estimating Statistics of Expression Results – **Transactions:** Transaction Concept – Transaction State – Concurrent Executions – Testing for Serializability.

Text Book:

1. Abraham Silberschtz, Henry F.Korth, S.Sudarshan , *Database System Concepts*, McGraw-Hill International Edition, 5th Edition, 2006

   Chapters:

Unit I	:	Chapter 1 & 2
Unit II	:	Chapter 3 & 5
Unit III	:	Chapter 6 & 7
Unit IV	:	Chapter 11 & 12
Unit V	:	Chapter 13, 14 & 15

Reference Books:

1. Date.C.J , *An Introduction to Database Systems,* Pearson Education Publication, New Delhi, 7th Edition, 2003

2. Gogan Varshney, *Database Management Systems,* Global Vision Publishing House, New Delhi, 1st Edition, 2010.

3. Jeffrey Hoffer. A, Mary Prescott.B, Fred McFadden.R , *Modern Database Management ,* Dorling Kindersley Private Limited , New Delhi,7th Edition,2003

4. Ramakrishnan and Gehrke , *Database Management System* , McGraw Hill , New York , 3rd Edition, 2003

5. Abraham Silberschtz, Henry F.Korth, S.Sudarshan, *Database System Concepts,* McGraw,Hill International Edition ,6th Edition, 2011.

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Title of the Paper : Theory of Computation
Semester : II   **Contact Hours : 5**
Sub Code : 17PI22   **Credits : 4**

Objectives:

1. Master regular languages and finite automata, context-free languages, push-down automata, and Turing recognizable languages.

2. Be exposed to a broad overview of the theoretical foundations of computer science.

3. Be familiar with thinking analytically and intuitively for problem-solving situations in related areas of theory in computer science.

UNIT- I:

Finite Automata : Introduction – Finite State Machine – Acceptance of Strings and Languages – Deterministic Finite Automata – Non Deterministic Finite Automata – Significance of Non Deterministic Finite Automaton – NFA with ε-Transitions – Conversions and Equivalence – NFA to DFA Conversion – Minimization of FSM – Equivalence between Two FSM's – FA with Output – Equivalence of Moore and Mealy Machines.

UNIT- II:

Regular Expressions : Introduction – Regular Set – Regular Expressions – Finite Automata and Regular Expressions – Conversion of Finite Automata to Regular Expressions – Identity Rules – Proving Languages not to be Regular – Applications of Regular Expression – Closure Properties of Regular Languages.

UNIT- III:

Context Free Grammar : Introduction – Regular Grammar – Equivalence between Regular Grammar and FA – Context Free Grammar – Derivation and languages – Derivation Trees – Relationship between Derivation and Derivation Tree – Ambiguity – Simplification of CFG.

UNIT- IV:

Properties of Context Free Languages: Introduction – Normal Forms – Applications of Context free Grammar – Properties of Context Free Languages.

UNIT-V:

Turing Machines : Introduction – Model of Turing machine – Definition of Turing machine – Programming Techniques for Turing Machines – Computable Language and Functions – Two way infinite Tape – Power of Turing Machine – Comparison of FM, PDA and TM.

Text Book:

Puntambekar A.A, *Theory of Computation*, Technical Publications, Pune, First Edition 2009.

UNIT I	–	Chapter 2
UNIT II	–	Chapter 3
UNIT III	–	Chapter 4
UNIT IV	–	Chapter 5
UNIT V	–	Chapter 7.1 to 7.8

Reference Books:

1. Dexter C. Kozen, *Theory of Computation*, Springer Publication, New York, 2006 edition, 2006.

2.John Hopcroft.E, Rajeev Motwani, Jeffrey D.Ullman, *Introduction to Automata Theory*,

Languages and Computation, Pearson Education, New Delhi, Third Edition, 2014.

3. John Martin, Introduction to Languages and the Theory of Computation , McGraw-Hill Publication, Boston, First Edition, 2003.

4. Michael Sipser, *Introduction to the Theory of Computation*, PWS Publishing Company,   Boston, Third edition, 2002.

5. Wayne Goddard*, Introducing the Theory of Computation*, Jones & Bartlett India Pvt Ltd, Delhi, 2008.

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Title of the Paper : **System software and Operating System**

Semester : II		**Contact Hours : 5**
Sub Code : 17PI23		**Credits** : 5

Objectives:

1. Focusing on internal working of the hardware and software interface of a typical system.

2. To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.

3. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, and Deadlock detection algorithms.

UNIT –I:

Introduction to System Software and Machine Architecture - The Simplified Instructional Computer(SIC) - Traditional (CISC) Machines-RISC machines.

UNIT -II: Assemblers: Basic assembler functions - machine - Dependent and machine independent assembler features - Assembler design options.

UNIT - III:

Basic Loader functions- Machine dependent and independent Loader features - Loader Design options. **Compilers**: Basic Compiler Functions – Machine - Dependent compiler features -Machine Independent compiler features - Compiler Design Options.

UNIT - IV:

Process Management: Process Concept – Process Scheduling – Operations on Processes – CoOperating Processes – Inter process Communication.- Scheduling Algorithm. **Deadlocks:** System model – Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

UNIT- V:

Memory Management: Background – Swapping – Contiguous Memory Allocation – Paging Segmentation - Segmentation with Paging. **Virtual Memory**: Background – Demand Paging – Process Creation – Page Replacement.

Text books:

1. Leland L.Beck , *System Software An Introduction to System Programming* , Addision Wesely, New Delhi , Third Edition , 2009.

Unit I   : Chapter 1

Unit II : Chapter 2

Unit III : Chapters 3, 5

2. Silberschatz, Galvin, Gagne, Operating System Concepts, John Wiley & Sons, Inc., New Delhi, Sixth Edition, 2013.

Unit IV : Chapters 4, 8

Unit V : Chapter 9

Reference Books:

1. Deital.H.M, *Operating System*, Published by Pearson Education,11th Edition 2003.

2. Dhamdhere.D.M , *System programming and operating system,* Tata McGraw Hill, New Delhi, 2nd revised edition , 2006.

3. Donova, *System Programming* , Tata McGrawHill , New Delhi , 2nd revised edition, 2006.

4. Nithyashri.J, *System Software,* Tata McGraw-Hill , New Delhi , 2nd revised edition , 2010.

5. Pramod Chandra, P.Bhatt, *An Introduction to Operating Systems*, PHI, New Delhi, First Edition, 2007.

6. William Stallings, *Operating Systems*, Internals and Design Principles, PHI, New Delhi, 2008.

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Title of the Paper   : Compiler Design
Semester   : II   **Contact Hours : 5**
Sub Code   : 17PIE2A   **Credits   : 5**

Objectives:

1. To introduce the major concept areas of language translation and compiler design.

2. To develop an awareness of the function and complexity of modern compilers.

3. To provide practical, hands on experience in compiler design.

UNIT- I:

Introduction to compiling: Compilers-Analysis of the source program-The phases of the compilers-cousins of the compliers-The grouping of phases-Compliers Construction tools. **A simple one-pass compilers:** Overview-syntax definition-syntax directed translation-Parsing-A translator for simple expression-lexical analysis-incorporating a symbol table-abstract stack machines-putting the techniques together.

UNIT - II:

Lexical Analysis: The role of the Lexical analyzer-Input buffering-Specification of tokens-Recognition of tokens- A language for specifying lexical analyzers-Finite automata-From a regular expression to an NFA-Design of a lexical analyzer generated-optimization of DFA-Based pattern matchers. **Syntax Analysis:** The role of the parser - context free grammars - writing a grammar- top down parsing-bottom up parsing-operator precedence parsing -LR parser-Using ambiguous grammars - Parsers generators.

UNIT- III:

Syntax-directed translation: Syntax-directed definitions-construction of syntax trees – Bottom up evaluation of S-Attributed definitions- L-attributed definitions - Top down Translations-Bottom-up Evaluation Inherited attributes-Recursive evaluators-space for attribute values at compile time-Assigning space at compliers construction time- analysis of syntax directed definition. **Type checking:**

Type systems –specification of a simple type checker-equivalence of type expressions - type conversions-attribute grammar for simple type checking systems.

UNIT - IV:

      Run time environments: Source language issues-storage organization-storage allocation strategy-storage allocation in c-parameter passing. **Intermediate code generation:** Intermediate languages-declarations-assignments statements- Boolean expression-case statements-back patching-procedure calls.

UNIT-V:

      Code Generation: Issues in the design of a code generators - the target machine -run time storage management-basic blocks and flow graphs-next use information-A simple code generator-register allocation and assignment-The dag representation of basic blocks-Generating code from dags - dyanamic programming code generations algorithm - code generator generators. **Introduction to code optimization:** Introduction-The principle sources of optimization-peep hole optimization-optimization of basic blocks-loops in flow graphs-Introduction to global data flow analysis-iterative solution of data flow equation-Code improving transformation-dealing with aliases-data flow analysis of structure flow graphs-efficient data flow algorithm-A tool for data flow analysis-Estimation of types-symbolic debugging of optimized code.

Text Book:

Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, *Compilers Principles, Techniques, and Tools*, Pearson Education, New Delhi, First Impression, Reprint 2007.

        UNIT I   : Chapter 1,3

        UNIT II : Chapter 4,5

        UNIT III : Chapter 6,7

        UNIT IV : Chapter 9,11,12

        UNIT V : Chapter 13,15

Reference Books:

1. Allen I. Hollub, *Compiler Design in C*, PHI, NewDelhi, Second Edition,2003.

2. Bennet J.P, *Introduction to Compiler Techniques*, Tata McGraw-Hill, New Delhi, Second Edition, 2003.

3. Dick Grone, Henri E Bal, Ceriel J H Jacobs and Koen G Langendoen, Modern Compiler Design, John Wiley and Sons, USA, 2000.

4. Fischer C. N and LeBlanc R. J, *Crafting a compiler with C* , Benjamin Cummings, USA, 2003.

5. Alfred V.Aho and Jeffrey D.Ullman, *Principles of Compiler Design*, Pearson Education, New Delhi, Low Price Edition, Reprint 2004.

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Title of the Paper : Resource Management Techniques
Semester : II   **Contact Hours : 5**
Sub Code : 17PIE2B   **Credits** : 5

Objectives:

1. The objective of the course is to notify students with the application of operations research to business and industry

2. To expose them to various tools, techniques and methods available for decision making.

3. Understand the mathematical tools that are needed to solve optimization problems.

UNIT-I:

   Operations research-An overview : Introduction-Origin and development of O.R - Nature and features of O.R – Scientific method in O.R – Modelling in operations research – Advantages and limitations of models – General solution method for O.R models – Methodology of operations research – Operation research on decision making – Applications of operation research – Opportunities and shortcomings of operation research. **Linear programming problem-mathematical formulation:** Introduction - Linear programming problem – Mathematical formulation of the problem – illustration on mathematical formulations of LPPs – **Linear programming problem-Graphical solution extension:** Introduction – Graphical solution method –Some exceptional cases-general linear programming problem- canonical and standard forms of LPP-Insights into the simplex method- **linear programming problem-simplex method:** Introduction- Fundamental properties of solutions –the computational procedure-use of artificial variables - **Duality linear programming:** introduction- general primal dual pair-formulating a dual problem.

UNIT-II:

Transportation problem: Introduction – LP formulation of the transportation problem-existence of solution in T.P - duality in transportation problem-the transportation table - loops in transportation tables - triangular basis in a T.P-solution of transportation problem - finding an initial basic feasible solution-test for optimality-economic interpretation of uj's and vj's-degenaracy in transportation problem - transportation algorithm (MODI method) - **assignment problem:** Introduction-mathematical formulation of the problem-solution methods of assignment problems-the travelling salesman problem.

UNIT-III:

Games and strategies: Introduction-two person zero sum games- Some basic terms-the maximin minimax principle - games without saddle points mixed strategies-graphic solution of 2*n and m*2 games-dominance property-**network scheduling by PERT/CPM:** Introduction- network basic components-logical sequencing-rules of network construction-concurrent activities-critical path analysis-probability considerations in PERT-distinction between PERT and CPM-applications of network techniques-advantages of network techniques-limitations and difficulties in using network

UNIT-IV:

Inventory control-I: Introduction-types of inventories-reasons for carrying inventories-the inventory decisions-objectives of scientific inventory control-costs associated with inventories-factors affecting inventory control-an inventory control problem-the concept of EOQ-deterministic inventory problem with no shortages-deterministic inventory problem with shortages-problems of EOQ with price breaks-**inventory control-II:** introduction –inventory problems with uncertain demand-systems of inventory control-one period problem-one period problem with setup cost.

UNIT-V:

Queueing Theory: Introduction- queueing systems - elements of the queueing systems-operating characteristics of a queueing systems-deterministicqueueing systems –probability distribution in queueing systems-classification of queueing

models –definition of transient and steady states-poisson queueing systems (upto model v).

Text Book :

Kanti Swarup, P.K. Gupta and Manmohan , *Operations Research*, Sultan Chand and Sons, New Delhi, Fifteenth Edition, Reprint 2011.

      Unit I: Chapter 1, 2, 3, 4.1 to 4.4, 5.1 to 5.3

      Unit II: Chapter 10.1 to 10.13, 11.1 to 11.3 and 11.7

      Unit III: Chapter 17.1 to 17.7, and 25

      Unit IV: Chapter 19.1 to 19.12 and 20.1 to 20.5

      Unit V: Chapter 21.1 to 21.9 (Upto Model V)

Reference Books:

1. Hamdy A.Taha, *Operations Research   An Introduction,* PHI Learning private Limited, New Delhi, Eighth Edition,2008.

2. KapoorV.K, *Operations Research,* SultanChan & Sons, New Delhi, 17th edition, 2003.

3. Man Mohan, *Problems in Operation Research,* Sultan Publishers, New Delhi, 10th edition, 2004.

4. Natarajan.A.M,Balasubramani.P,Tamilarasi.A, *Operations Research,* Baba BarkhaNath Printers,India, Third Impression, 2008.

5. NitaH.Shah, Ravi M.Goal, HardikSoni, *Operations Research,* PHI Learning Private Limited, New Delhi, Third Edition, 2009.

6. Sharma.S.D, *Operations   Research,* Kedar nath Ram nath & Co, India, Sixteenth Edition, 2012.

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Title of the Paper **: Data Mining and Warehousing**

Semester	**: II**	**Contact Hours : 5**
Sub Code	**: 17PIE2C**	**Credits : 5**

Objectives:

1. To equip the students in the knowledge of various tools and techniques involved in Data Mining and Warehousing.

2. To introduce the concept of data mining with in detail coverage of basic tasks, metrics, issues, and implication. Core topics like classification, clustering and association rules are exhaustively dealt with.

3. To introduce the concept of data warehousing with special emphasis on architecture and design.

UNIT - I:

Data Mining A First View: Data Mining Definition – Three Concept Views – Supervised Learning – Unsupervised Clustering – Data Mining Vs Data Query - An Example – Data Mining Vs Expert Systems – A simple Data Mining process Model - Data Mining Applications.

UNIT - II:

Data Mining A Closer Look: Data Mining Strategies – Supervised Data Mining Techniques – Association Rules – Clustering Techniques – Evaluating Performance.

UNIT - III:

Data Mining Techniques: Decision Trees – Generating Association Rules – The K-Means Algorithm – Genetic Learning – Choosing a Data Mining Technique.

UNIT - IV:

Knowledge Discovery in Databases: A KDD Process Model – Goal Identification – Creating a Target Dataset – Data Preprocessing – Data

Transformation – Data Mining – Interpretation and Evaluation – Taking Action - The CRISP-DM Process Model – Experimenting with ESX.

UNIT - V:

The Data Warehouse: Operational Databases – Data Warehouse Design – On-Line Analytical Processing – OLAP: An Example.   **Formal Evaluation Techniques:** Components for Supervised learning – Tools for Evaluation – Computing Test Set Confidence Intervals – Comparing Supervised Learner Models.

Text Book:

Michael W.Geatz, Richard J.Roiger , *Data Mining* , A Tutorial,Based Primer , Dorling Kindersley (India) Pvt. Ltd., New Delhi , First Edition , 2007.

Chapters:

Unit I	:	Chapter 1
Unit II	:	Chapter 2
Unit III	:	Chapter 3
Unit IV	:	Chapter 5
Unit V	:	Chapter 6 (6.1 – 6.3) & Chapter 7 (7.1 – 7.4)

Reference Books:

1) Alex Berson, Stephen Smith.J , *Data Warehousin ,* Data Mining & OLA, Tata Mc Graw Hill Education Pvt Ltd , New Delhi , Eighteenth reprint,2010.

2) Arun K.Pujari , *Data Mining Techniques* , Universities Press (India) Pvt Lt, Hyderabad , Second Edition , 2010.

3) Dennis Murray , Sam Anahory , *Data Warehousing in the Real World* , Dorling Kindersley (India) Pvt Ltd , New Delhi , Fifth Edition , 2009.

4) Gordon S.Linoff, Michael J.A.Berry , *Data Mining Techniques* , Wiley India Pvt ltd , NewDelhi , Second Edition , 2008.

5) Jiawei Han and Micheline Kamber , *Data Mining Concepts and Techniques* Elsevier India Pvt Ltd , Haryana , Second Edition (Fifth Reprint) , 2009.

6) Margaret H.Dunham , *Data Mining : Introductory and Advanced Topics* , Dorling Kindersley (India) Pvt. Ltd., New Delhi , Sixth Edition , 2009.

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(w.e.f.2017 – 2018 onwards)

Title of the Paper : **RDBMS Lab**
Semester : **II**   **Contact Hours : 5**
Sub Code : **17PI21P**   **Credits** : **4**

Query:

1. Data Definition Language

2. Data Manipulation Language

3. Simple Queries

4. Built-in-Queries

5. Constraints (Primary Key, Foreign Key)

6. Sub Queries

7. Joins

PL/SQL Programs:

(a) Program using conditional control, iterative control

8. Reverse of a given number

9. Odd Number generation

10. Electricity Bill Preparation

11. Employee details

12. Multiplication Table

13. Prime Number or Not

(b) Write a program using exceptional handling

14. Predefined Exception

15. User defined Exception

(c) Write a program for Cursor

      16. Implicit Cursor

      17. Explicit cursor

(d) Write a program to design procedures / functions

      18. Fibonacci Series

      19. Factorial

(e) Write a program using database triggers

      20. Trigger Deletion

      21. Trigger Updation

(f) Write a program to design Forms & Reports.

      22. Inventory Control

      23. Banking Process

      24. Invoice - Telephone

      25. Railway Reservations

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Title of the Paper : **Dynamic Web Programming Lab**
Semester : **II**   **Contact Hours : 5**
Sub Code : **17PI22P**   **Credits** : **4**

1. String Manipulation.

2. Math Operation.

3. Array Functions and Operations.

4. Looping Structures Utilization.

5. Page Hit Counter.

6. Input/output Operations.

7. Reading/Writing Files and Directories.

8. Events Calendar Application using PHP.

9. MySQL Connectivity and Database Manipulations.

10. Session Maintenance in PHP.

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Title of the Paper : Advanced Software Engineering

Semester	: III	Contact Hours: 5
Sub Code	: 17PI31	Credits :4

Objectives:

1. This course covers advanced theoretical concepts in software engineering and provides an extensive hands-on experience in dealing with various issues of software development.

2. The objective of this course is to teach students the methodology to design and test code.

3. The objective of this course is to expose the student to technical issues through a software development project.

Unit - I:

Software and Software Engineering: The Nature of Software – The unique Nature of WebApps – Software Engineering – The Software Process – Software Engineering Practice.

Process Models: A Generic Process Model – Process Assessment and Improvement – Prescriptive Process Models – Specialized Process Models – The Unified Process – Personal and Team Process Models – Process Technology – Product and Process.

Unit - II:

Requirements Modeling: Requirements Analysis – Scenario-Based Modeling – UML Models that Supplement the Use Case – Data Modeling Concepts – Class-Based Modeling – Requirements Modeling Strategies – Flow-Oriented Modeling – Creating a Behavioral Model – Patterns for Requirements Modeling – Requirements Modeling for WebApps.

Unit - III:

Software Quality Assurance: Issues – Elements of Software Quality Assurance – SQA tasks, Goals, Metrics – Formal Approaches to SQA – Statistical Software Quality Assurance – Software Reliability – The ISO 9000 Quality Standards – The SQA Plan.

Software Testing Strategies: A Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional Software – Test Strategies for Object-Oriented Software – Test Strategies for WebApps – Validation Testing – System Testing – The Art of Debugging.

Unit - IV:

Estimation for Software Projects: Observation on Estimation – The Project Planning Process Software Scope and Feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for Object-Oriented Projects – Specialized Estimation Techniques – The Make/Buy Decision. **Project Scheduling:** Basic Concepts – Project Scheduling – Defining a Task Set For the Software Project – Defining a Task Network – Scheduling – Earned Value Analysis.

Unit - V:

Software Process Improvement: SPI – The SPI Process – The CMMI The People CMM – Other SPI Frameworks – SPI Return on Investment – SPI Trends. **Emerging Trends in Software Engineering:** Technology Evolution – Observing Software Engineering Trends – Identifying "Soft Trends" – Technology Directions – Tools-Related Trends.

Text book:

Roger S. Pressman , *Software Engineering,* The Tata McGraw Hill, New York, Seventh Edition, 2010.

Chapters:

Unit I	-	Chapter 1, 2
Unit II	-	Chapter 6, 7
Unit III	-	Chapter 16, 17
Unit IV	-	Chapter 26, 27
Unit V	-	Chapter 30, 31

Reference books:

1. Jones & Bartlett , *Essentials of Software Engineering ,* Tata McGraw Hill, Delhi, First Indian Edition, 2010.

2. Pankajjalote , *Integrated approach to Software Engineering* , Tata McGraw Hill, New Delhi, Second Edition, 2009.

3. Richard Fairley , *Software Engineering Concepts* , McGraw Hill International Books Company, Delhi, First Edition, 1987.

4. Robert, *Facts & Fallacies of Software Engineering,* Pearson Education, New Delhi, Second Edition, 2007.

5. Summervill , *Software Engineering* , Pearson Education , New Delhi, Seventh Edition, 2008.

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(w.e.f.2017 – 2018 Batch onwards)

Title of the Paper : Advanced JAVA

Semester	**: III**	**Contact Hours : 5**	
Sub Code	**: 17PI32**	**Credits : 4**	

Objectives:

1. To enable the students to create web based applications using Applet and Graphics.

2. To develop the skills of programming in AWT, Event Handling and Networking Concepts.

3. To familiarize the java technologies of RMI, Servlet and EJB.

UNIT-I:

Introduction to Java: Introduction – History of Java – Features of Java – The difference between C++ and Java. **Applet:** Introduction to Applet - Applet life cycle- The Applet Tag-paint(),update(),and repaint()-setBackground() and setForeground()-Color constants-showStatus() - Passing parameters to Applets – FONT- getDocumentBase() and GetCodeBase()- Using images-Drawing image- Applet interfaces- Difference between Applet and Application Program – Converting Applet to Application.

UNIT –II:

Graphics: Introduction - Drawing lines – Drawing Rectangles – Drawing Ovals – Drawing Arcs – Drawing polygons – Drawing polyline Clipping.

AWT and Event Handling: Introduction – Component – Frame –The Button class - Layout Management – Insets – Canvas – Label - Text field –Text Area - Check Box - Check Box Group – Choice - List – Menu - Event handling - adapter class.

UNIT-III:

Networking : Introduction - TCP/IP -UDP/IP - Difference between TCP and UDP- IP Address –DNS – port – URL - chatting program using TCP/IP -Chatting Program using UDP/IP.

Remote Method Invocation(RMI): Introduction – comparison of Distributed and Non-Distributed java programs -RMI Packages - A simple Client/Server Application Using RMI - RMI Enhancements.

UNIT-IV:

Servlet: Introduction –Dynamic HTML –CGI SCRIPT - Java Servlet – Servlet Container -The Servlet Life Cycle - Servlet Interface - Generic Servlet class – HttpServlet class – HttpservletRequest Interface – Httpservletrespose Interface - getOutputstream method - SetHeader() method - parameter passing to servlet - More about Servlet trunner - Java Web Server - Cookies.

UNIT –V:

Java Beans: Introduction - Getting started for Beans - Using the BDK Demonstration Beans - saving and Restoring Beans - Building an Applet from BeanBox - Create your Own bean – InfoBus - Java Activation FrameWork(JAF) -The Extensive Runtime Containment and Service protocol - Enterprise JavaBeans(EJB) - Java OS - The JavaBean bridge for ActiveX - Other Bean Development Tools.

Text Book:

 Krishnamoorthy.R , Prabhu.S *Internet & Java Programming*, New Age International (P)
 Limited, New Delhi, First Edition, Reprint: 2007.

> **Chapters:**
>
> Unit I   : Chapters 3, 16
>
> Unit II   : Chapter 17, 19
>
> Unit III   : Chapters 18, 21
>
> Unit IV   : Chapter 22
>
> Unit V   : Chapter 24

Reference Books:

1. Balagurusamy.E, Programming with Java, Tata McGraw Hill Publishing, New Delhi, Twelth Reprint, 2009.

2. Harley Hahn, The Internet Complete Reference, Tata McGraw Hill Education Private Limited, New Delhi, Twenty first Reprint, 2011.

3. Herbert Schildt, The Complete Reference Java 2, Tata McGraw Hill Education Private Limited, New Delhi, Second Edition, 2002.

4. Jim Keogh , *The Complete Reference J2EE* , Tata McGraw Hill Education Private Limited, New Delhi, Twenty Sixth reprint , 2002

5. Phil Hanna, The Complete Reference JSP 2.0, Tata McGraw Hill Publishing, New Delhi, Ninth Reprint, 2003.

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(w.e.f.2017 – 2018 Batch onwards)

Title of the Paper : Computer Networks
Semester   : III   **Contact Hours:5**
Sub Code   : 17PIE3A   **Credits   :5**

Objectives:

1. Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers.

2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.

3. Have a knowledge of datagram and internet socket programming.

Unit - I:

Introduction: Uses of computer networks – Network Hardware – Network Software – Reference Models – A Comparison of the OSI and TCP/IP Reference Models – Example Networks – Network Standardization.

Unit - II:

The Physical Layer: The Theoretical Basis for Data Communication – Guided Transmission Media – Wireless Transmission – Communication Satellites – Digital Modulation and Multiplexing – The Public Switched telephone Network.

Unit - III:

The Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols.

The Medium Access Control: The Channel Allocation Problem – Multiple Access Protocols.

Unit - IV:

The Network layer: Network Layer Design Issues – Routing Algorithms.

The Transport Layer: The Transport Service – Elements of Transport Protocols.

Unit - V:

The Application Layer: The Domain Name System – Electronic Mail – The World Wide Web – Streaming Audio and Video

Text book:

Andrew S.Tanenbaum, David J. Wetherall , *Computer Network ,* Pearson Publications Private Limits , New Delhi , 5th Edition , 2013.

Chapters:

Unit I   : Chapter   1
Unit II : Chapter 2 (2.1 - 2.6)
Unit III : Chapters 3 (3.1, 3.2, 3.3, 3.4) , 4 (4.1, 4.2)
Unit IV : Chapters 5 (5.1, 5.2) , 6 (6.1, 6.2.)
Unit V : Chapter 7 (7.1- 7.4)

Reference books:

1. Barry Dumas.M, Morris Schwartz, *Principles of Computer Networks and Communications* , Pearson Education , New Delhi , Fourth edition , 2006.

2. Brijendra Singh , *Data communications and Computer Networks ,* PHI Learning Private Limited , New Delhi , Second Edition , 2009.

3. Behrouz A.Forouzan , *Data Communications and Networking ,* Tata McGraw Hill Publications , New Delhi , Second Edition , 2007 .

4. Fred Halsall , *Data Communications , Computer Networks and Open Systems,* Pearson Education., New Delhi , Fourth Edition , 2001.

5. William Stallings , *Data and Computer Communications ,* Pearson Education, New Delhi , Seventh Edition , 2004.

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DEPARTMENT OF INFORMATION TECHNOLOGY-PG
(w.e.f.2017 – 2018 Batch onwards)

Title of the Paper : Mobile Computing
Semester : III   **Contact Hours:5**
Sub Code : 17PIE3B   **Credits** :5

Objectives:

1. To impart fundamental concepts in the area of mobile computing.

2. This course covers the limitations of fixed networks, the need and the trend toward mobility.

3. Understand the concept of Wireless LANs, Mobile Networks and Sensor Networks.

Unit-I:

Mobility of Bits and Bytes-Wireless The beginning –Mobile computing –Dialogue Control-Networks-Middleware and Gateways-Applications and Services-Developing Mobile Computing Applications –Security in Mobile Computing-Standards –Standard Bodies-Players in the wireless space.

Mobile Computing Architecture: History of computers-History of Internet-Internet-The Ubiquitous Networks –Architecture for Mobile Computing –Three tier Architecture-Design consideration for mobile computing-Mobile computing through Internet-Making existing applications mobile enabled.

Unit–II:

Mobile computing through Telephony-Evolution of Telephony-Multiple Access Procedures- Satellite Communication System-Mobile computing through telephone-Developing an IVR Application-Voice XML-Telephony Application Programming Interface.

Emerging Technologies: Introduction–Bluetooth-Radio Frequency Identification(RFID)-Wireless broadband(WIMAX)-Mobile IP-Internet Protocol Version6(IPV6)-Java Card.

Unit-III:

Global System for mobile Communication-Global System for Mobile Communications-GSM Architecture- GSM Entities –Call routing in GSM-PLMN interfaces-GSM address and Identifiers-Network aspects in GSM –GSM Frequency Allocation-Personal Communication Service-Authentication and Security.

Unit-IV:

Wireless Application Protocol –Introduction- WAP- MMS - GPRS applications –**CDMA and 3G**: Introduction-Spread Spectrum technology –Is 95-CDMA versus GSM- Wireless Data-Third Generation Networks-Applications on 3G.

Unit-V:

Wireless LAN: Introduction-Wireless LAN advantages-IEEE 802.11 standards –wireless LAN architecture –mobility in wireless LAN-deploying wireless LAN-Mobile adhoc Networks and sensor Networks-wireless LAN security-Wireless Access in Vehicular Environment-Wireless Local Loop- HiperLAN- WiFi versus 3G.

Intelligent Networks and Interworking: Introduction- Fundamentals of call processing – Intelligence in the networks –SS#7 signaling –IN Conceptual Model-Soft switch - Programmable networks-Technologies and Interfaces for IN-SS7 Security-MAPSec-Virtual Private Network(VPN).

Text book:

Asoke K Talukder, Roopa R Yavagal, *Mobile Computing Technology applications and Service creation*, TMH publishing company, New Delhi, Second Edition , 2012.

Chapters:

Unit I   : Chapters 1, 2

Unit II : Chapters 3, 4

Unit III : Chapter 5

Unit IV : Chapters 8, 9

Unit V : Chapters 10,11

Reference books:

1. Amjad Umar , *Mobile Computing and Wireless Communications* , NGS solutions , Chennai , First Edition, 2004.

2. Behera G.K, Pamudra Das.L.O , *Mobile Communication*, Scitech Publication of india, Chennai, First Edition , 2009.

3. Frank Adelestein, Sandeep K.S.Gupta, Golden G.Richard III, Loren Schwiebert, *Fundamentals of Mobile and Pervasive Computing*, Tata MCGraw Hill Publishing Limited , New York , Fourth Edition , 2005.

4. Jochen Schiller, *Mobile Communication*,   Dorling Kindersley of India Pearson Education, South Asia , Second Edition , 2003.

5. Tomasz Imielinski, Henry F. Korth, *Mobile Computing*, Kluwer Academic Publishers, New Delhi, First Edition, 1996.

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Title of the Paper   **: Artificial Intelligence**
Semester   **: III**   **Contact Hours :5**
Sub Code   **: 17PIE3C**   **Credits**   **:5**

Objectives:

1. The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches.

2. Develop a basic understanding of the building blocks of AI as presented in terms of Knowledge representation, inference, logic, and learning.

3. To familiarize with matching Techniques and Fuzzy Logic Techniques.

UNIT-I:

Overview of Artificial Intelligence:

Introduction of AI - The Importance of AI - Early work in AI - AI and Related Fields.

Knowledge: General Concepts: Introduction -Definition and Importance of Knowledge - Knowledge-Based Systems - Representation of Knowledge - Knowledge Organization - Knowledge Manipulation - Acquisition of Knowledge.

UNIT-II:

Lisp and other AI Programming Languages:

Introduction to LISP: Syntax and Numeric Functions - Basic List Manipulation Functions in LISP - Functions – Predicates and Conditionals – Input – Output - and Local Variables - Iteration and Recursion - Property Lists and Arrays - Miscellaneous Topics - PROLOG and Other AI Programming Languages. **Formalized Symbolic Logics:** Introduction - Syntax and Semantics for Propositional Logic - Syntax and Semantics for FOPL, Properties fo Wffs - Conversion to Clausal Form - Inference Rules - The Resolution Principle - Nondeductive Inference Methods - Representations Using Rules.

UNIT-III:

Dealing with Inconsistencies and Uncertainties:

Introduction -Truth Maintenance Systems - Default Reasoning and the Closed World Assumption - Predicate Completion and Circumscription - Modal and Temporal Logics - Fuzzy Logic and Natural Language Computations. **Probabilistic Reasoning:** Introduction - Bayesian Probabilistic Inference - Possible World Representations - Dempster-Shafer Theory -Ad-Hoc Methods - Heuristic Reasoning Methods.

UNIT-IV:

Object-Oriented Representations:

Introduction -Overview of Objects-Oriented Systems – Objects – Classes – Messages - and Methods - Simulation Example Using an OOS program -Object Oriented Languages and Systems. **Search And Control Strategies:** Introduction - Preliminary Concepts - Example of search Problems -Uniformed or Blind Search - Informed Search - Searching And - Or Graphs.

UNIT-V:

Matching Techniques:

Introduction - structures Used in Matching - Measures for Matching - Matching Like Patterns - Partial Matching - Fuzzy Matching Algorithms - The RETE Matching Algorithm. **Knowledge Organization And Management:** Introduction - Indexing and Retrieval Techniques - Integrating Knowledge in Memory - Memory Organization Systems.

Text Book:

Dan W.Patterson, *Introduction to Artificial Intelligence And Expert Systems*, Prentice –Hall of India (P) Limited, New Delhi, Original U.S Edition, 2003.

Chapters:

Unit I	: Chapters 1, 2
Unit II	: Chapters 3, 4
Unit III	: Chapters 5, 6
Unit IV	: Chapters 8, 9
Unit V	: Chapters 10, 11

Reference Books:

1. Elaine Rich and Kevin Knight, *Artificial Intelligence*, Tata McGraw Hill Edition , New Delhi, Thirty Seventh Reprint , 2004

2. Patrick Henry Winston, *Artificial Intelligence,* Pearson Education*,* New Delhi, Seventh Reprint , 2005 .

3. Philip C. Jackson, *Introduction to Artificial Intelligence,* Dover Publications, New York, Second Edition, 2013.

4. Stuart Russell and Peter Norvig, *Artificial Intelligence to Modern approach,* Pearson Education, New Delhi, Third Edition, 2010.

5. Winny Henry*, Artificial Intelligence,* Tata McGraw Hill Edition, New Delhi, Second Edition, 2003.

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DEPARTMENT OF INFORMATION TECHNOLOGY-PG

(w.e.f.2017 – 2018 Batch onwards)

Title of the Paper	**: Big Data Analytics**	
Semester	**: III**	**Contact Hours : 5**
Subject Code	**: 17PIE3D**	**Credits : 5**

Objectives:

1. This course covers the current developments in the field of big data analytics.

2. To equip the students on Big Data Technologies of Managing Resources and applications with Hadoop, MapReduce and Hive.

3. Aims to provide a platform for the future trends in emerging discipline of big data analytics.

UNIT - I:

Introduction to Big Data: Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data-Evolution of Big data-Challenges of Big data-Other Characteristics of Data which are not Definitional Traits of Big Data- Why Big Data-Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment.

UNIT- II:

Analytics Basics: Big Data Analytics: Introduction – Big Data Analytics – Sudden Hype Around Big Data Analytics – Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – Importance of Big Data Analytics – Various kinds of Technologies to meet the Challenges Posed by Big Data – Data Science – Terminologies Used in Big Data Environments.

UNIT- III:

Big Data Technologies: The Big Data Technology Landscape: NoSQL (Not Only SQL) – Hadoop, Introduction to Hadoop: Introducing Hadoop – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of

Hadoop – Hadoop Distributors – HDFS(Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop.

UNIT- IV:

Introduction to MAP REDUCE Programming: Introduction – Mapper – Reducer – Combiner– Partitioner – Searching – Sorting – Compression.

UNIT- V :

Introduction to Hive: What is Hive – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) – RCFile Implementation – SerDe – User – Defined Function (UDF).

Text Book:

Seema Acharya, Subhashini Chellappan, *Big Data and Analytics*, Wiley India Pvt.Ltd, Noida, First Edition, 2015.

Chapters:

Unit I   : Chapters 1, 2
Unit II   : Chapter 3
Unit III   : Chapters 4, 5
Unit IV   : Chapter 8.
Unit V   : Chapter 9.

Reference Books:

1. Bart Baesens, *Analytics   in a Big Data World,* Wiley India Pvt.Ltd, New Delhi, 2015.

2. DT Editorial Services, *Black Book- Big Data*, Dream Tech Press Edition ,New Delhi, Reprint, 2016.

3. Nathan Marz, and James Warren, *Big Data – Principles and best practices of scalable real-time data systems,* Manning Publication cp., USA, Second Edition, 2015.

4. Radha Shankarmani, M Vijayalakshmi,   *Big Data Analytics*, Wiley Publications, Noida, First Edition, 2016.

5. Vignesh Prajapati, *Data analytics with R and Hadoop*, Packt Publishing, Mumbai, Second Edition, 2013.

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Title of the Paper : **Cyber Security**
Semester : III   **Contact Hours : 5**
Sub Code : **17PIE3E**   **Credits** : 5

Objectives:

1. Have knowledge of the use of cryptography and network security.

2. Basic issues to be addressed by a network security capability are explored through this course.

3. Develop an understanding of organizational security policies such as authentication, Reliability and Integrity.

UNIT- I:

Cryptography: Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – The Uses of Encryption.

UNIT- II:

Program Security: Secure programs – Non-malicious Program Errors – Viruses and other Malicious Code – Targeted Malicious code – Controls Against Program Threat. Protection in General-Purpose Operating System: Protected Objects and Methods of Address Protection – Control of Access to General Objects – File Protection Mechanisms - User Authentication.

UNIT- III:

Database and Data Mining Security: Introduction to Databases – Security Requirements – Reliability and Integrity – Sensitive Data – Inference – Multilevel Databases – Proposals for Multilevel Security – Data Mining.

UNIT- IV:

Security in Networks : Threats in networks – Network Security Controls – Firewalls – Intrusion Detection Systems – Secure e-mail.

UNIT- V:

Administering Security: Security Planning – Risk Analysis – Organizational Security Policies – Physical Security.

Text Book:

Charles P. Pfleeger, Shari Lawrence Pfleeger, *Security in Computing*, Pearson Education, New Delhi, Third Edition, 2011.

Chapters:

Unit I   : Chapter 2
Unit II   : Chapters 3, 4
Unit III : Chapter 6
Unit IV   : Chapter 7
Unit V   : Chapter 8

Reference Books:

1. Mao.W, *Modern Cryptography – Theory and Practice*, Pearson Education, New Delhi, Second Edition, 2007.

2. Michael Whitman, Herbert J. Mattord, *Management of Information Security*, Course Technology, Boston US, Third Edition, 2010.

3. MY Rhee, *Network Security*, John Wiley and Sons, New York, Second Edition, 2002.

4. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with coding,*   Pearson Publication, New Delhi, Second Edition, 2007.

5. William Stallings, *Cryptography and Network security: Principles and Practices*, PHI Publication, New Delhi, Fifth Edition, 2010.

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Title of the Paper : Pattern Recognition
Semester : III   Contact Hours : 5
Subject Code : 17PIE3F   Credits   : 5

Objectives:

1. To provide students with necessary theory and skills for automatic analysis of digital images.

2. This course focuses on the underlying principles of pattern recognition and on the methods of machine intelligence used to develop and deploy pattern recognition applications in the real world.

3. Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.

UNIT - I:

Pattern Classifier : Introduction - Data Sets for Pattern Recognition - Different Paradigms for Pattern Recognition - Representation -Data Structures for Pattern Representation - patterns as Vectors- Patterns as Strings - Logical Descriptions - Fuzzy and Rough Pattern Sets - Patterns as Trees and Graphs - Representation of Clusters.

UNIT- II:

Proximity Measures – Distance Measure - Weighted Distance Measure - Non-Metric Similarity Function - Edit Distance -Mutual Neighbourhood Distance (MND) - Conceptual Cohesiveness - Kernel Functions - Size of Patterns - Normalisation of Data -Use of Appropriate Similarity Measures - Abstractions of the Data Set.

UNIT- III:

Hidden Markov Models And Support Vector Machine: Markov Models for Classification - Hidden Markov Models - HMM Parameters - Learning HMMs - Classification Using HMMs - Classification of Test Patterns.

UNIT - IV:

Linear Discriminant Functions - Learning the Linear Discriminant Function - Learning the Weight Vector - Multi-class Problems - Generality of Linear Discriminates - SVM for Classification - Linearly Separable Case - Non-linearly Separable Case.

UNIT - V:

Clustering : Introduction to Clustering- Hierarchical Algorithms - Divisive Clustering - Agglomerative Clustering - Partitioned Clustering - k-Means Algorithm - Soft Partitioning- Clustering Large Data Sets - Possible Solutions - Incremental Clustering - Divide-and-Conquer Approach.

Text Book:

Narasimha Murthy.M, Susheela Devi.V, *Pattern Recognition,* Springer Publication, New Delhi, 2011.

Chapters:

UNIT I   : Chapter 1
UNIT II : Chapter 2
UNIT III : Chapter 5
UNIT IV : Chapter 7
UNIT V : Chapter 9

Reference Books:

1. Andrew Webb, *Statistical Pattern Recognition*, Arnold publishers, London, 1999.

2. Bishop C.M, *Pattern Recognition and Machine Learning,* Springer Publication, Newdelhi, Third Edition, 2006.

3. Duda R.O, Hart P.E, Stork D.G, *John Wiley Pattern Classification* , Tata McGraw Publication, New Delhi, Second Edition, 2001.

4. Roberti Schalkoff.J, *Pattern Recognition Statistical,* John Wiley & Sons Inc, NewYork, 1992.

5. Theodoridis. S, Koutroumbas .K, *Pattern Recognition*, Academic Press, Forth Edition, 2009.

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Title of the Paper : **Advanced JAVA Lab**
Semester : **III**   **Contact Hours : 5**
Sub Code : **17PI31P**   **Credits** : **4**

APPLICATION PROGRAMS:
1. Program for Overriding
2. Multiple Inheritance using Interface
3. Program for Package Implementation
4. Program for Multithreading
5. Merging of two files
6. Client / Server Network Program

APPLET PROGRAMS:
7. Login Authentication
8. Marquee of Text
9. Program for Mouse Event
10. Image Animation
11. To design a Component (LIST BOX, COMBO BOX,CHECK BOX)
12. Menu Bar Creation
13. Application form Designing

DATABASE CONNECTIVITY:
14. To create a Table in Oracle Using JDBC
15. Insertion of Records into a Table
16. Select Records from Oracle Table
17. Update /Delete Records into a Table

JAVA BEANS:
18. Text Area using Bean
19. To draw a Circle
20. Display clock using Bean

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Title of the Paper   : Web Technology Lab
Semester   : III   **Contact Hours: 5**
Sub Code   : 17PI32P   **Credits   : 4**

SIMPLE WEB APPLICATIONS
1. Finding the Factorial Value
2. Finding Armstrong Number
3. Quadratic Equation
4. Temperature Conversion
5. Login Authentication
6. Mathematical Calculation
7. Employee Pay Bill Calculation
8. Electricity Bill Calculation

USING WEB CONTROLS
9. Display States Of Asp.Net Page
10. Display Vacation in a Calendar Control
11. Difference between two Dates Using Calendar Control
12. Validation Control
13. Tree view operation using data list.
14. Tree view operation.

USING DATABASE CONNECTION
15. Data Binding Using Drop Down List Control
16. Create, Insert and Delete the data in to database using Execute non-query.
17. Student Mark list Using Database Connection
18. Creation Of Web Application

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Title of the Paper   : Project – Viva Voce
Semester   : IV   Duration : Six Months
Sub Code   : 17PIPR4   Credits   : 12

Objectives:

1. The aim of the Project work is to acquire practical knowledge on the implementation of the programming concepts studied.

2. Each student should carry out individually one Project Work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea.

* Exam will be conducted as follows

- Viva-voce will be conducted at the end of IV semester for 100 marks.

- Both the Internal (Respective Guides) and External Examiners (20+80) should conduct the Viva-Voce Examination.

- For awarding a pass, a candidate should have obtained 50% of the Total 100 marks.