PMA16108 MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS 3 2 0 4

COURSE OBJECTIVES

To enable the students to

- understand the concepts and operations of matrix algebra needed for computing graphics modelling
- understand and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science
- make the students to think logically and mathematically and apply these techniques in solving problems
- impart discrete knowledge in computer engineering through finite automata
- impart discrete knowledge in computer engineering through Context free Grammars

UNIT I MATRIX ALGEBRA 15

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors-Inverse of a Matrix - Cayley Hamilton Theorem

UNIT II BASIC SET THEORY 15

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations- Properties of relations - Matrices of relations - Closure operations on relations - Functions - injective, subjective and objective functions.

UNIT III MATHEMATICAL LOGIC 15

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus - Predicate calculus.

UNIT IV FORMAL LANGUAGES 15

Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma for Regular Languages-Context Free Languages.

UNIT V FINITE STATE AUTOMATA 15

Finite State Automata-Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA)- Equivalence of DFA and NFA-Equivalence of NFA and Regular Languages

TOTAL PERIODS 45+30 75

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems
- perform the knowledge of logical operations and predicate calculus needed for computing skill
- design and solve Boolean functions for defined problems
- apply the acquired knowledge of formal languages to the engineering areas like compiler design
- apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers

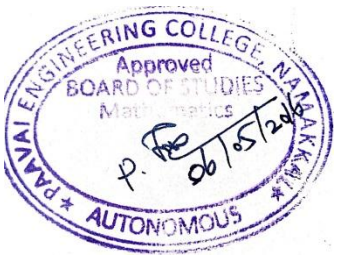
REFERENCES

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Tata McGraw-Hill, 5th Reprint 2013.
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2012.
3. Trembly J.P and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill, 35th Reprint 2013.
4. Sakthivel" Mathematical Foundations Of Computer Science" A.R.S Publications First Edition 2012.
5. A.Tamilarasi & A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, 2nd Edition 2014.

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3



CA16101 COMPUTER ORGANIZATION 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- impart the knowledge in the field of digital electronics
- impart knowledge about the various components of a computer and its internals
- design and realize the functionality of the computer hardware with basic gate
- design other components using combinational and sequential logic
- understand the importance of the hardware-software interface

UNIT I DIGITAL FUNDAMENTALS 9

Number Systems and Conversions – Boolean Algebra and Simplification – Minimization of Boolean Functions – Karnaugh Map, Logic Gates – NAND – NOR Implementation

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS 9

Design of Combinational Circuits – Adder / Subtracter – Encoder – Decoder – MUX / DEMUX – Comparators, Flip Flops – Triggering **–** Master – Slave Flip Flop – State Diagram and Minimization –Counters – Registers.

UNIT III BASIC STRUCTURE OF COMPUTERS & PARALLEL PROCESSING 9

Functional units – Basic operational concepts – Bus structures – Performance and Metrics – Instruction and instruction sequencing – Addressing modes – ALU design – Fixed point and Floating point operation.

UNIT IV PROCESSOR DESIGN 9

Processor basics – CPU Organization – Data path design – Control design – Basic concepts – Hard wired control – Micro programmed control – Pipeline control – Hazards – Super scalar operation.

UNIT V MEMORY, I/O SYSTEM AND PARALLEL PROCESSING 9

Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input/output system – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces - Multiprocessor Organization – Symmetric multiprocessors – Cache Coherence – Clusters: Non Uniform Memory Access - Vector Computation.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- design digital circuits by simplifying the Boolean functions
- understand the organization and working principle of computer hardware components
- acquire knowledge about multiprocessor organization and parallel processing
- trace the execution sequence of an instruction through the processor
- design digital circuits by simplifying the Boolean functions

REFERENCES

1. Morris Mano, “Digital Design”, Prentice Hall of India, Fourth Edition 2012.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer organization and Embedded Systems”, Sixth Edition, Tata McGraw Hill, 2012.
3. William Stallings, “Computer Organization & Architecture – Designing for Performance” 9th Edition 2013.
4. Charles H. Roth, Jr., “Fundamentals of Logic Design”, Jaico Publishing House, Mumbai, Fourth Edition, 2013.
5. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Fourth Edition, Morgan Kaufmann / Elsevier, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	1	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	2	-	-	-	2	-	-	-	3	2	3

CA16102 PROBLEM SOLVING TECHNIQUES 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- impart the knowledge in the field of digital electronics
- impart knowledge about the various components of a computer and its internals
- design other components using combinational and sequential logic
- understand the importance of the hardware-software interface
- impart the knowledge in the field of digital electronics

UNIT I DIGITAL FUNDAMENTALS 9

Number Systems and Conversions – Boolean Algebra and Simplification – Minimization of Boolean Functions – Karnaugh Map, Logic Gates – NAND – NOR Implementation

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS 9

Design of Combinational Circuits – Adder / Subtracter – Encoder – Decoder – MUX / DEMUX – Comparators Flops – Triggering **–** Master – Slave Flip Flop – State Diagram and Minimization –Counters – Registers.

UNIT III BASIC STRUCTURE OF COMPUTERS & PARALLEL PROCESSING 9

Functional units – Basic operational concepts – Bus structures – Performance and Metrics – Instruction and instruction sequencing – Addressing modes – ALU design – Fixed point and Floating point operation.

UNIT IV PROCESSOR DESIGN 9

Processor basics – CPU Organization – Data path design – Control design – Basic concepts – Hard wired control – Micro programmed control – Pipeline control – Hazards – Super scalar operation.

UNIT V MEMORY, I/O SYSTEM AND PARALLEL PROCESSING 9

Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input/output system – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces – Multiprocessor Organization – Symmetric multiprocessors – Cache Coherence – Clusters: Non Uniform Memory Access - Vector Computation.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- design digital circuits by simplifying the Boolean functions
- understand the organization and working principle of computer hardware components
- understand mapping between virtual and physical memory
- acquire knowledge about multiprocessor organization and parallel processing
- trace the execution sequence of an instruction through the processor

REFERENCES

1. Morris Mano, "Digital Design", Prentice Hall of India, Fourth Edition 2012.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Computer organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.
3. William Stallings, "Computer Organization & Architecture – Designing for Performance" 9th Edition 2013.
4. Charles H. Roth, Jr., "Fundamentals of Logic Design", Jaico Publishing House, Mumbai, Fourth Edition, 2013.
5. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Fourth Edition, Morgan Kaufmann / Elsevier, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	1	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	2
CO4	2	1	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	2	-	-	-	2	-	-	-	2	2	3

CA16103 **PROGRAMMING IN C** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand the fundamentals of basic programming concept
- know about data storage techniques a query processing
- understand the fundamentals of structures
- understand the fundamentals of file management systems
- understand the fundamentals of basic programming concept

UNIT I INTRODUCTION TO C LANGUAGE 9

Overview of 'C' language - Constants, Variables and Data Types - Operators, Expressions and Assignment statements - Managing Input/Output Operations - Formatted I/O - Decision Making - Branching - IF, Nested IF - Switch – go to - Looping- While, do, for statements.

UNIT II ARRAYS AND FUNCTIONS 9

Arrays - dynamic and multi-dimensional arrays - Character arrays and Strings - String handling Functions – User defined Functions - Categories of Functions - Recursion.

UNIT III STRUCTURES AND UNIONS 9

Basics of Structures-Declaring a Structure - Array of Structures -Passing Structures elements to Functions- Passing entire Structure to Function - Structures within Structures - Union - Union of Structures - Enumerated Data Types – typedef Statement.

UNIT IV POINTERS 9

Pointers - Declaration, Accessing a variable, dynamic memory allocation, Pointers versus Arrays, Array of pointers, Pointers to functions and structure Pointers.

UNIT V FILE MANAGEMENT 9

File Management in C - Data hierarchy- Files and Streams - Sequential access file- Random access file - Preprocessors

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the basic concepts of the programs
- design a program using C functions and structures
- acquire the knowledge of pointer to monitor the performance of the C language
- develop a simple applications using file manipulation
- develop a simple applications using structures

REFERENCES

1. Byron C Gottried, “Programming with C”, Schuams outline series, 2nd edition, Tata McGraw Hill, 2013.
2. Yashavant P. Kanetkar “Understanding Pointers In C” , BPB Publications, New Delhi, 2012.
3. Reema Thareja, “Programming in C”, Oxford University Press, 2012.
4. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, Delhi 2013.
5. E. Balagurusamy “ Programming in ANSI C ” , Tata McGraw Hill, 2013.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	1	3	2	2	-	-	-	-		2	1	2	1
CO4	1	2	3	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	2	2	-	-	-	2	-	-	-	2	1	3

CA16104 DATA STRUCTURES AND ALGORITHMS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the linear and non linear data structures available in solving problems
- know about the sorting and searching techniques and its efficiencies
- get a clear idea about the various algorithm design techniques
- using the data structures and algorithms in real time applications
- analyze the efficiency of algorithm

UNIT I LINEAR DATA STRUCTURES 9

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures – Stack – Queue – Circular Queue - Applications of stack – Infix to postfix conversion – evaluation of expression – Applications of Queue - Linked Lists – Doubly Linked lists – Applications of linked list – Polynomial Addition

UNIT II TREE STRUCTURES 9

Need for non-linear structures – Trees and its representation – Binary Tree – expression trees – Binary tree Traversals – left child right sibling data structures for general trees – applications of trees – Huffman Algorithm - Binary search tree.

UNIT III BALANCED SEARCH TREES, SORTING AND INDEXING 9

AVL trees–B-Trees-Sorting–Bubble sort - Quick Sort - Insertion Sort – Heap sort – Hashing - Hashing functions- Collision Resolution Techniques - Separate chaining - Open addressing - Multiple hashing.

UNIT IV GRAPHS 9

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

UNIT V ALGORITHM DESIGN AND ANALYSIS 9

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Warshall's Algorithm for Finding Transitive Closure – Backtracking – Sum of Subset Problem – Branch and Bound – Travelling Salesman Problem.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- select and apply the data structure to suit any given problem
- design their own data structure according to the application need
- apply the algorithm design techniques to any of the real world problem
- develop any new application with the help of data structures and algorithms
- write efficient algorithm for a given problem and able to analyze its time complexity

REFERENCES

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education Asia, 2013.
2. Tanaenbaum A.S.,Langram Y. Augestein M.J “ Data Structures using C” Pearson Education , 2012
3. Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education 2013.
4. E. Horowitz, S.Sahni and Dinesh Mehta, “Fundamentals of Data structures in C++”, University Press, 2013.
5. Reema Thareja, “Data Structures using C”, Oxford Press, 2012.

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	1	2	2	-	-	-	-		2	2	2	2
CO4	2	1	2	2	-	-	-	1	-	-	-	-	2	2
CO5	1	1	3	2	-	-	-	2	-	-	-	1	1	3

CA16105 PROGRAMMING IN C LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- understand the fundamentals of structures.
- understand the fundamentals of file management systems.

1. Display the following:
   (i) Floyd's triangle (ii) Pascal Triangle
2. Generate the following series of numbers:
   (i) Armstrong numbers between 1 to 100
   (ii) Prime numbers between 1 to 50
   (iii) Fibonacci series up to N numbers
3. Manipulate the strings with following operations.
   (i) Concatenating two strings
   (ii) Reversing the string
   (iii) Finding the substring
   (iv) Replacing a string
   (v) Finding length of the string
4. Find the summation of the following series:
   (i) Sine (ii) Cosine (iii) Exponential
5. Simulate following Banking operations using functions.
   (i) Deposit (ii) Withdrawal (iii) Balance Enquiry
6. Implement using recursion
   (i) Fibonacci number generation. (ii) Factorial
7. Generate Student mark sheets using structures.
8. Create a collection of books using arrays of structures and do the following:
   (i) Search a book with title and author name (ii) Sorts the books on title.
9. Perform string operations using pointers.
10. Program to implement dynamic memory allocation. Creating, Reading and displaying a sequential and random access file.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the basic concepts of the programs
- design a program using C functions and structures

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2

CA16106 DATA STRUCTURES AND ALGORITHMS LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- using the data structures and algorithms in real time applications
- able to analyze the efficiency of algorithm

1. Polynomial Addition using array
2. Array implementation of stack
3. Array implementation of Queue
4. Infix to postfix conversion
5. Singly Linked List operations
6. Binary tree traversals
7. Quick sort
8. Dictionary application using any of the data structure
9. Find the Shortest Path using Dijkstra's Algorithm – Greedy method
10. Warshall's Algorithm for finding transitive closure using Dynamic programming
11. Sum of subset problem using backtracking

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- develop any new application with the help of data structures and algorithms
- write efficient algorithm for a given problem and able to analyze its time complexity to apply

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO2	1	2	3	3	2	-	-	-	-	-	-	2	2	1

CA16107 **OFFICE AUTOMATION LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- understand MS-Office concept
- get a clear idea about the various design techniques

MS-WORD

1. Text Manipulations
2. Usage of Numbering, Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Text Formatting
5. Picture Insertion and Alignment
6. Creation of Documents Using Templates
7. Creation of Templates
8. Mail Merge Concept
9. Copying Text and Picture From Excel
10. Creation of Tables, Formatting Tables
11. Splitting the Screen
12. Opening Multiple Document, Inserting Symbols in Documents

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Aligning, Editing Data in Cell
3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions)
4. Changing of Column Width and Row Height (Column and Range of Column)
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Formatting Numbers and Other Numeric Formats
7. Drawing Borders around Cells 8. Creation of Charts Raising Moving
8. Changing Chart Type
9. Controlling the Appearance of a Chart

MS-POWER POINT (Working With Slides)

1. Creating, saving, closing presentation
2. Adding Headers and footers
3. Changing slide layout
4. Working fonts and bullets
5. Inserting Clipart
6. Run and Slide Show

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- design own data according to the application need
- develop any new document with the help of MS office

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2

CA16201 OBJECT ORIENTED PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
- understand and apply the principles hiding, localization and modularity in software development
- use the generic programming features of C++ including the STL
- design and implement reliable and maintainable object-oriented applications
- design and moderate complexity composed of several classes

UNIT I FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 9

Object Oriented Programming concepts – Encapsulation – Programming Elements – Program Structure – Enumeration Types –– Functions and Pointers – Function Invocation – Overloading Functions – Scope and Storage Class – Pointer Types – Arrays and Pointers – Call–by–Reference – Assertions – Standard template library.

UNIT II IMPLEMENTING ADTS AND ENCAPSULATION 9

Aggregate Type struct–Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

UNIT III POLYMORPHISM 9

ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading – Function Selection – Pointer Operators – Visitation – Iterators – containers – Sequence Containers - List – List Iterators – Associative Containers.

UNIT IV TEMPLATESAND FILE HANDLING 9

Template Class–Function Templates – RTTI Templates - Class Templates – Parameterizing – STL – Algorithms – Function Adaptors – Streams and Formatted I/O – I/O Manipulations -File handling – Random Access

UNIT V INHERITANCE 9

Derived Class– Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand and design the solution to a problem using object-oriented programming concepts
- use proper class protection mechanism to provide security
- demonstrate the use of virtual functions to implement polymorphism
- understand and implement the features of C++ including templates, exceptions and file handling
- reuse the code with extensible Class types, User-defined operators and function overloading

REFERENCES

1. Bhushan Trivedi, “Programming with ANSI C++”, Oxford Press, Second Edition, 2012.
2. HM Deitel and PJ Deitel “C++ How to Program”, Seventh Edition, 2013, Prentice Hall
3. Ira Pohl, “Object–Oriented Programming Using C++”, Pearson Education, 2 Edition, 2013.
1. E Balagurusamy, “Object Oriented Programming with C++”, 3 edition, 2012, Tata McGraw Hill
5. Stanley B.Lippman, Josee Lajoie, “C++ Primer”, Pearson Education, Third Edition, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
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CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2

CA16202 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the fundamentals of data models and conceptualize and depict a database system
- understand the fundamentals of ER diagram
- make a study of SQL and relational database design
- know about data storage techniques an query processing
- impart knowledge in transaction processing, concurrency

UNIT I INTRODUCTION 9

File systems versus Database systems–Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNIT II RELATIONAL MODEL AND QUERY EVALUATION 9

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – overview of commercial RDBMSs – Database Design – Functional Dependencies – Normal Forms – 1NF – 2NF-3NF-BCNF – 4NF-5NF - Algorithms for Executing Query Operations — Cost Estimation

UNIT III TRANSACTION PROCESSING 9

Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL – Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow paging–Log Based Recovery–Database Security Issues– Access control – Statistical Database Security

UNIT IV FILES AND INDEXING 9

File operations–Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing - Indexes on Multiple Keys.

UNIT V SPECIAL PURPOSE DATABASES 9

OODBMS - Object-Based Databases - OO Data Model - OO Languages – Persistence – Object Relational Databases - Temporal Databases – Mobile Databases – Spatial Databases – Case Study for Design and Manage the Database for any Project

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the basic concepts of the database and data models
- design a database using ER diagrams and map ER into Relations and normalize the relations
- acquire the knowledge of query evaluation to monitor the performance of the DBMS
- develop a simple database applications using normalization
- acquire the knowledge about different special purpose databases and to critique how they differ from traditional database systems

REFERENCES

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2012.
2. C.J. Date, "An Introduction to Database Systems", Eight Editions, Pearson Education Delhi, 2013.
3. Ramez Elamassri and Shankant B-Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education Delhi, 2013.
4. Raghu Ramakrishnan, Johannes Gehrke, "Database management systems" McGraw Hill, 2013.
5. Peter Rob, Carlos Coronel, "Database System Concepts", Cengage Learning, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	2	2	-	-	-	-	-	-	-	1	1	2
CO2	2	2	2	2	2	-	-	-	-	-	-	2	2	2
CO3	2	3	1	2	3	-	-	-	-		2	2	1	1
CO4	1	1	1	2	-	-	-	2	-	-	-	-	1	2
CO5	1	2	2	2	-	-	-	2	-	-	-	2	2	2

CA16203 **SYSTEM SOFTWARE** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand the relationship between system software and machine architecture
- understand the design and implementation of assemblers, linkers and loaders
- understand the design, function and implementation of assemblers, linkers and loaders
- have an understanding of macro processors
- have an understanding of system software tools

UNIT I BASICS OF SYSTEM SOFTWARE AND ASSEMBLER 9

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

UNIT II COMPILER- LEXICAL ANALYSIS, SYNTAX ANALYSIS 9

Phases of compiler-Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Finite Automata, Designing a lexical analyzer generator, Pattern matching based on NFA's. Syntax Analysis: Role of Parser, Top-down parsing, recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.

UNIT III COMPILER CODE GENERATION, OPTIMIZATION 9

Intermediate languages: graphical representations, DAGs, Three address code, types of three address statements, syntax directed translation into three address code, implementation of three address statements-Code Optimization: Machine dependent and machine independent code generation: Sources of optimization-Code Generation-Semantic stacks, evaluation of expressions, control structures, and procedure calls.

UNIT IV LOADERS AND LINKERS 9

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

UNIT V MACRO PROCESSORS & OTHER SYSTEM SOFTWARE 9

Basic macro processor functions – Macro Definition and Expansion – Macro Processor Algorithm and data structures – Implementation examples: MASM Macro Processor- Text editors – Overview of Editing Process - User Interface – Editor Structure – Interactive Debugging Systems – Debugging functions and capabilities – Relationships with Other parts of the system – User Interface Criteria -Virtual Machines

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- trace the path of a source code to object code and the to executable file
- design the front end of the compiler-scanner, parser
- understand and identify the relationship between system software and machine architecture
- analyze the functions of assembler, compiler, linker, and loaders
- know the design and implementation of loaders and linkers

REFERENCES

1. Leland Beck, “System Software – An Introduction to Systems Programming”, Third Edition, Pearson Education, Inc., 2013
2. A.V. Aho, R. Shethi and Ulman; Compilers - Principles, Techniques and Tools, Second Edition, Pearson Education, 2012.
3. D. M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw Hill Company, Second Edition, 2013.
4. John J. Donovan, “Systems Programming”, Tata McGraw Hill Company, Second Edition, 2013.
5. V. Raghavan, “Principles of Compiler Design”, Tata McGrawHill Education Publishers, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	1	2	1	2	-	-	-	-	-	-	2	2	2
CO3	2	2	2	2	2	-	-	-	-		2	2	1	2
CO4	1	2	2	1	-	-	-	1	-	-	-	-	2	2
CO5	2	1	1	2	-	-	-	2	-	-	-	2	1	2

CA16204 **OPERATING SYSTEMS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- be aware of the evolution and fundamental principles of operating system, processes
- understand the various operating system components
- know about file management and the distributed file system concepts in operating systems
- be aware of components of operating system with relevant case study
- understand the process management, memory management

UNIT I INTRODUCTION **9**

Introduction-Types of operating systems-operating systems structures-Systems components operating systems services-System calls-Systems programs-Processes-process concept- process scheduling-operation on processes-co- operating processes-Inter process communications-CPU Scheduling-Scheduling criteria-Scheduling algorithms- Multiple-processor Scheduling

UNIT II PROCESS SYNCHRONIZATION **9**

Process Synchronization -Critical Section problem -Semaphores-Classical problems of synchronization-critical regions-Monitors-Deadlock Characterization-Deadlock handling-Deadlock Prevention-Deadlock avoidance-Deadlock Detection-Deadlock Recovery –Threads-Multithreading Models

UNIT III MEMORY MANAGEMENT **9**

Memory Management-Swapping-Contiguous Memory allocation-Paging-Segmentation-Virtual Memory-Demand paging-Page Replacement-Thrashing

UNIT IV DISK SCHEDULING AND DISTRIBUTED SYSTEMS **9**

Disk Structures-Disk Scheduling-File Systems Interface-File concepts-Access methods-Directory Structures-File System Implementation-File Systems structures-Directory Implementation-Allocation Methods-Free Space management-Distributed File systems-Naming and Transparency-Remote File Accesses- Stateful Versus Stateless Service-File replication

UNIT V CASE STUDIES **9**

Linux System-design Principles- process management-File Systems-Windows Vista-Systems Structures-Process management-memory management-Android OS-Virtual machine OS

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the operating system components and its services
- implement the algorithms in process management and solving the issues of IPC
- demonstrate the mapping between the physical memory and virtual memory
- understand file handling concepts in OS perspective
- understand the operating system components and services with the recent operating systems

REFERENCES

1. Abraham Silberschalz Peter B Galvin, G.Gagne, ”Operating Systems Concepts”, Seventh Edition, Addision Wesley Publishing Co.,2013
2. Andrew S.Tanenbaum, “Modern operating Systems”, Third Edition, PHI Learning Pvt.Ltd., 2012
3. William Stallings, “Operating Systems: Internals and Design Principles”,Seventh Edition, Prentice Hall, 2013.
4. H M Deital, P J Deital and D R Choffnes, “Operating Systems” ,3rd edition, Pearson Education, 2013.
5. D M Dhamdhere, “ Operating Systems: A Concept-based Approach”, Second Edition, Tata McGraw-Hill Education, 2013.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	3	2	1	3	-	-	-	-	-	-	2	2	2
CO3	2	2	2	2	3	-	-	-	-		2	2	1	2
CO4	2	2	2	2	-	-	-	3	-	-	-	-	2	2
CO5	1	2	1	3	-	-	-	2	-	-	-	2	2	3

CA16205 COMPUTER GRAPHICS AND MULTIMEDIA 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand computational development of graphics with mathematics
- provide in-depth knowledge of display systems, image synthesis, shape modelling of 3D application
- understand basic concepts related to Multimedia including data
- understand the concepts of standards, algorithms and software
- experience development of multimedia software by utilizing existing libraries and descriptions of algorithms

UNIT I BASIC CONCEPTS 9

2D Transformations - Clipping – Window - View Prot Mapping - Graphical User Interfaces and Interactive Input Methods – Picture Construction Techniques - Virtual Reality Environment.

UNIT II 3D GRAPHICS 9

3D Transformation – 3D Viewing – Visible Surface Detection – Back Face Detection – Depth Buffer Method – Scan Line Method.

UNIT III MULTIMEDIA BASICS 9

Introduction to Multimedia – Components – Hypermedia – Authoring – Authoring tools – File formats – Color models – Digital Audio representation – Transmission – Audio signal processing – Digital music making – MIDI – Digital video – Video compression techniques – Video performance measurements – Multimedia Databases – Animation – Key frames and tweeting techniques – Principles of animation – Virtual reality – Multimedia for portable devices

UNIT IV MULTIMEDIA COMMUNICATION 9

Stream characteristics for Continuous media – Temporal Relationship – Object Stream Interactions – Media Synchronization – Models for Temporal Specifications – Streaming of Audio and Video – Recovering from packet loss – RTSP — Multimedia Communication Standards –RTP/RTCP – SIP and H.263- Real time streaming and On-demand streaming

UNIT V MULTIMEDIA APPLICATION DEVELOPMENT 9

Design, Development and evaluation of multimedia a system - The development of user interface design - Design Process - Multimedia & the Internet - Multimedia conferencing - Multimedia file sharing – Multimedia broadcasting - Multimedia Development Issues - Multimedia project - Structured Multimedia development - Multimedia project timing - Sample project

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- gain proficiency in 3D computer graphics API programming
- enhance the perspective of modern computer system with modelling, analysis and interpretation of 2D and 3D visual information
- understand different realizations of multimedia tools
- develop interactive animations using multimedia tools
- gain the knowledge of different media streams in multimedia transmission

REFERENCES

1. Donald Hearn and M. Pauline Baker, "Computer Graphics in C Version", Second Edition, Pearson Education
2. Tom McReynolds – David Blythe " Advanced Graphics Programming Using OpenGL", Elsevier, 2013
3. Parag Havaldar and Gerard Medioni, "Multimedia Systems-Algorithms, Standards and Industry Practices", Course Technology, Cengage Learning, 2012.
4. John F. Koegel Bufend , "Multimedia systems", Pearson Education, Delhi, 2013
5. Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	1	2	-	-	-	-	-	-	-	2	1	2
CO2	1	1	2	2	1	-	-	-	-	-	-	1	2	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	2
CO4	2	1	1	1	-	-	-	2	-	-	-	-	2	2
CO5	2	2	2	2	-	-	-	2	-	-	-	2	2	2

CA16206 OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- learn how C++ supports Object Oriented principles such as abstraction
- understand and apply the principles hiding

1. Write a C++ Program to illustrate Enumeration and Function Overloading
2. Write a C++ Program to illustrate Scope and Storage class
3. Implementation of ADT such as Stack and Queues
4. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading
5. Write a Program to illustrate Static member and methods
6. Write a Program to illustrate Bit fields
7. Write a Program to overload as binary operator, friend and member function
8. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function
9. Write a Program to illustrate Iterators and Containers
10. Write a C++ Program to illustrate function templates
11. Write a C++ Program to illustrate template class
12. Write C++ Programs and incorporating various forms of Inheritance
13. Write a C++ Program to illustrate Virtual functions
14. Exception Handling
15. File Handling – Read, Write, Update

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- understand and design the solution to a problem using object-oriented programming concepts
- use proper class protection mechanism to provide security

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	-	-	-	-	2	1	2
CO2	2	1	3	3	2	-	-	-	-	-	-	1	2	1

CA16207 **DBMS LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- understand the fundamentals of data models and conceptualize and depict a database system using ER diagram
- make a study of SQL and relational database design.

1. Creation of base tables and views.
2. Data Manipulation INSERT, DELETE and UPDATE in Tables. SELECT, Sub Queries and JOIN
3. Data Control Commands
4. High level language extensions – PL/SQL. Or Transact SQL – Packages . Use of Cursors, Procedures and Functions
5. Embedded SQL or Database Connectivity.
6. Oracle or SQL Server Triggers – Block Level – Form Level Triggers
7. Working with Forms, Menus and Report Writers for a application project in any domain 9. Front-end tools – Visual Basic/Developer 2000.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the basic concepts of the database and data models
- design a database using ER diagrams and map ER into Relations and normalize the relations

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2

CA16208 GRAPHICS AND MULTIMEDIA LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- understand computational development of graphics with mathematics
- provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application

Using C or C++

1. Implement the Bresenham's Line, Circle Drawing algorithms
2. Implement the Two Dimensional Transformations such as translation, rotation, scaling, reflection and shearing
3. Implement the Cohen-Sutherland 2D Line Clipping Algorithm.
4. Implement the Conversion between the color models.

Using Adobe Photoshop

5. Design the logo for a designing industry.
6. Design the fire effect for a text.

Using CorelDraw (or) PageMaker

7. Design the poster for the inter-collegiate cultural meet.

Using Adobe Flash

8. Animation using motion, shape and frame-by-frame animation (use onion skin, guide layer, masking and etc.)
9. Design and animate the cartoons, animals and the like

Using Dreamweaver

10. Create a web page with all multimedia elements.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- gain proficiency in 3D computer graphics API programming
- enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information.

Mapping of Courses Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	Programme Outcomes (POs)													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-		-	-	-	-	2	1	2

PMA16301 RESOURCE MANAGEMENT TECHNIQUES 3 2 0 4

COURSE OBJECTIVES

To enable the students to

- provide the concept and an understanding of basic concepts in Operations Research
- understand the Techniques for Analysis and Modeling in Computer Applications
- understand, develop and solve mathematical model of linear programming problems
- understand, develop and solve mathematical model of Transport and assignment problems
- understand network modeling for planning and scheduling the project activities

UNIT I LINEAR PROGRAMMING MODELS 15

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 15

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

UNIT III INTEGER PROGRAMMING MODELS 15

Formulation – Gomory's IPP method – Gomory's mixed integer method – Branch and Bound technique.

UNIT IV SCHEDULING BY PERT AND CPM 15

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling

UNIT V QUEUEING MODELS 15

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞), (M / M / 1) : (FIFO/ N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

TOTAL PERIODS 75

COURSE OUTCOMES

At the end of the course the students would be able to

- understand and apply linear, integer programming to solve operational problem with constraints
- apply transportation and assignment models to find optimal solution in warehousing
- prepare project scheduling using PERT and CPM
- identify and analyze appropriate queuing model to reduce the waiting time in queue
- use optimization concepts in real world problems

REFERENCES

1. Taha H.A., "Operations Research : An Introduction" 8th Edition, Pearson Education, 2011.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2013.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand& Company Ltd, New Delhi, 3rd Edition, 2013.
4. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods' Springer, 2013
5. Ravindran, Phillips, Solberg, "Operations Research: Principles And Practice", 2ndEdition, JohnWiley& Sons, 01-Jul-2012

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COs	**Programme Outcomes (POs)**													
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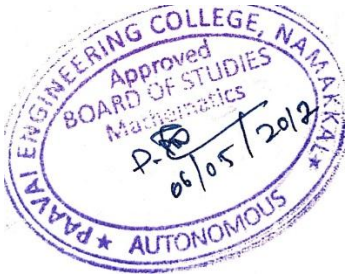
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3



CA16301 COMPUTER COMMUNICATION NETWORKS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand networking concepts and basic communication model
- understand network architectures and components required for data communication
- analyze the function and design strategy of physical, data link, network layer and transport layer
- acquire knowledge of various application protocol standard developed for internet
- analyze the trace for the flow of information from one node to another node in the network

UNIT I INTRODUCTION 9

Data Communications – Networks – Protocols and Standards. Network Models – OSI Model – Layers – TCP/IP Protocol Suite–Addressing. Digital Transmission – Digital-to-Digital Conversion – Analog-to-Digital Conversion – Transmission Modes. Analog Transmission – Digital-to-Analog Conversion – Analog-to-analog Conversion. Transmission Media – Guided and Unguided Media.

UNIT II DATA LINK LAYER 9

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control – stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - IEEE 802.4 - IEEE 802.5 IEEE 802.11 – FDDI - SONET – Bridges.

UNIT III NETWORK LAYER 9

Internetworks–Circuit Switching- Packet Switching and Datagram approach – IP addressing methods– Subnetting – Routing – Distance Vector Routing – Link State Routing – BGP -Routers.

UNIT IV TRANSPORT LAYER 9

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATIONS 9

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- identify the components required to build different types of networks
- understand the functionalities needed for data communication into layers
- choose the required functionality at each layer for given application
- understand the working principles of various application protocols
- acquire knowledge about security issues and services available

REFERENCES

1. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fourth Edition, Harcourt Asia / Morgan Kaufmann, 2013.
2. William Stallings, "Data and Computer Communications", Ninth Edition, Prentice Hall, 2013.
3. Forouzan, " Data Communication and Networking", Fifth Edition , TMH 2013
4. Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2013
5. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition,2013

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COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	1	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	2	-	-	-	2	-	-	-	3	2	3

CA16302 OBJECT ORIENTED SOFTWARE ENGINEERING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the phases in a software project and activities in project management
- comprehend the purpose of different UML diagrams
- understand the major considerations in collecting, documenting and analyzing project requirements
- cognize the activities in the crucial phase of system design
- identify the key phases in the recent trends of RUP and agile development

UNIT I INTRODUCTION 9

Introduction to Software Engineering-Concepts-Software engineering development activities-Managing software development

UNIT II MODELING WITH UML 9

UML Diagrams: Use Case Diagrams - Class Diagrams – Interaction Diagrams - State Machine Diagrams - Activity Diagrams. Modeling Concepts - Diagram Organization - Diagram Extension

UNIT III REQUIREMENTS AND ANALYSIS 9

Requirements Elicitation - Concepts - Activities & Managing Requirements Elicitation - **Analysis:** Concepts - Analysis Activities - Analysis Model

UNIT IV SYSTEM DESIGN 9

Decomposing the System - Addressing Design Goals - Reusing Patterns - Specifying Interfaces - Mapping Models to Code

UNIT V AGILE DEVELOPMENT AND RATIONAL UNIFIED PROCESS 9

Rational Unified Process Key Features - Software Best Practices – Static Structure – Dynamic Structure. Agile Development: Adapting to Scrum - Patterns for Adopting to Scrum - New Roles – Changed Roles – Sprints - Product Backlogs - Teamwork

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- conceive the basics concepts of object oriented software engineering
- use Knowledge documentation for object oriented software engineering using UML
- analyze Problem and alternative solutions using object oriented software engineering approach
- manage Software process and build software engineering teams based on engineering approach
- acquire knowledge about security issues and services available

REFERENCES

1. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering Using UML, Patterns, and Java", 3rd Edition, ISBN-10: 0136061257 | ISBN-13: 978-0136061250, 2010
2. Philippe Kruchten, "The Rational Unified Process: An Introduction", 3rd Edition, ISBN-10: 0321197704, ISBN-13: 978-0321197702
3. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", 1st Edition, ISBN-10: 032157936 ISBN-13: 9780321579362. 2010.
4. Grady Booch, James Rumbaugh and Ivar Jacobson, "The Unified Modeling Language User Guide", Addison -Wesley Longman, USA, 2nd Edition, ISBN-10: 0321267974, ISBN-13: 9780321267979, 2005.
5. Timothy Lethbridge, Robert Laganiere, "Object-Oriented Software Engineering: Practical Software Development using UML and Java", ISBN-10: 0077109082 | ISBN-13: 978-0077109080, 2010

Mapping of Courses Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		3	1	2	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	2	-	-	1	-	-	-	3	1	2

CA16303 ENTERPRISE RESOURCE PLANNING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the concept of ERP
- comprehend the purpose of Enterprise Systems
- understand the major process of ERP
- cognize the activities in Integration
- identify the key phases in the recent trends of ERP development

UNIT I INTRODUCTION TO ERP 9

ERP essentials – ERP evolution – ERP market – ERP tiers – information systems – Presentation tier – Application tier – database tier.

UNIT II ENTERPRISE SYSTEMS 9

Enterprise systems – stand alone mainframe systems – client server architecture – service oriented architecture – types of enterprise systems – types of data – SAP overview.

UNIT III PROCESS IN ERP 9

Basic Procurement process – physical flow – document flow – information flow – financial impact - role of enterprise systems in the procurement process – fulfillment process – production process.

UNIT IV INTEGRATION 9

Integrated processes – Integrated processes execution – additional intra company processes – extended (intracompany) processes.

UNIT V CASE STUDY 9

ERP for construction industry – ERP for a corrugated box manufacturing company – ERP for lens making company–ERP for furniture manufacturing company – ERP for toys manufacturing company - Mc Donald's story – Automobile enterprises.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- conceive the basics concepts of ERP
- use Knowledge documentation for Enterprise Systems
- analyze Problem and Process in ERP
- manage Integration of ERP
- acquire knowledge about security issues and services available

REFERENCES

1. Simha R Magal, Jeff Word, “Essentials of Business Processes and Information Systems”, Wiley Publications, 2009.
2. Marianne Bradford, “Modern ERP: Select, Implement and use Today's advanced business systems”, Second Edition, Lulu Publishers, 2010.
3. Jyotindra Zaveri, “Enterprise Resource Planning”, Second edition, Himalaya Publishing House, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	2	2	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		3	1	2	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	2	1	2	-	-	1	-	-	-	3	1	2

CA16304 INTERNET PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand an overview of oops concepts
- know the basics of java, AWT and String handling
- understand the knowledge in java spring framework and able to develop programs used
- develop programs in java and java swings
- understand and practice web development techniques on client-side and server side

UNIT I FUNDAMENTALS OF JAVA 9

Introduction to java-Features of java-basic-Access controls-Static and fixed methods-Inner classes-String class-Inheritance-Overriding- methods- Using Super- Abstract classes-Packages-Interfaces-Exception Handling-Threads.

UNIT II I/O STREAMS 9

The Java I/O Classes and Interfaces, the Stream Classes. The Byte Streams: InputStream, OutputStream, File InputStream, FileOutputStream, PrintStream, DataInputStream, DataOutputStream. The Character Streams: Reader, Writer, FileReader, FileWriter, CharArrayReader, CharArrayWriter, BufferedReader, BufferWriter,

UNIT III APPLET AND AWT 9

AWT package – Layouts – Containers – Event Package – Event Model – Garbage Collection– Multithreading – Language Packages.

UNIT III JDBC & RMI 9

JDBC – Introduction to JDBC and its components – implementing JDBC in Applet in – Introduction to RMI – Structure of RMI–implementing RMI Request scope

UNIT V SWINGS 9

GUI Programming with Java -Introduction to swings, JLabel, JImageIcon, JTextField, JButton, JToggleButton, JChekcBoxes, JRadioButtons, JTabbedPane, JScrollPane, JList, JComboBox, JTrees, JTable.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge about the overview on oops concepts
- explore the basics of java, AWT and String handling
- learn and design in java spring framework and able to develop programs using it
- acquire knowledge in java and java swings
- able to design web development techniques on client-side and server side

REFERENCES

1. Rajkumar Buyya, S.Thamarai Selvi, Xingchen Chu, "Object–Oriented Programming with JAVA: Essentials and Applications", Fourth Edition, Tata McGraw Hill Education Private Limited, 2013.
2. Herbert Schildt , " Java: The Complete Reference ", Ninth Edition, McGraw-Hill , 2014.
3. Felipe Gutierrez, "Introducing Spring Framework: A Primer" Apress, 2014.
4. P.Naughton and H.Schildt, "Java 2(Complete Reference)" by fourth Edition.
5. Kathy Sierra & Bert Bates, "Head First Servlets & Jsp" by O'Reilly publications.

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	3	3	3	3	-	-	-	-		2	2	1	3
CO4	2	2	2	2	-	-	-	2	2	-	-	2	2	2
CO5	2	2	3	2	-	-	-	1	-	-	-	2	2	2

CA16405 **CASE TOOLS LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- understand and practice the various fields such as analysis, design, development testing of Software Engineering.
- develop skills to construct software of high quality with high reliability

1. Practicing the different types of case tools such as Rational Rose / other Open Source to be used for all the phases of Software development life cycle.
2. Data modeling
3. Source code generators
4. Apply the following to typical application problems:
    a. Project Planning
    b. Software Requirement Analysis
    c. Software Design
    d. Data Modeling& Implementation
5. Software Estimation
6. Software Testing
7. A possible set of applications may be the following:
    a. Library System
    b. Student Marks Analyzing System
    c. Text Editor.
    d. Create a dictionary.
    e. Telephone directory.
    f. Inventory System.

TOTAL PERIODS 60

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COURSE OUTCOMES

At the end of the course the students would be able to

- model software projects into high level design using DFD,UML diagrams
- measure the product and process performance using various metrics

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	2	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CA16306 INTERNET PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- understand and practice basics of java, AWT and String handling
- understand and practice of JSP and java Servlet

1. Writing Java programs by making use of class, interface, package, etc for the following
   a. Different types of inheritance study
   b. Uses of 'this' keyword
   c. Polymorphism
   d. Creation of user specific packages
   e. User specific exception handling
2. Write programs in Java for event handling Mouse and Keyboard events.
3. Write programs in Java to manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using AWT.
4. Write programs in Java using Layout Manager create different applications
5. Create an application using Java Applets.
6. Database using JDBC concept
7. Applications in RMI concept
8. Event Handling concept using Swing

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- explore the features and create interactive web pages using them
- acquire knowledge about the JSP and Servlet programs

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	2	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

PEN16201 COMMUNICATION AND SOFT SKILLS LABORATORY 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- develop the ability to communicate effectively in spoken english
- draft flawless resume in English and participate successfully in group discussions
- enhance their soft skills and interpersonal skill
- equip the learners to make effective presentations on topics in engineering and technology

UNIT I FORMAL & INFORMAL CONVERSATION PRACTICE 6

Role Play1- with family members, neighbours, friends, relatives etc. Simple Expressions – agreeing / disagreeing, persuading, wishing, consoling, advising, arguing, expressing opinions etc - Professional dialogues with the superiors-Conversation with different professionals- Situations like - Government and Corporate Offices, Official Meetings, Educational Institutions, (At the railway junction, malls, post office, bank) etc.

UNIT II ORAL REVIEW, RADIO SHOW &NARRATIVE TECHNIQUES 6

Oral review of movies and discussion or sharing the view on various concepts of the movie, Presentation of various radio programs like news, announcements, advertisements, entertainment programs etc. as a team activity, Understanding the basic narrative techniques-Narrating short stories with message, Narrating real life experiences.

UNIT III RÉSUMÉ / LETTER WRITING 6

Preparation of résumé–structure – use of words and language style – Types of letter – structure of a letter – format for writing letters – use of language in letters

UNIT IV RESENTATION SKILLS&GROUP DISCUSSION 6

Elements of effective presentation – Structure of presentation - Presentation tools – Voice modulation – effective use to presentation tools - Audience analysis - Body language – Video samples- Importance of GD – GD in selection process - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work – Body Language - Mock GD -Video samples

UNIT V INTERVIEW SKILLS 6

Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.

TOTAL PERIODS 30

COURSE OUTCOMES

At the end of the course the students would be able to

- speak effectively and confidently in English.
- attend job interviews with confidence
- write effective job applications with resume
- participate in GD with involvement and confidence

REFERENCES

1. Kalpana. V & Co., "Communication Skills Laboratory Manual", Vijay Nicole Imprints Pvt. Limited, Chennai. 2013
2. Anderson, P.V. "Technical Communication", Thomson Edition, New Delhi, 2012.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi, 2012
4. Kumar Sanjay, PushpLata, "Communication Skills (With CD)", Oxford University Press, New Delhi. 2011
5. Dutt, Kiranmai P and GeethaRajeevan, "BasicCommunication Skills", Foundation Books, New Delhi. 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	2	-	-	3	3	-	-	-	-
CO2	-	-	-	3	3	-	2	2	3	-	-	-	-	-
CO3	-	-	2	1	3	-	3	3	3	3	2	3	-	-

CA16401 C# and .NET FRAMEWORK 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- learn the .NET framework concept and understand the syntax of basic C# Programs
- learn C# elements and OOPS concepts
- learn fundamentals of window application programming and how to create a window applications
- develop web based applications and learn advanced features of C#
- understand the foundation of CLR execution

UNIT I INTRODUCTION TO C# 8

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

UNIT II OBJECT ORIENTED ASPECTS OF C# 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III APPLICATION DEVELOPMENT ON .NET 8

Building Windows Applications, IDE, Standard Controls, Application Model, Accessing Data with ADO.NET-ADO .NET Architecture, Automatically generating SQL Statements

UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET 8

Programming Web Applications with Web Forms - ASP.Net, Programming Web Services, Asynchronous Communication

UNIT V THE CLR AND THE .NET FRAMEWORK 12

Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using SingleCall, Threads.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- use Visual Studio .NET to implementing the .NET application and to Know the basic C# elements
- know the C# OOPS Concepts
- know the basic ADO.NET structures and Understand the ADO.NET database connectivity
- understand the ASP.NET Programming Model and able to create ASP pages for web applications
- understand the internal functions of CLR and develop Web based applications on .NET CLR

REFERENCES

1. E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, 2014. (Unit I, II)
2. J. Liberty, “Programming C#”, 2nd ed., O’Reilly, 2013. (Unit III, IV, V)
3. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, 2014.
4. Robinson et al, “Professional C#”, 2nd ed., Wrox Press, 2013.
5. Andrew Troelsen, “C# and the .NET Platform”, A1 Press, 2014.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	2	2	3	3	1	3	1
CO2	-	-	-	2	3	-	1	2	-	3	3	1	2	2
CO3	-	-	-	-	-	-	-	-	-	3	1	1	2	-
CO4	-	-	-	-	3	1	1	-	2	3	3	1	3	2
CO5	-	-	-	-	-	2	-	2	1	3	1	1	3	2

CA16402 DATA MINING AND DATA WAREHOUSING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- expose the students to the concepts of Data warehousing Architecture and Implementation
- understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- understand the concept of classification for the retrieval purposes
- know the clustering techniques in details for better organization and retrieval of data
- identify Business applications and Trends of Data mining

UNIT I DATA WAREHOUSE 8

Data Warehousing-Operational Database Systems vs. Data Warehouses-Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

UNIT II DATA MINING & DATA PREPROCESSING 9

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 8

Introduction-Data Mining Functionalities-Association Rule Mining - Mining Frequent Item Sets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 10

Classification vs. Prediction–Data preparation for Classification and Prediction – Classification by Decision Tree Introduction–Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT V CLUSTERING 10

Cluster Analysis:-Types of Data in Cluster Analysis–A Categorization of Major Clustering Methods– Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understanding the Store voluminous data for online processing
- prepare the Pre-process the data for mining applications
- learn the association rules for mining the data
- practice and deploy appropriate classification techniques
- understand the high dimensional data for better organization of the data

REFERENCES

1. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2012.
2. K.P. Soman, ShyamDiwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2012.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2013.
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2012

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	3	1	-	-	-	1	-	-	-	3	2	3
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	3	2	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	1	-	-	-	-	2	2
CO5	2	2	3	3	-	-	-	1	-	-	-	3	2	3

CA16403 **WEB PROGRAMMING** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand and practice mark-up languages
- know of how to do project using PHP
- understand and practice embedded dynamic scripting on client side Internet Programming
- understand and practice of PYTHON concept
- understand and practice web development techniques on client-side and server side

UNIT I MARKUP LANGUAGE **9**

Introduction to HTML and HTML5-Formatting and Fonts-Commenting Code– Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms.

UNIT II STYLE SHEET **9**

The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS.

UNIT III INTRODUCTION TO PHP **9**

PHP Introduction-Basic Development concept-types-Variables-Constants-Expressions-Operators-Control Structures-Arrays-Function

UNIT IV HANDLING FORM & SESSION HANDLING **9**

Handling form with GET and POST – Cookies – Session – Server Variables

UNIT V INTRODUCTION TO PYTHON **9**

The basic elements of python-Branching Programs-Control Structures-Strings-Functions and scoping-Tuples-Lists and Dictionaries-Lists and Mutability-Functions as Objects

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge about functionalities of scripting language
- explore mark-up languages features and create interactive web pages using them
- learn and design Client side validation using PHP scripting languages
- acquire knowledge about Open source PYTHON libraries
- able to design front end web page and connect to the back end databases

REFERENCES

1. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web – How to Program", Fifth Edition, Pearson Education, 2013
2. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2012
3. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2012
4. Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004
5. Vikram Vaswani, "PHP and MySQL", Tata McGraw-Hill, 2005

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	3	3	3	3	-	-	-	-		2	2	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	2	2	3	2	-	-	-	1	-	-	-	2	2	2

CA16404 **CLOUD COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- introduce the broad perceptive of cloud architecture and model to understand the concept
- understand the features of cloud simulator
- apply different cloud programming model as per need
- learn to design the trusted cloud Computing system
- address the core issues of cloud computing such as security, privacy and interoperability

UNIT I CLOUD ARCHITECTURE AND MODEL **9**

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IAAS, PAAS, SAAS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II VIRTUALIZATION **9**

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization – Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-centre Automation.

UNIT III CLOUD INFRASTRUCTURE **9**

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL **9**

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

UNIT V SECURITY IN THE CLOUD **9**

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- compare the strengths and limitations of cloud computing
- identify the architecture, infrastructure and delivery models of cloud computing
- apply suitable virtualization concept
- choose the appropriate cloud player, Programming Models and approach
- design Cloud Services and Set a private cloud

REFERENCES

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	3	2	3	-	-	-	-	-	-	2	1	2
CO3	1	2	2	3	3	-	1	-	-		2	2	1	2
CO4	2	1	2	2	-	-	-	2	-	-	-	-	2	2
CO5	2	2	2	1	-	-	-	2	-	-	-	3	2	2

CA 16405 C# and .NET FRAMWORK LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- learn the cost estimation techniques during the analysis of the project
- understand the quality concepts for ensuring the functionality of the software

1. Programs using Branching, Looping.
2. Programs using Methods, Arrays, Strings.
3. Programs using Structures, Enumerations.
4. Programs using Inheritance.
5. Programs using Polymorphism.
6. Programs using Interfaces.
7. Programs using Operator overloading.
8. Programs using Delegates, Events, Errors and Exceptions.
9. Program to Build an Calculator widget
10. Programs Using Multi Module Assembly
11. Programs using application development on .net.
12. Programs using Web applications.

TOTAL PERIOD 60

COURSE OUTCOMES

At the end of the course the students would be able to

- learn the risk management activities and the resource allocation for the projects
- can apply the software estimation and recent quality standards for evaluation of the software projects

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO2	2	2	3	2	3	-	-	-	-		2	1	1	3

CA16406 **WEB PROGRAMMING LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- understand and practice embedded dynamic scripting on client side Internet Programming
- understand and practice of PHP and Python concept

1. Create a web page with the following using HTML5
   a. To embed an image map in a web page
   b. To fix the hot spots
   c. Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Use of conditional statements in PHP
4. Use of looping statements in PHP
5. Creating different types of arrays
6. Usage of array functions
7. Creating user defined functions
8. Creating simple webpage using PHP
9. Use of conditional statements in Python
10. Use of looping statements in Python
11. Creating different types of arrays in Python
12. Usage of array functions in Python
13. Creating user defined functions in Python

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- explore mark-up languages features and create interactive web pages using them
- acquire knowledge about Open source PHP and Python libraries

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CA16407 TECHNICAL SEMIANR AND REPORT WRITING 0 0 4 2

The goal of this course is to train the students to critically evaluate a well-defined set of research subjects and to summarize the findings concisely in a paper of scientific quality. The paper will be evaluated based on the ability to understand a topic, communicate it and identify the issues. Results from this term paper will be presented to Fellow students and a committee of faculty members.

1. Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct primary sources.
2. Every student must write a short review of the topic and present it to fellow students and faculty (discuss the topic – expose the flaws – analyze the issues) every week.
3. The faculty should evaluate the short review and award marks with respect to the following.
   a. Has the student analyzed – not merely quoted – the most significant portions of the primary sources
   b. Employed?
   c. Has the student offered original and convincing insights?
   d. Plagiarism to be checked.
4. Every student should re-submit and present the review article including issues/ comments/ conclusions which had arisen during the previous discussion.
5. Every student should submit a final paper as per project specifications along with all short review reports (at least 4 internal reviews) and corresponding evaluation comments.
6. Every student should appear for a final external review exam to defend themselves.

TOTAL PERIODS 60

Mapping of Courses Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

PCA16408 CAREER DEVELOPMENT LABORATORY 0 0 2 1

UNIT I CORPORATE READINESS 6

Business Communication–Inter & Intra Personal Skills–Business Etiquettes – Corporate Ethics – Communication Media Etiquette

UNIT II INTERVIEW SKILLS 6

Resume Building – Group Discussions – Presentation Skills – Entrepreneur Skills – Psychometric Assessment – Mock Interview

UNIT III QUANTITATIVE APTITUDE (QA) 2 6

Profit & Loss–Clock–Power & Square Roots – Train – Boats & Streams – Probability – Calendars – Permutations & Combinations - Partnership – Simplification – Pipes & Cisterns – Puzzles

UNIT IV LOGICAL REASONING (LR) 2 6

Statements & Assumptions – Matching Definitions – Logical Games – Making Judgments – Statements & Conclusions – Verbal Classifications

UNIT V VERBAL REASONING (VR) 2 6

Syllogisms – Data Sufficiency – Dice – Series Completion – Character Puzzles – Cube & Cuboid – Arithmetic Reasoning

TOTAL PERIODS 30

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

	Programme Outcomes (POs)													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CA16501 MOBILE APPLICATION DEVELOPMENT 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the basic programming concepts in Android
- relate the need of the different User interface component in an application
- identify the components beyond User Interface and use them in an application
- gain an basic understanding of the architecture of IoS and design an application
- understand the basic concepts related to Windows mobile applications

UNIT I INTRODUCTION 8

Introduction to mobile applications - Mobility landscape - Mobile platforms - Mobile apps development – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications – Market and business drivers for mobile application

UNIT II UI DESIGN & APP DEVELOPMENT IN ANDROID 9

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity – states and life cycle, interaction amongst activities – Threads – Async Task –Services – state and life cycle – Notifications.

UNIT III APP FUNCTIONALITYBEYOND USER INTERFACE IN ANDROID 10

Broadcast receivers, Telephony and SMS APIs– Shared preferences – Mobile databases using SQlite – Content Providers – Animation – Multimedia-Audio/Video Playback and Recor Location Awareness – Native Hardware Access (Sensors such as Accelerometer and Gyroscope).

UNIT IV MOBILE TECHNOLOGY – iOS 9

Introduction to Objective C – IOS features – UI implementation – Touch frameworks – Data Persistence using Core Data and SQlite – Location awareness using Core location and Map kit Integrating calendar and address book with social media application – Using Wifi – iPhone market place.

UNIT V MOBILE TECHNOLOGY – WINDOWS 9

Intro to Windows RT 8.1 , Windows phone Runtime – Tiles and Toasts – Push notifications – Launchers and Choosers – Alarms & Reminders - Context Menu – Dialogs – Flyouts – Appbar – Working with Sensors- REST fundamentals – Windows Store app Certification.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- explain the architecture, platform and tools required for mobile application
- explore Hadoop distributed system and its components
- design applications using map reducing concept
- install and utilize Hadoop tool
- understanding the Framework applications

REFERENCES

1. Anubhav Pradhan, Anil V. Deshpande, "Composing Mobile Apps Learn|Explore|Apply ", Wiley 2014.
2. ZigurdMednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, "Programming Android",O'Reilly, 2011.
3. Reto Meier, Wrox Wiley, "Professional Android 2 Application Development", 2010.
4. Alasdair Allan, "iPhone Programming", O'Reilly, 2010.
5. Wei-Meng Lee, "Beginning iPhone SDK Programming with Objective-C", Wrox Wiley, 2010

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	2	2	-	-	-	-	-	-	-	1	1	2
CO2	2	3	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		3	1	1	3
CO4	2	2	3	3	-	-	-	1	-	-	-	-	2	2
CO5	3	2	2	2	-	-	-	2	-	-	-	1	2	2

CA16502 **BIG DATA ANALYTICS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand the Bigdata concept
- understand mining data stream system
- understand the Hadoop concept
- understand usage of file systems
- understand how to buid up framework

UNIT I INTRODUCTION TO BIG DATA **8**

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools

UNIT II HADOOP **9**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics

UNIT III MAP REDUCE **10**

Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures - Job Scheduling- Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT IV HADOOP ENVIRONMENT **9**

Setting up a Hadoop Cluster-Cluster specification-Cluster Setup and Installation- Hadoop Configuration- Security in Hadoop- Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

UNIT V FRAMEWORKS **9**

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

TOTAL PERIODS **45**

COURSE OUTCOMES

At the end of the course the students would be able to

- identify the need for big data analytics for a domain
- explore Hadoop distributed system and its components
- design applications using Map Reducing Concepts
- install and utilize Hadoop tool.
- understanding the Framework applications

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2012.
2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012
4. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2

CA16503 AGILE SOFTWARE ENGINEERING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software
- understanding of software design and a set of software technologies and APIs
- detailed examination and demonstration of Agile development and testing techniques
- benefits and pitfalls of working in an Agile team
- understand Agile development and testing

UNIT I AGILE METHODOLOGY 9

Theories for Agile management – agile software development – traditional model vs. agile model – classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values

UNIT II AGILE PROCESSES 9

Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, Extreme Programming: Method overview – lifecycle – work products, roles and practices

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT 9

Agile information systems – agile decision making - Earl's schools of KM – institutional knowledge evolution cycle – development, acquisition, refinement, distribution, deployment , leveraging – KM in software engineering – managing software knowledge – challenges of migrating to agile methodologies – agile knowledge sharing – role of story-cards – Story-card Maturity Model (SMM)

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING 9

Impact of agile processes in RE – current agile practices – variance – overview of RE using agile – managing unstable requirements – requirements elicitation – agile requirements abstraction model – requirements management in agile environment, agile requirements prioritization – agile requirements modeling and generation – concurrency in agile requirements generation

UNIT V AGILITY AND QUALITY ASSURANCE 9

Agile product development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile approach to Quality Assurance - Test Driven Development – Agile approach in Global Software Development

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- importance of interacting with business stakeholders in determining the requirements for a software system
- iterative software development processes: how to plan them, how to execute them
- the impact of social aspects on software development success
- techniques and tools for improving team collaboration and software quality
- software process improvement as an ongoing task for development teams
- how agile approaches can be scaled up to the enterprise level

REFERENCES

1. David J. Anderson; Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003
2. Hazza & Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer 2009, VIII, 296 p.
3. Craig Larman, Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
4. Kevin C. Desouza, Agile information systems: conceptualization, construction, and management, Butterworth-Heinemann, 2007.
5. Chetankumar Patel, Muthu Ramachandran, Story Card Maturity Model (SMM): A Process Improvement Framework for Agile Requirements Engineering Practices, Journal of Software, Academy Publishers, Vol 4, No 5 (2009), 422-435, Jul 2009.

Mapping of Courses Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2

CA16504 MOBILE APP DEVELOPMENT LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- understand the platform and tool available for developing mobile application
- gain the basics about micro browser based applications in Android to access the Internet

1. Add a spinner. When the spinner is selected, there should be three option(e.g., android, java, testing). When you click on each option, it should go to another page containing some other components. Each of these pages should have a "back" button, which on pressing will take you back to the page with the spinner
2. Program a calculator
3. Add two EditText. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2 as a separate Activity.
4. Create applications to include Action Bar, Menus, Dialogs and Notifications in Android.
5. Create a camera application, where you can click a picture and then save it as the wallpaper.
6. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.
7. Create an application that works with Android Content Provider, which searches, add, change and remove content of MIME types.
8. Create a media player, which plays an mp3 song and will record the sound.
9. Create a thread, which performs a single task, and perform multithreading in Android.
10. Create Animation apps like a. Bouncing ball b. Moving arrow

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- develop useful mobile applications for the current scenario in mobile computing
- construct applications that use animation, media players, and content providers

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CA16505 XML AND WEB SERVICES LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- provide fundamental concepts of Service Oriented Architecture
- gain knowledge about SOAP, UDDI and XML to create web services

1. XML document creation.
2. Importing and Exporting XML document in database.
3. XSL Transformation
4. Internal and External DTD creation
5. XML Schema creation
6. Parsing XML document using DOM/SAX parser.
7. Web Service creation using JAX-WS
8. Web Service creation using JAX-RS
9. Web Service creation using .NET
10. JAXB Marshaling and Unmarshaling

A possible set of applications may be the following:

a. Currency Conversion
b. Temperature Conversion
c. Ticket Booking
d. Dictionary

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- known about the basic principles of service oriented architecture, its components and techniques
- understand the architecture of web services

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	2	3	-	-	-	2	-	-	-	-	3	2
CO2	2	2	2	2	-	-	-	1	-	-	-	2	2	3

CA16506 **MINI PROJECT (SOCIALLY RELEVANT)** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- team Project with a maximum of two in a team
- students shall select a domain and develop an application with social relevance

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the students shall select a domain and develop an application with social relevance
- documentation is to be based on the standards

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	2	3	-	-	-	2	-	-	-	-	3	2
CO2	2	2	2	2	-	-	-	1	-	-	-	2	2	3

CA16601 **PROJECT WORK** **0 0 24 12**

COURSE OBJECTIVES

To enable the students to

- apply the fundamentals knowledge for understating state of the art information about any topic relevant to curriculum
- identify specific problem for the current need of the society and collecting information related to the same through detailed review of literatures
- develop the methodology to solve the identified problems
- prepare the project report and face reviews and viva-voce examination

SYLLABUS

The student individually works on a specific topic approved by faculty members who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The student will be evaluated through a viva-voce examination by a panel of examiners

TOTAL PERIODS 180

COURSE OUTCOMES

At the end of the course the students would be able to

- review communication engineering and problems available in literature
- select appropriate techniques to analyze the complex communication engineering problems
- apply engineering and management principles through efficient handling of project
- write a detailed report about the topic in the prescribed format

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	1	3	-	2	1	2	3	2	1	3	3	3
CO2	3	3	1	3	-	-	1	-	3	-	1	3	3	3
CO3	2	2	2	2	2	2	1	-	2	2	1	3	3	3
CO4	3	3	2	2	-	2	2	2	2	2	1	3	3	3

CAE16401 FINANCIAL ACCOUNTING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand an overview of accounting concepts
- know the basics ratio analysis
- understand the knowledge in funds flow statement in accounting
- develop budget and budgetary control concept
- understand and practice of costing concept

UNIT I ACCOUNTING 9

Definition, Objectives, Advantages, Accounting Concepts, Accounting- Conventions. Methods of Accounting – Single Entry and Double Entry System. – Journal and Ledger – Preparation of Trial Balance.-Final Accounts: Trading and Profit and Loss Account and Balance Sheet of Sole- Proprietary Concern.

UNIT II RATIO ANALYSIS 9

Meaning – Advantages – Limitations – Classification of Ratio : Profitability, Turnover and Solvency Ratios.

UNIT III FUNDS FLOW STATEMENT 9

Concept of Funds – Funds flow Statement – Uses and Limitations – Preparation of Fund Flow Statement- – Cash Flow Statement

UNIT IV BUDGET AND BUDGETARY CONTROL 9

Meaning and Definition - Objectives of Budgetary - Control, Advantages and Limitations Preparation of Different Types o f Budgets.

UNIT V COSTING 9

Definition, Nature and Importance Advantages and Limitations of Cost Accounting – Classifications of Cost — Preparation of Cost Sheet- Marginal Costing: Meaning, Advantages Cost – Volume Profit Analysis – Break Even Analysis – Uses and Assumptions – Applications of Marginal Costing.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge about the overview of accounting concepts
- explore the basics ration analysis concept
- learn and understand the funds flow statement
- acquire knowledge in budget and budgetary control
- able to understand the concept of costing

REFERENCES

1. Decenzo and Robbins, financial Accounting, Wilsey, 10th edition, 2012.
2. Mamoria C.B. and Mamoria. S., Personnel Management, Himalaya Publishing Company, 1997.
3. Mirza S. Saiyadain Ration Analysis , Tata McGraw Hill , 4th edition 2009.
4. Eugence Mckenna and Nic Beach Budget and Budgetary Control, Pearson Education Limited, 2002.
5. Dessler, Accounting and Costing, Pearson Education Limited, 2002

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16402 INFORMATION SECURITY 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the basics of cryptography
- learn to find the vulnerabilities in programs and to overcome them,
- know the different kinds of security threats in networks and its solution
- know the different kinds of security threats in databases and solutions available
- learn about the models and standards for security

UNIT I ELEMENTARY CRYPTOGRAPHY 9

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates .

UNIT II PROGRAM SECURITY 9

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws – Common Weakness Enumeration Most Dangerous Software Errors

UNIT III SECURITY IN NETWORKS 9

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

UNIT IV SECURITY IN DATABASES 9

Security requirements of database systems – Reliability and Integrity in databases –Redundancy – Recovery – Concurrency/ Consistency – Monitors – Sensitive Data – Types of disclosures – Inference-finding and confirming SQL injection

UNIT V SECURITY MODELS AND STANDARDS 9

Secure SDLC – Secure Application Testing – Security architecture models – Trusted Computing Base – Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison - Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCI DSS – Security Standards - ISO 27000 family of standards – NIST.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- apply cryptographic algorithms for encrypting and decryption for secure data transmission
- understand the importance of Digital signature for secure e-documents exchange
- understand the program threats and apply good programming practice
- get the knowledge about the security services available for internet and web applications
- understand data vulnerability and sql injection

REFERENCES

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.
2. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.
3. William Stallings, "Cryptography and Network Security : Principles and Practices", Fifth Edition, Prentice Hall, 2010.
4. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, McGrawHill Osborne Media, 2009.
5. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-wesley

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2

CAE16403 **NETWORK PROTOCOLS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand the existing network architecture models and analyze the performance
- understand the high speed network protocols and design issues
- learn gamin engine design
- learn Network Security Technologies and Protocols
- study various protocols in wireless LAN, MAN

UNIT I FUNDAMENTALS OF NETWORKING STANDARDS ANDPROTOCOLS 9

Network Communication Architecture and Protocols - OSI Network Architecture seven Layers Model - Definition and Overview of TCP/IP Protocols -TCP/IP Four Layers Architecture Model - Other Network Architecture Models: IBM SNA

UNIT II ROUTED AND ROUTING PROTOCOLS 9

Application Layer Protocols-Presentation Layer Protocols- Session Layer Protocols – Transport Layer Protocols - Network Layer Protocols - Data Link Layer Protocols - Routing Protocols - Multicasting Protocols - MPLS.

UNIT III GAMING ENGINE DESIGN 9

Overview of ISDN − Channels − User access – Protocols Network management requirements – Network monitoring − Network control − SNMP V_1, V_2 and V_3 − Concepts, MIBs − Implementation issues-RMON.

UNIT IV SECURITY AND TELEPHONY PROTOCOLS 9

Network Security Technologies and Protocols - AAA Protocols - Tunneling Protocols – Security Protocols- Private key encryption − Data encryption system, public key encryption − RSA – Elliptic curve cryptography− Authentication mechanisms− Web security -Secured Routing Protocols - IP telephony -Voice over IP and VOIP Protocols –Signaling Protocols- Media/CODEC.

UNIT V NETWORK ENVIRONMENTS AND PROTOCOLS 9

Wide Area Network and WAN Protocols - Frame relay - ATM - Broadband Access Protocols –PPP Protocols - Local Area Network and LAN Protocols - Ethernet Protocols - Virtual LAN Protocols -Wireless LAN Protocols - Metropolitan Area Network and MAN Protocol - Storage Area Network and SAN Protocols.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- study, analyze and design seven layers of protocols of wired and wireless networks
- design Cloud Services and Set a private cloud
- analyze design implementation issues
- design ISDN and Network Protocols
- implement the broadband access protocol

REFERENCES

1.Javvin, "Network Protocols" , Javvin Technologies Inc , second edition, 2005

2. William Stallings, "Cryptography and Network Security", PHI, 2000.

3. Mani Subramanian, "Network Management−Principles and Practices", Addison Wesley, 2000

4.William Stallings, "SNMP, SNMPV2, SNMPV3 and RMON1 and 2", 3rd Edition, Addison Wesley, 1999

5. William Stallings, "Data and Computer Communications" 5th Edition, PHI, 1997.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	2	2	-	-	-	-	-	-	-	1	1	2
CO2	2	3	2	2	3	-	-	-	-	-	-	2	2	2
CO3	2	2	3	2	3	-	-	-	-		1	2	2	2
CO4	1	2	2	1	-	-	-	2	-	-	-	-	3	2
CO5	1	3	2	2	-	-	-	2	-	-	-	2	2	2

CAE16404 SOFTWARE TESTING AND QUALITY ASSURANCE 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand an overview of software testing concepts
- know the basics analysis of quality assurance
- understand the knowledge in activity planning
- develop the risk management concept
- understand and practice of software quality assurance

UNIT I INTRODUCTION 9

Software Projects various other types of projects - Problems with software projects - an overview of project-planning - Project evaluation - Project Analysis and technical planning - Project estimates - Preparation of Estimates - COCOMO model - Function Point Analysis - Putnam Model - Non-development overheads.

UNIT II ACTIVITY PLANNING 9

Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration Identifying critical activities.

UNIT III RISK MANAGEMENT 9

Resource allocation - Monitoring and Control - Managing people and organizing teams - Planning for small projects- Handling large projects - Divide and Conquer - Software Project survival.

UNIT IV SOFTWARE CONFIGURATION MANAGEMENT 9

Basic functions, responsibilities, standards, configuration Management, Prototyping - Models of prototyping.

UNIT V SOFTWARE QUALITY ASSURANCE 9

Quality and the quality system - standards and procedures - Technical activities – components - Continuous Improvement - Software Tasks - Management responsibility - Quality System - Contract Review – Document Control - Product identification and trace ability.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge about the overview of software testing concepts
- explore the basics activity planning concept
- learn and understand the risk management concept
- acquire knowledge in software configuration management control
- able to understand the software quality assurance

REFERENCES

1. Mike Cotterell and Bob Hughes, “Software Project Management - Inclination”, Tata McGraw Hill, 2006.
2. Robert K. Wysocki, Robert Beck Jr and David B. Crane, “Effective Project Management”, John Wiley & Sons Inc, 2002.
3. Steve McConnell, “Software Project Survival Guide”, Microsoft Press, 2000
4. Gerald M. Weinberg,” Quality Software Management”, Volume I, Systems Thinking, Dorset House Publishing, 2002
5. Gerald M. Weinberg,” Quality Software Management”, Volume II, First Order Measurement, Dorset House Publishing, 2002.

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CO2	2	1	1	2	2	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	2	2
CO4	1	2	2	1	-	-	-	2	-	-	-	-	2	2
CO5	2	3	2	1	-	-	-	1	-	-	-	3	2	3

CAE16405 GAME PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the concepts of Game design and development
- learn the processes, mechanics and issues in Game Design
- be exposed to the Core architectures of Game Programming
- know about Game programming platforms, frame works and engines
- learn to develop games

UNIT I 3D GRAPHICS FOR GAME PROGRAMMING 9

3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

UNIT II GAME ENGINE DESIGN 9

Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time.simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.

UNIT III GAME PROGRAMMING 9

Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

UNIT IV NG PLATFORMS AND FRAMEWORKS 9

2D and 3D Game development using Flash, DirectX, Java, Python, Game engines – DX Studio, Unity.

UNIT V GAME DEVELOPMENT 9

Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- discuss the concepts of Game design and development
- design the processes, and use mechanics for game development
- explain the Core architectures of Game Programming
- use Game programming platforms, frame works and engines
- create interactive Games

REFERENCES

1. Mike Mc Shaffrfy and David Graham, “Game Coding Complete”, Fourth Edition, Cengage Learning, PTR, 2012
2. Jason Gregory, “Game Engine Architecture”, CRC Press / A K Peters, 2009.
3. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, 2nd Edition Prentice Hall / New Riders 2009.
4. Eric Lengyel, “Mathematics for 3D Game Programming and Computer Graphics”, 3rd Edition, Course Technology PTR, 2011
5. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.

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CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16406 ADVANCED DATABASE 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- learn the modeling and design of databases
- acquire knowledge on parallel and distributed databases and its applications
- study the usage and applications of Object Oriented database
- understand the principles of intelligent databases
- understand the usage of advanced data models

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- Distributed Database Concepts – Distributed Data Storage–Distributed Transactions–Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES 9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL –OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES 9

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules-Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships - Spatial Data Structures- Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models -Concurrency Control - Transaction Commit Protocols - Multimedia Databases- Information Retrieval- Data warehousing- Data Mining- Text Mining.

UNIT V EMERGING TECHNOLOGIES 9

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages-Storing XML in Databases -XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- select the appropriate high performance database like parallel and distributed database
- model and represent the real world data using object oriented database
- design a semantic based database to meaningful data access
- embed the rule set in the database to implement intelligent databases
- represent the data using XML database for better interoperability

REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/ Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database SystemConcepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, 3rd Edition 2004.

Mapping of Courses Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	Programme Outcomes (POs)													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2

CAE16501 **LINUX INTERNALS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand an overview of Linux concepts
- know the basics analysis of buffer cache
- understand the knowledge in system calls
- develop the system process concept
- understand and practice of memory management concept

UNIT I INTRODUCTION **9**

General Review of the System-History-System structure-User Perspective-Operating System Services-Assumptions About Hardware. Introduction to the Kernel-Architecture- System Concepts-Data Structures-System Administration.

UNIT II ANALYSIS OF BUFFER CACHE **9**

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages Internal Representation of Files-Inodes- Structure-Directories-Path Name to Inode - Super Block - Inode Assignment-Allocation of Disk Blocks -Other File Types

UNIT III SYSTEM CALLS **9**

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat- Fstat-Pipes-Dup-Mount-Unmount- Link-Unlink-File System Abstraction-Maintenance.

UNIT IV SYSTEM PROCESSES **9**

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context -Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting -Invoking other Programs-The Shell-System Boot and the INIT Process.

UNIT V MEMORY MANAGEMENT **9**

Memory Management Policies-Swapping-Demand Paging-a Hybrid System-I/O- Subsystem-Driver Interfaces-Disk Drivers-Terminal Drivers.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge about the overview of Linux concepts
- explore the basics of buffer cache concept
- learn and understand the system calls concept
- acquire knowledge in memory management control
- able to understand the concept of costing

REFERENCES

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education, 2012
2. Uresh Vahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
3. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
4. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000
5 M. Beck et al, “Linux Kernel Programming”, Pearson Education Asia, 2002

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CO2	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	3	1	2	1	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16502 HIGH PERFORMANCE COMPUTING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- know how modern high performance processors are organized their strengths and weaknesses
- study about the architecture of parallel systems
- understand scope of parallel computing
- learn parallel algorithms design
- gain depth knowledge about the analytical parallel algorithms

UNIT I MODERN PROCESSORS 9

Stored-program computer architecture – General-purpose cache-based microprocessor architecture – Memory hierarchies - Multicore processors - Multithread processors - Vector processors – Basic optimization techniques forserial code - Common sense optimizations - Simple measures – large impact - Role of compilers.

UNIT II PARALLEL COMPUTERS 9

Data access optimization - Balance analysis and light speed estimates - Storage order - Taxonomy of parallel computing paradigms - Shared memory computers - Distributed memory computers - Hierarchical systems – Networks - Basics of parallelization- Parallelism – Parallel scalability

UNIT III INTRODUCTION TO PARALLEL COMPUTING 9

Motivating parallelism - Scope of parallel computing - Parallel programming platforms: Implict parallelism trends in microprocessor architectures - Limitations-Dichotomy - Physical organizations - Communication costs – Routing mechanisms for interconnected networks- Impact of process.

UNIT IV PRINCIPLES OF PARALLEL ALGORITHM DESIGN 9

Preliminaries - Decomposition techniques - Characteristics of tasks and interactions – Mapping techniques for load balancing-Methods for containing interaction overheads- Parallel algorithm models - Basic Communication operations.

UNIT V SORTING AND GRAPH ALGORITHMS 9

Dense matrix Algorithm: Matrix-vector multiplication - Martix- matrix multiplication- Issues in sorting on parallel computing - Sorting networks - Bubble sorts and its variants - Quick sort – Graph algorithms – Definition and representation - Prims algorithm - Dijkstra's algorithm - All pairs shortest path - Transitive closure – Connected components.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- apply basic principles and practices of Computer Science and Engineering research
- design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, manufacturability, and sustainability
- apply routing mechanisms for interconnected networks
- analyze algorithm models
- identify, analyze, formulate and solve engineering problems

REFERENCES

1. Georg Hager and Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers
2. Ananth Grama and George Karypis, Introduction to parallel computing, Addison-Wesley 2009.
3. John Levesque and Gene Wagenbreth, High Performance Computing: Programming and Applications
4. John L. Hennessy and David Patterson, Computer Architecture- A Quantitative Approach, Elsevier, 2012.

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CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16503 SOFTWARE PROJECT MANAGEMENT 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- know of how to do project planning for the software process
- learn the cost estimation techniques during the analysis of the project
- understand the quality concepts for ensuring the functionality of the software
- understand the knowledge and skills needed for the construction of highly reliable software project
- understand to create reliable, replicable cost estimation that links to the requirements of project planning and managing

UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS 9

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and Allocate resources.

UNIT II SOFTWARE EVALUATION AND COSTING 9

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, Cost - benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing Technologies, choice of process models, Structured methods.

UNIT III SOFTWARE ESTIMATION TECHNIQUES 9

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT IV RISK MANAGEMENT 9

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT V SOFTWARE QUALITY MANAGEMENT 9

TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards, Comparison of Project management software's: dot Project, Launch pad, OpenProject. Case study:PRINCE2

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the activities during the project scheduling of any software application
- learn the risk management activities and the resource allocation for the projects
- can apply the software estimation and recent quality standards for evaluation of the software projects
- acquire knowledge and skills needed for the construction of highly reliable software project
- able to create reliable, replicable cost estimation that links to the requirements of project planning

REFERENCES

1. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012.
2. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition, 2013.
3. Richard H.Thayer “Software Engineering Project Management,”: IEEE Computer Society
4. Futrell , “Quality Software Project Management”, Pearson Education India, 2012
5. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012.
6. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition, 2013.
7. Richard H.Thayer “Software Engineering Project Management,”: IEEE Computer Society
8. Futrell , “Quality Software Project Management”, Pearson Education India, 2012

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CO2	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	3	1	2	1	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16504 DATA TUNING AND ADMINISTRATION 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- learn the fundamentals of database tuning
- study the indexing mechanisms for organizing data
- understand the significance of Query Optimization
- learn to troubleshoot database issues
- understand the need for time series and distributed databases

UNIT I FUNDAMENTALS OF TUNING 9

Review of relational databases–Relational algebra - Locking and concurrency control – Correctness consideration – Lock tuning – Logging and the recovery subsystem – Principles of recovery – Tuning the recovery subsystem – Operating systems considerations – Hardware tuning

UNIT II INDEX TUNING 9

Types of queries – Data structures – B tree – B+ Tree - Hash structures – Bit map indexes – Clustering indexes – Non clustering indexes – Composite indexes – Hot tables – Comparison of indexing and hashing techniques

UNIT III QUERY OPTIMIZATION 9

Techniques - Tuning relational systems – Normalization – Tuning denormalization – Clustering two tables – Aggregate maintenance–Record layout–Query tuning–Triggers–Client server mechanisms–Objects, application tools and performance – Tuning the application interface – Bulk loading data – Accessing multiple databases

UNIT IV TROUBLESHOOTING 9

Query plan explainers – Performance monitors – Event monitors – Finding "Suspicious" queries – Analyzing a query's access plan – Profiling a query execution – DBMS subsystems

UNIT V CASE STUDIES 9

Transaction chopping – Time series databases – Understanding access plans – Configuration parameters: Oracle; SQL Server; DB2 UDB – Distributed database - Implementation

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- analyze different execution plans for queries
- analyze different execution tuning for queries
- create an execution plan for a query to reduce the execution time
- optimize the retrieval in query processing
- analyze the query response using data dictionaries

REFERENCES

1. Dennis Shasha and Philippe Bonnet "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Elsevier Reprint 2005.
2. Thomas Connoly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education 2003.
3. M.Tamer Ozsu, Patrick Valduriez and S.Sridhar "Principles of Distributed Database Systems", Pearson Education 2007.
4. Ramez Elmasri and Navathe, "Fundamentals of Database Systems", Sixth Edition, Addison Wesley

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CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16505 **SOFT COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- learn the key aspects of Soft computing
- know about the components and building block hypothesis of Genetic algorithm
- understand the features of neural network and its applications
- study the fuzzy logic components
- gain insight onto Neuro Fuzzy modeling and control.

UNIT I INTRODUCTION TO SOFT COMPUTING **9**

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS **9**

Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III NEURAL NETWORKS **9**

Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in neural networks.

UNIT IV FUZZY LOGIC **9**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT V NEURO-FUZZY MODELING **9**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- implement machine learning through neural networks
- gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system
- write Genetic Algorithm to solve the optimization problem
- understand fuzzy concepts and develop a Fuzzy expert system to derive decisions
- model Neuro Fuzzy system for data clustering and classification

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003
2. KwangH.Lee, "First course on Fuzzy Theory and Applications", Springer–Verlag Berlin Heidelberg, 2005.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
4. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
5. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	3	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	1	2	3	2	-	-	-	2	-	-	-	-	2	2
CO5	2	2	1	2	-	-	-	2	-	-	-	3	2	3

CAE16506 AD-HOC AND SENSOR NETWORKS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the basics of Ad-hoc & Sensor Networks
- learn various fundamental and emerging protocols of all layers in ad-hoc network
- study about the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks
- understand the nature and applications of ad-hoc and sensor networks
- understand various security practices and protocols of Ad-hoc and Sensor Networks

UNIT I ADHOC NETWORKS FUNDAMENTALS AND MAC PROTOCOLS 9

Fundamentals Of WLans – IEEE 802.11 Architecture - Self Configuration And Auto Configuration Issues in Ad-Hoc Wireless Networks – MAC Protocols For Ad-Hoc Wireless Networks – Contention Based Protocols - TCP Over Ad-Hoc Networks-TCP Protocol Overview - TCP And MANETs – Solutions For TCP Over Ad-Hoc Networks.

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT 9

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches - Proactive, Reactive, Hybrid Routing Approach - Principles and issues – Location services – DREAM – Quorums based Location Service – Grid – Forwarding Strategies – Greedy Packet Forwarding – Restricted Directional Flooding - Hierarchical Routing- Other Routing Protocols.

UNIT III SENSOR NETWORK COMMUNICATION PROTOCOLS 9

Introduction–Architecture- Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN's – Protocols for WSN – Physical Layer – Transceiver Design Considerations – MAC Layer Protocols – IEEE 802.15.4 Zigbee – Link Layer and Error Control Issues – Routing Protocols – Mobile Nodes and Mobile Robots - Data Centric & Contention Based Networking – Transport Protocols & QoS – Congestion Control Issues – Application Layer Support.

UNIT IV SENSOR NETWORK MANAGEMENT AND PROGRAMMING 9

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators.

UNIT V SOFTWARE TESTING AND QUALITY METRICS 9

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Antitamper Techniques – Water Marking techniques – Defense against Routing Attacks – Secure Adhoc Routing Protocols – Broadcast Authentication WSN Protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- work with existing Ad-hoc and sensor network protocols and standards
- create a Sensor network environment for different type of applications
- design ad-hoc and sensor network architectures using QOS and Congestion control mechanisms
- interpret the various control fields of the protocol in each layer
- select appropriate routing algorithms for different network environments

REFERENCES

1. Carlos De MoraisCordeiro, Dharma PrakashAgrawal, "Ad Hoc and Sensor Networks: Theory and Applications", Second Edition, World Scientific Publishing, 2011.
2. Holger Karl, Andreas willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc .2005.
3. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
4. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
5. ErdalÇayırcı , ChunmingRong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	3	2	3	3	-	-	-	-	-	-	2	2	2
CO3	2	2	3	2	2	-	-	-	-		2	1	2	3
CO4	1	3	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	2	2	-	-	-	3	-	-	-	2	1	3

CA16507 **INTERNET OF THINGS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- learn the basic issues, policy and challenges in the Internet
- understand the components and the protocols in Internet
- build a small low cost embedded system with the internet
- understand the various modes of communications with internet
- learn to manage the resources in the Internet

UNIT I INTRODUCTION **9**

Definition–phases – Foundations – Policy– Challenges and Issues - identification - security –privacy Components in internet of things**:** Control Units – Sensors – Communication modules –Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks –Mobile Internet – Wired Communication

UNIT II PROGRAMMING THE MICROCONTROLLER FOR IOT **9**

Basics of Sensors and actuators – examples and working principles of sensors and actuators –Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / ethernet

UNIT III RESOURCE MANAGEMENT IN THE INTERNET OF THINGS **9**

Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture -The Role of Context- Design Guidelines -Software Agents for Object – Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy- Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behavior of Objects

UNIT IV BUSINESS MODELS FOR THE INTERNET OF THINGS **9**

The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework-Device Integration - Middleware Technologies Needed for a DiY Internet of Things Semantic Interoperability as a Requirement for DiY Creation -Ontology- Value Creation in the Internet of Things -Application of Ontology Engineering in the Internet of Things-Semantic Web-Ontology - The Internet of Things in Context of EURIDICE – Business Impact

UNIT V FROM THE INTERNET OF THINGS TO THE WEB OF THINGS **9**

Resource-oriented Architecture and Best Practices-Designing REST ful Smart Things– Webenabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case studies – Open Source e-Health sensor platform – Be Close Elderly monitoring – Other recent projects.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of this course the students will be able to

- identify the components of IOT
- design a portable IOT using appropriate boards
- program the sensors and controller as part of IOT
- develop schemes for the applications of IOT in real time scenarios
- establish the communication to the cloud through wifi/ Bluetooth

REFERENCES

1. CharalamposDoukas , Building Internet of Things with the Arduino, Create space, April 2012
2. Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011
3. Luigi Atzor et.al, "The Internet of Things: A survey, ", Journal on Networks, Elsevier Publications, October, 2010

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COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	3	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	1	2	3	2	-	-	-	2	-	-	-	-	2	2
CO5	2	2	1	2	-	-	-	2	-	-	-	3	2	3

CA16508 **MACHINE LEARNING** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- understand the machine learning theory
- implement linear and non-linear learning models
- implement distance-based clustering techniques
- build tree and rule based models
- apply reinforcement learning techniques

UNIT I FOUNDATIONS OF LEARNING **9**

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – approximation generalization tradeoff – bias and variance – learning curve

UNIT II LINEAR MODELS **9**

Linear classification – univariate linear regression – multivariate linear regression –beyond regularized regression – Logistic regression – perceptions – multilayer neural networks – learning neural networks structures– support vector machines–soft margin SVM – going linearity – generalization and over fitting – regularization – validation

UNIT III DISTANCE-BASED MODELS **9**

Nearest neighbor models – K-means – clustering around medoids – silhouttes – hierarchical clustering – k-d trees –locality sensitive hashing–non-parametric regression ensemble learning – bagging and random forests– boosting – meta learning

UNIT IV TREE AND RULE MODELS **9**

Decision trees–learning decision trees–ranking and probability estimation trees–regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

UNIT V REINFORCEMENT LEARNING **9**

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal-difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- explain theory underlying machine learning
- construct algorithms to learn linear and non-linear models
- implement data clustering algorithms
- construct algorithms to learn tree and rule-based models
- apply reinforcement learning techniques

REFERENCES

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AML Book Publishers, 2012
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.

Mapping of Courses Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week**														
COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	2	2	3	3	1	3	1
CO2	-	-	-	2	3	-	1	2	-	3	3	1	2	2
CO3	-	-	-	-	-	-	-	-	-	3	1	1	2	-
CO4	-	-	-	-	3	1	1	-	2	3	3	1	3	2
CO5	-	-	-	-	-	2	-	2	1	3	1	1	3	2

CAE16509 HEALTH CARE ANALYTICS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the basic concepts of health care system
- know about creating and maintaining health care information systems
- understand information architecture
- ensure access of clinical information system on the fly
- understand IT governance and assessment of health care information system

UNIT I INTRODUCTION 9

Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

UNIT II HEALTH CARE INFORMAION SYSTEMS 9

History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

UNIT III INFORMATION TECHNOLOGY 9

Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

UNIT IV MANAGEMENT OF IT CHALLENGES 9

Organizing information technology services – IT alignment and strategic planning – IT governance and management.

UNIT V T INITIATIVES 9

Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- develop an understanding of basic research skills applicable to the design
- apply evaluation and implementation of appropriate Healthcare Information Systems (HIS)
- analyze the impact, strengths and weaknesses of various HIS in any healthcare settings
- write reports on the roles of HIS and their impact on facilitating superior healthcare delivery Design a suitable HIS architecture
- use research methods and analysis together to plan the successful implementation of an appropriate HIS solution

REFERENCES

1. Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", John Wiley, 2nd edition 2009.
2. Marion J. Ball, Charlotte Weaver, Joan Kiel ,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, 2010, 3rd edition
3. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems : A Component based approach", Springer 2005.
4. Kevin Beaver, Healthcare Information Systems, Second edition Best Practices, CRC Press, 2002
5. Marion J. BallHealthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995.

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COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16510 GREEN COMPUTING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- acquire knowledge to adopt green computing practices to minimize negative impacts on the environment
- skill in energy saving practices in their use of hardware
- examine technology tools that can reduce paper waste and carbon footprint by user
- analyze the green compliance
- understand how to minimize equipment disposal requirements

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture– Environmental Intelligence- Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GRID FRAMEWORK 9

Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V GREEN TECHNOLOGY 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- acquire knowledge to adopt green computing practices to minimize negative impacts on the environment
- apply green business process management
- analyze GRID framework
- skill in energy saving practices in their use of hardware concept
- understand the technology tools that can reduce paper waste and carbon footprint by user

REFERENCES

1. BhuvanUnhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2011
2. Woody Leonhard, Katherrine Murray, "Green Home computing for dummies", August 2009.
3. Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey", Shoff / IBM rebook, 2011
4. John Lamb, "The Greening of IT", Pearson Education, 2009.
5. Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com, 2008.

Mapping of Courses Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	3	3	-	-	-	-	-	-	2	1	2
CO3	1	2	2	2	2	-	-	-	-		2	1	1	3
CO4	1	2	3	1	-	-	-	1	-	-	-	-	2	2
CO5	2	2	2	2	-	-	-	2	-	-	-	2	2	3

CAE16511 HUMAN RESOURCE MANAGEMENT 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the importance of human resources
- describe the steps involved in the human resource planning process
- understand the stages of employee socialization and training needs
- know about the purposes of performance management systems and appraisal
- know the list of occupational safety and health administration enforcement priorities

UNIT I FUNDAMENTALS OF HRM 9

Introduction- importance of HRM – functions- qualities of HR manager – evolution and growth of HRM – trends and opportunities - HRM in global environment – legal and ethical context – laws for discriminatory practices – equal opportunity employment.

UNIT II STAFFING, RECRUITMENT AND SELECTION 9

HR Polices - need, type and scope - human resource planning - job analysis - recruiting goals – recruiting sources – global perspective – selection process – pre-employment testing – interviews – job offers – hiring mistakes - key element for successful predictors.

UNIT III TRAINING AND DEVELOPMENT 9

Socialization – new employee orientation, training, development – organizational development – methods – evaluating training– international training and development issues – career development - value for organization and individual – mentoring and coaching – traditional career stages

UNIT IV PERFORMANCE EVALUATION, REWARDS AND BENEFITS 9

Appraisal process – methods – factors distort appraisal – team appraisal – international appraisal – rewards – Theories of motivation - compensation administration – job evaluation and pay structure – special cases of compensation – executive compensation programs – employee benefits.

UNIT V SAFE AND HEALTHY WORK ENVIRONMENT 9

Occupational safety and health act - issues – stress – assistance program – labor management - employee unions – labor legislation. Promotion, demotion, transfer and separation – employee grievances – redressal methods.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- identify the primary external influences affecting HRM
- outline the components and the goals of staffing, training and development
- understand the selection procedure in various organizations
- understand the practices used to retain the employees and able to evaluate their performance
- able to identify the stress and the cause of burn out

REFERENCES

1. Decenzo and Robbins, Human Resource Management, Wilsey, 10th edition, 2012.
2. Mamoria C.B. and Mamoria. S., Personnel Management, Himalaya Publishing Company, 1997.
3. Mirza S. Saiyadain Human Resource Management , Tata McGraw Hill , 4th edition 2009.
4. EugenceMckenna and Nic Beach Human Resource Management, Pearson Education Limited, 2002.
5. Dessler, Human Resource Management, Pearson Education Limited, 2002.

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(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week

COs	**Programme Outcomes (POs)**													
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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3

CAE16512 SOCIAL NETWORK ANALYSIS 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the components of the social network
- model and visualize the social network
- mine the users in the social network
- understand the evolution of the social network
- mine the interest of the user

UNIT I INTRODUCTION 9

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks.

UNIT II MODELING AND VISUALIZATION 9

Visualizing Online Social Networks-A Taxonomy of Visualizations-Graph Representation-Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node- Link Diagrams -Hybrid Representations-Modeling and aggregating social network data-Random Walks and their Applications – Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships

UNIT III MINING COMMUNITIES 9

Aggregating and reasoning with social network data, Advanced Representations - Extracting evolution of Web Community from a Series of Web Archive-Detecting Communities in Social Networks - Evaluating Communities -Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms-Node Classification in Social Networks.

UNIT IV EVOLUTION 9

Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence – Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks – Expert Location without Graph Constraints - with Score Propagation–Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction- Bayesian Probabilistic Models - Probabilistic Relational Models.

UNIT V TEXT AND OPINION MINING 9

Text Mining in Social Networks-Opinion extraction-Sentiment classification and clustering-Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product review mining- Review Classification–Tracking sentiments towards topics over time.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- work on the internals components of the social network
- model and visualize the social network
- mine the behavior of the users in the social network
- predict the possible next outcome of the social network
- mine the opinion of the user

REFERENCES

1. Charu C. Aggarwal, "Social Network Data Analytics", Springer; 2011
2. Peter Mika, "Social Networks and the Semantic Web", Springer, 1st edition, 2007.
3. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st edition, 2010
4. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking–Techniques & applications Springer, 1st edition, 2011.
5. Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.

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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	3	3	-	-	-	-	-	-	2	1	2
CO3	1	2	2	2	2	-	-	-	-		2	1	1	3
CO4	1	2	3	1	-	-	-	1	-	-	-	-	2	2
CO5	2	2	2	2	-	-	-	2	-	-	-	2	2	3