PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)

B.Tech. – INFORMATION TECHNOLOGY

REGULATIONS 2019

CURRICULUM

(CHOICE BASED CREDIT SYSTEM)

(For the candidates admitted during the Academic Year 2019-2020)

SEMESTER I

Course Code	Category	Course Title	Course Mode	L	T	P	C
MA19101	BS	Matrices and Calculus	-	3	1	0	4
EN19101	HS	English Communication Skills I	Integrated Theory and Laboratory	2	0	2	3
PH19101	BS	Engineering Physics	Integrated Theory and Laboratory	2	0	2	3
CH19101	BS	Engineering Chemistry	Integrated Theory and Laboratory	2	0	2	3
CS19101	ES	Programming in C	Integrated Theory and Laboratory	2	0	2	3
GE19101	ES	Engineering Practices Laboratory	-	0	0	4	2
			TOTAL	**11**	**1**	**12**	**18**

SEMESTER II

Course Code	Category	Course Title	Course Mode	L	T	P	C
MA19201	BS	Complex Variables and Differential Equations	-	3	1	0	4
EN19201	HS	English Communication Skills II	Integrated Theory and Laboratory	2	0	2	3
PH19202	BS	Physics for Information Science	Integrated Theory and Laboratory	2	0	2	3
CH19201	BS	Material Chemistry	Integrated Theory and Laboratory	2	0	2	3
CS19202	ES	Data Structures and Algorithms	Integrated Theory and Laboratory	2	0	2	3
EE19201	ES	Basic Electrical Engineering	-	3	0	0	3
ME19204	ES	Engineering Graphics Laboratory	-	0	0	4	2
			TOTAL	**14**	**1**	**12**	**21**

CS19101 **PROGRAMMING IN C** **2 0 2 3**

(COMMON TO CSE / IT)

COURSE OBJECTIVES

To enable the students to

- learn the organization of a digital computer.
- work with problem solving techniques and to learn the basics of C.
- solve problems using control statements.
- use strings, functions, pointers in C.
- learn structure, union and file handling in C.

UNIT I INTRODUCTION TO COMPUTERS **6**

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations –Classification of Computers – Basic Computer organization – Software –Types of Software – Software Development Lifecycle - Number System Conversion.

UNIT II PROBLEM SOLVING AND BASICS OF C LANGUAGE **6**

Problem Solving Techniques: Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudo code.

Overview of C: Structure of C programs, Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operations.

UNIT III CONTROL STATEMENTS AND ARRAYS **6**

Decision Making and Branching: Simple if statement – ifelse statement – nested ifelse statement - switch statement.

Decision Making and Looping: while statement - dowhile statement – for statement – nested forstatement.

Arrays: Introduction – One Dimensional array - Two Dimensional Array - Multidimensional array - Matrix operations.

UNIT IV STRINGS , FUNCTIONS AND POINTERS **6**

String: Declaring and Initializing string variables – string handling functions.

Functions: Function declaration – categories of function - parameter passing methods – call by value, callby reference, recursion - Library functions.

Pointers: Understanding pointers – Accessing address of variable – Declaring pointer variables –Initialization of pointer variables – Accessing a variable through its pointer – Pointers and functions – Operations on pointers.

UNIT V STRUCTURE, UNIONS AND FILE HANDLING **6**

Structures and Union: Defining a structure – Declaring structure variables – Accessing structure members – Structure initialization - Structure assignment - Nested Structure - Array of Structure – Union –Enumerated data type.

File Handling: Introduction to file – Defining and opening a file – closing a file – File operations.

TOTAL PERIODS: 30

LIST OF EXPERIMENTS

a) Word Processing

1. Document creation, Text manipulation with Scientific notations
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. 4. Drawing - flow Chart.

b) Spread Sheet

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

c) C Programming

9. Data types, Expression Evaluation, Condition Statements
10. Arrays
11. Structures and Unions
12. Functions
13. File Handling
14. Pointers

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- gain knowledge about the organization of computer.
- understand basic concepts of C programs.
- program with various control statements.
- acquire knowledge for handling strings, functions, pointers in C.
- implement C programs using structure, union and file handling concepts.

TEXT BOOKS

1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.

REFERENCES

1. Byron Gottfried, "Programming with C", 3rd Edition, (Indian Adapted Edition), TMH publications, 2010.
2. Stephen G.Kochan, "Programming in C", 5th Edition, Pearson Education India, (2011).
3. BrianW.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2009).

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	3	3	3	-	1	1	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	1	-	1	-	-	-	-	2	3	3
CO4	1	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2

PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018

(AUTONOMOUS)

B.Tech. INFORMATION TECHNOLOGY

CURRICULUM

REGULATIONS 2016

(CHOICE BASED CREDIT SYSTEM)

SEMESTER III

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA16301	Transforms and Boundary Value Problems	3	2	0	4
2	PC	IT16301	Object Oriented Programming with C++	3	0	0	3
3	PC	IT16302	Design and Analysis of Algorithms	3	0	0	3
4.	ES	EC16307	Principles of Communication	3	0	0	3
5.	ES	EC16308	Digital Principles and System Design	3	0	0	3
6	BS	CH16301	Environmental Science and Engineering	3	0	0	3
Practical							
7.	PC	IT16305	Object Oriented Programming with C++ Laboratory	0	0	4	2
8.	ES	EC16309	Digital Laboratory	0	0	4	2
9.	HS	EN16301	Business English Course Laboratory	0	0	2	1
			TOTAL	**18**	**2**	**10**	**24**

SEMESTER IV

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1.	BS	MA16401	Probability and Queuing Theory	3	2	0	4
2.	PC	IT16401	Java Programming	3	2	0	4
3.	PC	IT16402	Operating Systems	3	0	0	3
4.	PC	IT16403	Database Management Systems	3	0	0	3
5.	PC	IT16404	Computer Architecture	3	0	0	3
6.	ES	EC16408	Microprocessor and Microcontroller	3	0	0	3
Practical							
7.	PC	IT16405	Database Management Systems Laboratory	0	0	4	2
8.	PC	IT16406	Operating Systems Laboratory	0	0	4	2
9.	ES	EC16409	Microprocessor and Microcontroller Laboratory	0	0	4	2
			TOTAL	**18**	**4**	**12**	**26**

IT16301 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

- to get a clear understanding of object-oriented concepts.
- to understand object oriented programming through C++.
- to develop the problem solving skills by applying object-oriented concepts inheritance and virtualclasses.
- to create programs using streams and file handling
- to learn templates and exception handling in C++

UNIT I PRINCIPLES OF OOP 9

Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program - Applications of C++- Tokens- Keywords- Identifiers-constants- variables - Data types - Basic, User defined ,Derived - Dynamic initialization -Reference variables- Scope resolution operator- Function Prototyping- Inline function- Default arguments – Function overloading.

UNIT II CLASSES, OBJECTS AND CONSTRUCTORS 9

Class specification- Static data members and member functions - Array of objects- Objects as function arguments - Friend functions- Returning objects- Local classes - Constructors – Parameterized constructors- Multiple Constructors- Constructors with default arguments-Copy constructors- Destructors - Operator Overloading-Overloading unary and binary operator.

UNIT III INHERITANCE AND VIRTUAL CLASS 9

Introduction – types- Single Inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance-Hybrid Inheritance. Virtual base class – Abstract class – this pointer-Dynamic binding-virtualfunction – pure virtual function.

NIT IV STREAMS AND FILE HANDLING 9

Stream classes- Formatted and unformatted I/O operations- Manipulators- File handling - File open and close-File pointers and their manipulators- Sequential and random access-Error Handling.

UNIT V TEMPLATES AND EXCEPTION HANDLING 9

Class templates-Function templates- overloading of template functions- Exception Handling: Exception handling mechanism-throwing mechanism- catching mechanism- rethrowing an exception. Standard Template Library.

TOTALHOURS 45

COURSE OUTCOMES

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

- explain the object oriented concepts
- understand object oriented programming through C++.
- create programs using inheritance and virtual classes.
- develop programs using streams and file handling.
- know function and class template & way of handling exception.

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013

REFERENCES

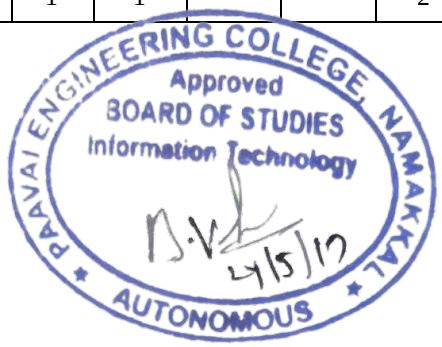
1. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
2. K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
3. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006
4. BjarneStroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
5. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd,First Edition, 2000.

WEB LINKS

1. http://www.desy.de/gna/html/cc/Tutorial/tutorial.html
2. http://thatchna.weebly.com/uploads/4/1/9/3/4193382/std_c_notes_03.pdf
3. https://www.youtube.com/watch?v=CzWZYwOvrcE

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	3
CO2	3	2	-	-	-	-	-	-	1	1	-	-	2	3
CO3	3	2	-	-	-	-	-	-	1	1	-	-	2	2
CO4	3	2	-	-	-	-	-	-	1	1	-	-	2	3
CO5	3	2	-	-	-	-	-	-	1	1	-	-	2	2



IT16302 DESIGN AND ANALYSIS OF ALGORITHMS 3 0 0 3

COURSE OBJECTIVES

- to study the principles of algorithm design.
- to know the importance of computational complexity of the algorithm .
- to become familiar with dynamic programming, divide and conquer, branch and bound andbacktracking techniques.
- to understand the limitations of algorithm power.
- to study about Notions of P, NP, NPC, and NP-hard.

UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving –Important Problem Types– Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force –Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - KnapsackProblem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-HullProblems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient– Warshall's and Floyd's algorithm – Optimal Binary Search Trees– KnapsackProblem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm- Dijkstra's Algorithm- Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method-The Maximum-Flow Problem – Maxim Matching in Bipartite Graphs- The Stablemarriage Problem.

UNIT V LIMITATIONS OF ALGORITHM POWER 9

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems- Coping- with the Limitations – Backtracking - n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound - Assignment problem – Knapsack Problem – Traveling Salesman Problem.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- discuss the significance of algorithms in problem solving process.
- analyze asymptotic runtime complexity of algorithms.
- describe and apply dynamic programming and divide and conquer algorithms.
- design efficient algorithms for new situations, using as building blocks the techniques learned.
- apply algorithm design techniques to solve certain NP-complete problems.

TEXT BOOK

1. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, PearsonEducation, 2012.

REFERENCES

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

WEB LINKS

1. nptel.ac.in/courses/106101060/
2. freevideolectures.com › Computer Science › IIT Bombay

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	2	1	-	2	1	1	1	2	3	1	-
CO2	3	3	1	2	2	-	2	-	-	-	2	3	2	-
CO3	3	3	1	2	2	-	2	-	-	-	2	3	2	2
CO4	3	3	1	2	2	-	2	-	-	-	2	3	2	1
CO5	3	3	1	2	2	-	2	-	-	-	2	3	2	1

EC16307 PRINCIPLES OF COMMUNICATION 3 0 0 3

COURSE OBJECTIVES

- to understand the different types of AM and FM Communication systems
- to gain knowledge in different digital modulation techniques for digital transmission.
- to study about base band transmission ISI and distortion free base band transmission.
- to know the different multiple access methods in wireless communication
- to acquire knowledge about Satellite and Optical Communication.

UNIT I ANALOG COMMUNICATION 9

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation

UNIT II DIGITAL COMMUNICATION 9

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation.

UNIT III DIGITAL TRANSMISSION 9

Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Inter symbolinterference, eye patterns.

UNIT IV MULTIPLE ACCESS TECHNIQUES 9

Multiple access techniques – wireless communication, TDMA, FDMA and CDMA in wireless communication systems, Source coding of speech for wireless communications.

UNIT V SATELLITE AND OPTICAL COMMUNICATION 9

Satellite Communication Systems-Keplers Law, LEO and GEO Orbits, Link model-Optical Communication Systems-Elements of Optical Fiber Transmission link, Types, Losses, Sources and Detectors.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- compare AM and FM communication systems .
- evaluate different digital modulation techniques for digital transmission.
- analyze the concepts of digital communication and applications.
- apply the concept of different multiple access methods
- analyze the concepts of satellite and optical communication.

TEXT BOOKS

1. Wayne Tomasi, “Advanced Electronic Communication Systems”, Pearson Education, 2007.
2. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley &Sons., 2001.

REFERENCES

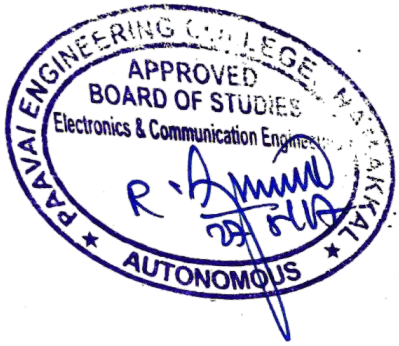
1. H.Taub, D L Schilling ,GSaha ,"Principles of Communication"3/e,2007.
2. B.P.Lathi,"Modern Analog and Digital Communication systems", 3/e, Oxford University Press, 2007
3. Dennis Roddy, "Satellite Communications", 4th Edition, McGraw Hill Professional, 2006.
4. Govind.P.Agarwal, "Fiber optic communication systems", 3rd edition, John Wiley & Sons Publications 2002.

WEB LINKS

1. https://www.youtube.com/watch?v=TPm0XSPxld8
2. www.nptel.ac.in/courses/106105080/pdf/M2L5.pdf
3. http://nptel.ac.in/courses/108101037/28
4. http://nptel.ac.in/courses/108101037/12

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak													
COs	**Programme Outcomes(POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	-	-	-	-	2	-	-	3	3	3
CO2	3	3	3	2	-	-	-	-	2	-	-	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	2	-	-	-	-	2	-	-	3	3	3



SEMESTER IV

PROBABILITY AND QUEUEING THEORY

MA16401 **3 2 0 4**

(COMMON TO CSE & IT)

COURSE OBJECTIVES

- to acquire knowledge of the random variables and manipulate.
- to understand the concepts of standard distributions methods.
- to analyse the relationship between the two random variables.
- to provide necessary basic concepts in probability and random processes related to communicationengineering domain.
- to use various queuing theory models for real time situations.

UNIT I RANDOM VARIABLES 15

Axioms of probability – Conditional probability – Total probability – Baye's theorem - Random variable- Probability mass function – Probability density function – Properties – Moments – Moment generating functionsand their properties.

UNIT II STANDARD DISTRIBUTION 15

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions and theirproperties – Functionsof a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15

Joint distributions – Marginal and conditional distributions – Covariance – Correlation andLinear regression – Transformation of random variables.

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 15

Classification – Stationary process – Poisson process – Markov Chain – Transition probabilities– LimitingDistributions.

UNIT V QUEUEING MODELS 15

Markovian models – (M/M/1), (M/M/C), finite and infinite capacity – (M/G/1) queue –Pollaczek – KhintchineFormula.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- understand the basic probability concepts.
- know the standard distribution for real time applications.
- acquire skills in handling situations involving more than one random variable and functions of random variables.
- evolve with respect to time in a probabilistic manner.
- acquire the fundamental skills to analyze queuing models and systems.

TEXT BOOKS

1. Gross, Donald Harris and M Carl, " Fundamentals of Queuing Theory", 3rd ed., Wiley Publications, NewDelhi, 2008

2. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint,2010.
3. T Veerarajan, "Probability, Statistics and Random Processes", 2nd ed., Tata McGraw- Hill, New Delhi,2008.

REFERENCES

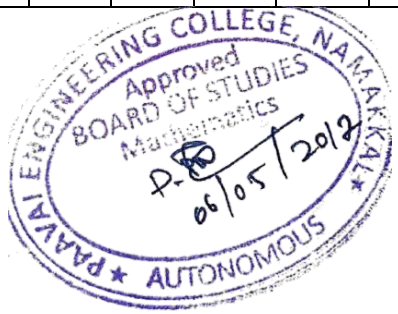
1. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications",PHI, New Delhi, 2nd Edition, 2009.
2. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and RandomProcesses", Tata McGraw Hill, New Delhi, 9th Reprint, 2010.
3. Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt.Ltd.Bangalore,2nd Edition, 2012
4. Venkatachalam.G,"Probabilityand Queueing Theory", Hitech Publishing Company Pvt.Ltd.,Chennai,3rd Edition, 2012.

WEB LINKS

1. https://www.youtube.com/watch?v=IYdiKeQ9xEI
2. https://www.youtube.com/watch?v=xGkpXk-AnWU
3. https://www.youtube.com/watch?v=l-rRtmNpdkU
4. https://www.youtube.com/watch?v=J70dP_AECzQ
5. http://172.16.100.200/NPTEL/displayvideo.html?type1=111105041%2Fmod01lec16.mp4

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	-	-	-	-	-	-	-	-	3	3
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	2	3	-	-	-	-	-	-	-	-	3	3
CO5	3	3	2	-	-	-	-	-	-	-	-	-	3	3



IT16401 JAVA PROGRAMMING 3 2 0 4

COURSE OBJECTIVES

- to understand the concepts of object oriented programming.
- to understand the concepts of inheritance.
- to develop an application in event driven programming.
- to develop an application in generic programming.
- to develop an application in concurrent programming.

UNIT I OBJECT-ORIENTED PROGRAMMING – FUNDAMENTALS 15

Review of OOP - Objects and classes in Java – defining classes – methods –access specifies – static members– constructors – finalize method – Arrays – Strings -Packages – Java Doc comments.

UNIT II OBJECT-ORIENTED PROGRAMMING – INHERITANCE 15

Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword –abstract classes – the Objectclass – Reflection – interfaces – object cloning – inner classes – proxies.

UNIT III EVENT-DRIVEN PROGRAMMING 15

Graphics programming – Frame – Components– working with 2D shapes – Using color, fonts, and images - Basics of event handling – event handlers – adapter classes –actions – mouse events – AWT event hierarchy – introduction to Swing – Model – View-Controller design pattern – buttons – layout management – Swing Components.

UNIT IV GENERIC PROGRAMMING 15

Motivation for generic programming – generic classes – generic methods – generic code and virtual machine– inheritance and generics – reflection and generics – exceptions –exception hierarchy – throwing andcatching exceptions – Stack Trace Elements -assertions – logging.

UNIT V CONCURRENT PROGRAMMING 15

Multi-threaded programming – interrupting threads – thread states – thread properties –thread synchronization– thread-safe Collections – Executors – synchronizers – threads and event-driven programming.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- understand the needs of object oriented programming.
- differentiate the functionalities of object oriented approach and procedural languages.
- demonstrate the concepts of event-driven programming.
- exhibit the concepts of generic programming using Java .
- perform the concepts of concurrent programming.

TEXT BOOKS

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, SunMicrosystems Press, 2008.

2. Herbert Schildt, Java2-CompleteReference, Tata McGraw Hill, 2011.

REFERENCES

1. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, PearsonEducation, 2000.
3. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, TataMcGraw-Hill Publishing Company Ltd., 2006.
4. Gary Cornell and Cay S. Horstmann, Core Java Vol.1andVol.2,Sun Microsystems Press,2008
5. Herbert Schildt, Java, A Beginner's Guide, Tata McGraw Hill,2007.

WEB LINKS

1. www.javatpoint.com/java-oops-concepts
2. www.w3resource.com/java.../java-object-oriented-programming.php

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	1	1	-	-	-	-	-	-	-	-	2	1
CO2	2	1	1	2	-	-	-	-	-	-	-	-	1	2
CO3	2	1	2	2	3	-	-	-	-	-	-	-	1	2
CO4	1	2	2	1	1	-	-	-	-	-	-	-	1	2
CO5	1	1	2	1	-	-	-	-	-	-	-	-	-	2

IT16402 **OPERATING SYSTEMS** **3 0 0 3**

COURSE OBJECTIVES

- to study the basic concepts and functions of operating systems.
- to understand the structure and functions of OS.
- to learn about Processes, Threads and Scheduling algorithms.
- to understand the principles of concurrency and Deadlocks.
- to learn various memory management schemes.

UNIT I INTRODUCTION **9**

Introduction: Computer system organization - Introduction to operating systems – operating system structures – Services - System calls – System programs. Processes: Process concept – Process scheduling – Operations on Processes –Cooperating processes – Inter process communication – Communication in client-server systems.Threads: Multi-threading models – Threading issues. Case Study: Pthreads library.

UNIT II PROCESS MANAGEMENT AND DEADLOCK **10**

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Monitors. Deadlock: System model – Deadlock Characterization –Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock. Case Study: Process scheduling in Linux.

UNIT III MEMORY MANAGEMENT **9**

Main Memory: Background – Swapping – Contiguous memory allocation –Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Page replacement – Allocation offrames –Thrashing. Case Study: Memory management in windows and Solaris.

UNIT IV FILE SYSTEMS **9**

File-System Interface: File concept – Access methods – Directory structure – File system mounting – File sharing- Protection. File-System Implementation:Directory implementation–Allocation methods – Free-space management – efficiency and performance – recovery– Network file systems. Case studies: File systemin Windows XP.

UNIT V I/O SYSTEMS AND MASS STORAGE MANAGEMENT **8**

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass- Storage Structure: Disk attachment - Disk scheduling – Disk management – Swap-space management – RAID –stable storage. Case study: I/O in Linux.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design various scheduling algorithms.
- apply the principles of concurrency.

- design deadlock, prevention and avoidance algorithms.
- compare and contrast various memory management schemes.
- schedule and manage the disk effectively .

TEXT BOOK

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd,2013.

REFERENCES

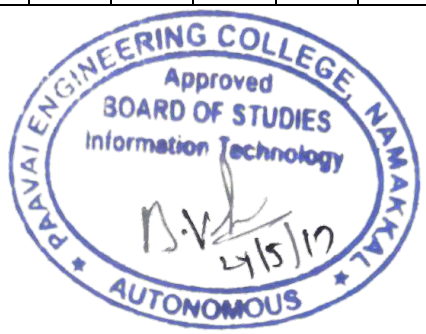
1. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2014.
2. William Stallings, "Operating Systems – internals and design principles", Prentice Hall, 7thEdition,2011.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2007.
4. Andrew S. Tannenbaum&Albert S. Woodhull, "Operating System Design and Implementation", Prentice Hall, 3rd Edition, 2006.
5. Gary J.Nutt, "Operating Systems", Pearson/Addison Wesley, 3rd Edition, 2004.

WEB LINKS

1. http://nptel.ac.in/courses/106108101
2. http://www.learnerstv.com

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak													
COs	**Programme Outcomes(POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	3	-	-	-	-	-	-	1	-	-	-	2	1
CO2	3	3	3	-	3	-	-	-	1	-	-	1	2	1
CO3	2	3	3	-	3	-	-	-	1	-	1	2	2	1
CO4	2	3	3	-	3	-	-	-	1	-	2	3	2	1
CO5	3	3	-	-	-	-	-	-	3	3	2	3	1	3



IT16403 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

COURSE OBJECTIVES

- to learn the fundamentals of database management systems.
- to make the students understand the relational model.
- to familiarize the students with ER diagrams.
- to expose the students to SQL.
- to familiarize the students with the different types of databases.

UNIT I INTRODUCTION 9

Purpose of Database System - Views of data – Data Models – Database Languages – Database System Architecture – Database users and Administrator – Entity–Relationship model (E-R model) – E-R Diagrams - Introduction to relational databases.

UNIT II RELATIONAL MODEL 9

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations –Additiona l/O operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views –Introduction to Distributed Databases and Client/Server Databases.

UNIT III DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/ Code Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT IV TRANSACTIONS 9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery –Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking –Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQLFacilities for Concurrency.

UNIT V IMPLEMENTATION TECHNIQUES 9

Overview of Physical Storage Media–Magnetic Disks – RAID –Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing –Query Processing Overview – Catalog Information for Cost Estimation – Selection Operation – Sorting – Join Operation – Database Tuning.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- describe basic concepts of database system.
- design a data model and schemas in RDBMS.
- analyze functional dependencies for designing a robust database.
- apply SQL for business related problems.

- implement transactions, Concurrency control, and be able to do database recovery

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, "Database System Concepts", Sixth Edition,
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems",Eighth Edition, PearsonEducation, 2006.

REFERENCES

1. Elmasri R. and Shamakant B. Navathe, "Fundamentals of Database Systems", 6th Edition, AddisionWesley , 2011.
2. Atul Kahate, "Introduction to Database Management Systems", Pearson Education, New Delhi, 2006.
3. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata Mc Graw Hill, 2010.
4. G.K.Gupta, "Database Management Systems", Tata Mc Graw Hill, 2011.
5. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book",Pearson Education, Second Edition, 2008

WEB LINKS

1. www.nptelvideos.in/2012/11/database-management-system.html
2. nptel.ac.in/courses/106106093

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	1	1	-	-	-	-	-	-	-	-	2	-
CO2	1	2	3	2	-	-	-	-	-	-	-	-	1	2
CO3	1	3	2	2	1	-	-	-	-	-	-	-	1	2
CO4	1	2	2	2	1	-	-	-	-	-	-	-	1	2
CO5	1	2	2	1	2	-	-	-	-	-	-	-	1	2

IT16404 COMPUTER ARCHITECTURE 3 0 0 3

COURSE OBJECTIVES

- to make students understand the basic structure and operation of digital computer.
- to familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- to expose the students to the concept of pipelining.
- to understand the concept of virtual and catch memory .
- to expose the students with different ways of communicating with I/O devices and standard I/Ointerfaces.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface –Instruction set architecture – Addressing modes – RISC– CISC.

UNIT II BASIC PROCESSING UNIT & ALU OPERATIONS 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization– Hardwired control– Micro programmed control – ALU-Addition and subtraction–Multiplication–Division.

UNIT III PIPELINING & PARALLELISM 9

Basic concepts – Data hazards – Instruction hazards – Structural Hazards-Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling-Instruction-level- parallelism –Parallel processing challenges – Flynn's classification –Hardware multithreading- Hardware support for exposing parallelism

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache Performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Programmed Input/ Output -Interrupts – Direct Memory Access– Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand instruction and addressing modes.
- design arithmetic and logic unit.
- design and analyses pipelined control units.
- evaluate performance of memory systems.
- understand parallel processing architectures.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design', Morgan Kauffman/ Elsevier, Fifth edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2012.

REFERENCES

1. William Stallings "Computer Organization and Architecture" , Seventh Edition , Pearson Education,2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, PearsonEducation, 2005.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, TataMcGraw Hill, 1998.

WEB LINKS

1. http://courses.cs.vt.edu/csonline/OS/Lessons/
2. http://www.linux-tutorial.info/modules.php?name=MContent&pageid=4

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	-	-	-	-	-	-	-	2	2	2
CO2	3	2	2	3	2	-	-	-	-	-	-	2	2	2
CO3	3	2	1	2	2	-	-	-	-	2	-	2	-	2
CO4	3	3	2	3	2	-	-	-	-	2	-	3	-	2
CO5	2	3	2	3	2	-	-	-	-	2	-	3	2	2

IT16405 DATABASE MANAGEMENT SYSTEMS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- to learn to create and use a database.
- to be exposed to different types of database applications.
- to develop conceptual understanding of database management system.
- to understand how a real world problem can be mapped to schemas.
- to develop understanding of different applications and constructs of SQL PL/SQL.

LIST OF EXPERIMENTS

1. Data Definition, Table Creation, Constraints.
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries.
4. Views.
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools.
7. Forms.
8. Triggers.
9. Menu Design.
10. Reports.
11. Database Design and implementation (Mini Project).
    a) Personal Information System.
    b) Web Based User Identification System.
    c) Timetable Management System.
    d) Hotel Management System

TOTAL PERIODS 60

COURSE OUTCOMES

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

- design and implement a database schema for a given problem-domain.
- populate and query a database.
- create and maintain tables using PL /SQL.
- prepare forms and reports.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

HARDWARE: Standalone desktops (or) Server supporting terminals.

CO-PO MAPPING:

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

IT16406 OPERATING SYSTEMS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- to implement scheduling algorithms.
- to learn to use the file allocation and organization strategies.
- to be familiar with implementation of deadlock avoidance & detection algorithms.
- to implement page replacement algorithms.
- to be exposed to process creation and inter process communication.

LIST OF EXPERIMENTS

1. Simulate the following CPU scheduling algorithms: a) Round Robin b) SJF c) FCFS d) Priority.
2. Simulate all file allocation strategies: a) Sequential b) Indexed c) Linked.
3. Implement the producer – consumer problem using semaphores.
4. Simulate all File Organization Techniques:

   a) Single level directory b) Two level c) Hierarchical d) DAG.
5. Simulate Bankers Algorithm for Dead Lock Avoidance.
6. Simulate an Algorithm for Dead Lock Detection.
7. Simulate all page replacement algorithms a) FIFO b) LRU c) Optimal.
8. Simulate Shared memory and IPC.
9. Simulate Paging Technique of memory management.
10. Implement Threading & Synchronization Applications.
11. Simulate the following CPU scheduling algorithms: a) Round Robin b) SJF c) FCFS d) Priority.
12. Simulate all file allocation strategies: a) Sequential b) Indexed c) Linked.
13. Implement the producer – consumer problem using semaphores.
14. Simulate all File Organization Techniques:

TOTAL PERIODS 60

COURSE OUTCOMES

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

- compare the performance of various CPU scheduling algorithm.
- implement file allocation and organization strategies.
- implement deadlock avoidance, and detection algorithms.
- critically analyze the performance of the various page replacement algorithms.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Standalone desktops (or) Server with C / C++ / Java / Equivalent complier

HARDWARE: Standalone desktops (or) Server supporting terminals.

CO-PO MAPPING:

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

PAAVAIENGINEERINGCOLLEGE,NAMAKKAL–637018

(AUTONOMOUS)

B.Tech. INFORMATION TECHNOLOGY

CURRICULUM

REGULATIONS 2016

(CHOICE BASED CREDIT SYSTEM)

SEMESTER – V

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	ES	EC16506	Principles of Digital Signal Processing	3	2	0	4
2	PC	IT16501	Computer Networks	3	0	0	3
3	PC	IT16502	Object Oriented Analysis and Design	3	0	0	3
4	PC	IT16503	Internet Programming	3	0	0	3
5	PE	*******	Elective - I *	3	0	0	3
6	PC	IT16504	Software Engineering	3	0	0	3
Practicals							
7	PC	IT16505	Computer Networks and Internet Programming Laboratory	0	0	4	2
8	PC	IT16506	CASE Tools Laboratory	0	0	4	2
9	EE	EN16501	Career Development Laboratory I	0	0	2	1
			TOTAL	**18**	**2**	**10**	**24**

SEMESTER – VI

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	PC	IT16601	Compiler Design	3	0	0	3
2	PC	IT16602	Graphics and Multimedia	3	0	0	3
3	PC	IT16603	Embedded Systems	3	0	0	3
4	HS	BA16254	Principles of Management	3	0	0	3
5	PE	*******	Elective – II*	3	0	0	3
6	OE	*******	Open Elective – I**	3	0	0	3
Practicals							
7	PC	IT16604	Graphics and Multimedia Laboratory	0	0	4	2
8	PC	IT16605	Compiler Design Laboratory	0	0	4	2
9	EE	EN16601	Career Development Laboratory II	0	0	2	1
			TOTAL	**18**	**0**	**10**	**23**

ELECTIVE-I

S.No	Category	Course Code	CourseTitle	L	T	P	C
1	PE	MA16151	Discrete Mathematics	3	0	0	3
2	PE	IT16151	Theory of Computation	3	0	0	3
3	PE	IT16152	Information CodingTechniques	3	0	0	3
4	PE	IT16153	User Interface Design	3	0	0	3
5	PE	IT16154	Artificial Intelligence	3	0	0	3

ELECTIVE-II

S.No	Category	Course Code	CourseTitle	L	T	P	C
1	PE	IT16251	Open Source Software	3	0	0	3
2	PE	IT16252	Distributed Systems	3	0	0	3
3	PE	BA16351	Engineering Economics and Financial Accounting	3	0	0	3
4	PE	IT16253	TCP/IP Protocol Design and Implementation	3	0	0	3
5	PE	IT16254	System Software	3	0	0	3

OPEN ELECTIVE-I

S.No	Category	Course Code	CourseTitle	L	T	P	C
1	OE	IT16901	Green Computing	3	0	0	3
2	OE	IT16902	Information Technology Essentials	3	0	0	3
3	OE	IT16903	Open Source Technologies	3	0	0	3

EC16506 PRINCIPLES OF DIGITAL SIGNAL PROCESSING 3 2 0 4

COURSE OBJECTIVES

To enable students to

- introduce signals, systems, time and frequency domain concepts and the associated mathematical tools that are fundamental to all DSP techniques.
- introduce discrete Fourier transform and its applications.
- teach the design of infinite and finite impulse response filters for filtering undesired signals.
- provide a thorough understanding and working knowledge of design, implementation, analysis andcomparison of digital filters for processing of discrete time signals.
- introduce signal processing concepts in systems having more than one sampling frequency

UNIT I SIGNALS AND SYSTEMS 15

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Convolution

UNIT II FREQUENCY TRANSFORMATIONS 15

Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering.

UNIT III IIR FILTER DESIGN 15

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance - Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

UNIT IV FIR FILTER DESIGN 15

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques.

UNIT V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS 15

Binary fixed point and floating point number representations – Comparison - Quantization noise truncation and rounding – quantization noise power- input quantization error - coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- impart the knowledge about continuous and discrete time signals.

- create an understanding of Fourier Transform.
- examine the process of Quantization and the effects of finite Register Length
- determine and implement the appropriate type of design method for FIR filter.
- know different types of IIR filter structures.

TEXT BOOK

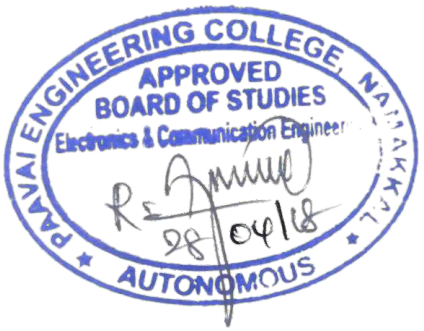
1. John G. Proakis and DimitrisG.Manolakis, "Digital Signal Processing – Principles, Algorithms &Applications", Fourth Edition, Pearson Education, Prentice Hall, 2007.

REFERENCES

1. Ramesh babu "Digital Signal Processing" Second Edition,2007.
2. Emmanuel C.Ifeachor, and Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.
3. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Third Edition, Tata McGrawHill, 2007.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	3	-	-	2	-	-	2	2	2
CO2	3	3	3	3	3	3	-	-	2	-	-	2	2	2
CO3	3	3	3	3	3	3	-	-	2	-	-	2	2	2
CO4	3	3	3	3	3	3	-	-	2	-	-	2	2	2
CO5	3	3	3	3	3	3	-	-	2	-	-	2	2	2



IT16501 COMPUTER NETWORKS 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understandthedivisionofnetworkfunctionalitiesintolayers.
- explain the following terms: computer network, LAN, WAN, MAN, internet, protocol, topology, media, peer-to-peer network, and server based network.
- befamiliarwiththecomponentsr e q u i r e d tobuilddifferenttypesofnetworks.
- beexposedtotherequiredfunctionalityateachlayer.
- learntheflowcontrolandcongestioncontrolalgorithms.

UNIT I FUNDAMENTALS & PHYSICAL LAYER 09

Data communication - Networks - Network models - Layer tasks - The OSI Model - Layers in the OSI model - TCP/IP protocol suit - Data and signals - Transmission media - Switching.

UNIT II DATA LINK LAYER 09

Error detection and correction - Data link control – Framing – HDLC - Multiple access - Wireless LAN's:Standard Ethernet - Fast Ethernet - Gigabit Ethernet - 802.11 - Bluetooth.

UNIT III NETWORK LAYER 09

Logical address (IP4, IP6) - Internet protocol: Internetworking (IP4, IP6) - Transitions from IP4 to IP6 –ICMP –IGMP – Forwarding - Unicasting routing protocol (Distance Vector Routing, Link State Routing) – Multi casting routing protocol.

UNIT IV TRANSPORT LAYER 09

Duties of Transport Layer - UDP – TCP - Congestion control and Quality of Service - Techniques to ImproveQoS.

UNIT V APPLICATION LAYER 09

Electronic Mail (SMTP, POP3, IMAP, MIME) - File Transfer Protocol - WWW – HTTP– DNS.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- have a good understanding of the OSI reference model.
- have experience in designing communication protocols.
- analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- expose TCP/IP protocol suite.
- design and build a network using routers.

TEXT BOOK

1. Behrouz A. Forouzan, "Data Communication and Networking", Fifth Edition, Tata McGraw – Hill, 2012.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.
4. William Stallings,"Data and Computer Communication"tenthEdition,Pearson Education, 2014.

CO-PO MAPPING:

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

IT16502 OBJECT ORIENTED ANALYSIS AND DESIGN 3 0 0 3

COURSE OBJECTIVES

To enable students to

- learn the basics of Object Oriented analysis and design skills.
- learn the UML design diagrams.
- learn to map design to code.
- be exposed to the various testing techniques.
- understand the Object Oriented concepts for new projects.

UNIT I UML DIAGRAMS 09

Introduction to OOAD – Unified Process • UML diagrams – Use Case – Class Diagrams– Interaction Diagrams –State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II DESIGN PATTERNS 09

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller • Design Patterns – creational • factory method • structural – Bridge – Adapter • behavioral – Strategy – observer.

UNIT III CASE STUDY 09

Case study – the Next Gen POS system, Inception •Use case Modeling • Relating Use cases – include, extend and generalization • Elaboration • Domain Models • Finding conceptual classes and description classes – Associations– Attributes – Domain model refinement – Finding conceptual class Hierarchies • Aggregation and Composition.

UNIT IV APPLYING DESIGN PATTERNS 09

System sequence diagrams • Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement • UML class diagrams • UML interaction diagrams • Applying GoF design patterns.

UNIT V CODING AND TESTING 09

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design and implement projects using Object Orientedconcepts.
- use the UML analysis and design diagrams.

- apply appropriate design patterns.
- compare and contrast various testing techniques.
- create own logic for problem solving.

TEXT BOOK

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object•Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

REFERENCES

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis andDesignUsing UML", Fourth Edition, Mc•Graw Hill Education, 2010.
2. Ali Bahrami, "Object Oriented Systems Development using the unified modeling language", 1stEdition, TMH, 2008.
3. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Thirdedition, Addison Wesley, 2003.
4. Paul C. Jorgensen, "Software Testing:• A Craftsman's Approach", Third Edition, AuerbachPublications,Taylor and Francis Group, 2008.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	3	-	2	-	-	-	-	-	2	-	3
CO2	2	3	3	2	3	-	-	-	-	-	-	3	3	2
CO3	3	3	3	2	2	-	-	2	-	-	2	3	2	2
CO4	3	3	3	3	2	-	-	2	-	-	2	3	3	2
CO5	3	2	3	2	3	-	-	2	-	-	-	3	2	3

IT16503 INTERNET PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand different Internet Technologies.
- implement Client side programs.
- design and implement server side programs using Servlets and JSP.
- understand XML.
- be exposed to java specific web services architecture.

UNIT I WEBSITES BASICS, HTML 5, CSS 3, WEB 2.0 09

Web 2.0 : Basics – RIA Rich Internet Applications – Collaborations tools – Understanding websites and web servers: Understanding Internet – Difference between websites and web server- Internet technologies Overview –Understanding the difference between internet and intranet; HTML and CSS: HTML 5.0 , XHTML, CSS 3.

UNIT II CLIENT SIDE PROGRAMMING 09

Java Script : An introduction to JavaScript – JavaScript DOM Model-Date and Objects -Regular Expressions-Exception Handling – Validation-Built-in objects-Event Handling- DHTML with JavaScript.

UNIT III SERVER SIDE PROGRAMMING 09

Servlets : Java Servlet Architecture - Servlet Life Cycle - Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server. **Database Connectivity:** JDBC perspectives - JDBC program example – JSP: Understanding Java Server Pages- JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

UNIT IV PHP & XML 09

An introduction to PHP : PHP - Using PHP - Variables - Program control- Built-in functions - Connecting to Database – Using Cookies -Regular Expressions. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML - XML Parsers and Validation - XSL and XSLT Transformation - News Feed (RSS and ATOM).

UNIT V INTRODUCTION TO AJAX and WEB SERVICES 09

Client Server Architecture-XML Http Request Object-Call Back Methods. Web Services: Introduction- Java web services Basics – Creating – Publishing - Testing and Describing a Web services (WSDL)-Consuming a web service - Database Driven web service from an application – SOAP.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- create a basic website using HTML and Cascading Style Sheets.
- design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- design and implement server side programs using Servlets and JSP.
- present data in XML format.
- design rich client presentation using AJAX.

TEXT BOOK

1. Deitel and Deitel and Nieto, "Internet and World Wide Web – How to Program", Prentice Hall, 5th Edition, 2011.

REFERENCES

1. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.

CO-PO MAPPING:

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

IT16504 **SOFTWARE ENGINEERING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- learn Software life cycle models and system engineering process for developing a system from scratch.
- study the Software project management concepts.
- know about Prototyping techniques for requirement engineering process and to analyze data, functional and behavioral model.
- become familiar with Design levels of software engineering.
- study Software testing and technical metrics for verifying and validating the software.

UNIT I SOFTWARE PROCESS **09**

The Evolving role of Software – Software – The changing Nature of Software – Legacy Software –A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models. Product and Process - Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

UNIT II SOFTWARE REQUIREMENTS **09**

Software Engineering Practice – communication Practice – Planning practice modeling practice– Construction Practice –Deployment. Requirements Engineering - Requirements Engineering tasks – Initiating the requirements Engineering Process-Eliciting Requirements – Developing Use cases – Building the Analysis Models –Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements.

UNIT III REQUIREMENTS ANALYSIS **09**

Requirements Analysis – Analysis Modeling approaches – data modeling concepts – Object oriented Analysis – Scenario based modeling – Flow oriented Modeling – Class based modeling – creating a behavior model.

UNIT IV SOCIAL ISSUES AND ENVIRONMENT **09**

Design Engineering – Design process -Design Quality-Design model-Agile Methods – Extreme Programming-Rapid Application development – Software Prototyping- Software Reuse – The Reuse Landscape – Design Patterns – Generator-Based Reuse –Application Frameworks – Application System Reuse - Software Evolution Program Evolution Dynamics – Software Maintenance – Evolution Processes – Legacy system evolution Planning -Verification and Validation – Software Inspections – Automated Static analysis – Verification and Formal methods - Software Testing – System Testing – Component Testing – Test case Design –Test Automation.

UNIT V SOFTWARE PROJECT MANAGEMENT **09**

Software Cost Estimation – productivity – Estimation Techniques – Algorithmic Cost Modeling –Project Duration and Staffing - Process and Product Quality – Quality Assurance and Standards –Planning – Control- Software Measurement and Metrics - Process Improvement – Process Classification – Measurement –Analysis and Modeling –Change – The CMMI process improvement Framework - Configuration Management –Planning Change Management – Version and Release Management – System Building – CASE tools for configuration management.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explore the strength and weakness of life cycle models such as water fall, incremental and spiral model.
- plan, schedule, identify the risk involved and track the development of project for ensuring the software quality.
- identify the functional and non-functional requirements for the project and use it to develop the project using life cycle model.
- apply design processes and concepts for architectural, data, software, user interface and real time systems design.
- verify, and validate the software applications using different types of testing like black box testing, structural testing, unit testing etc.

TEXT BOOK

1. Roger Pressman.S, ―Software Engineering: A Practitioner's Approach", Seventh Edition, McGraw Hill, 2010.

REFERENCES

1. Ian Sommerville,"Software Engineering ", 9th Edition, Pearson Education Asia, 2011.
2. S.A. Kelkar, "Software Engineering, A Concise Study", Prentice Hall of India, 2007.
3. Richard E. Fairley, "Principles of Software Engineering", IEEE computer society press, 2010.
4. Shari Pfleeger, Joanne Atlee, "Software Engineering: Theory and Practice", Fourth Edition,Pearson Education, 2010.
5. PankajJalote, "Software Engineering, A Precise Approach", Wiley India, 2010.

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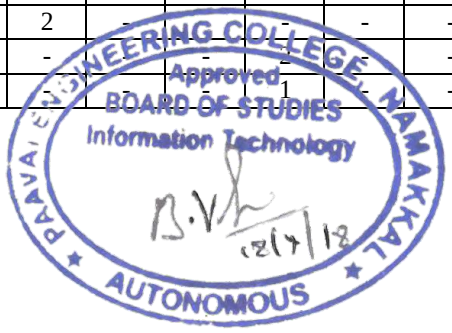
CO2	2	3	3	2	3	-	-	-	-	-	-	2	3	2
CO3	3	2	2	1	2	-	-	-	-	-	2	1	3	3
CO4	2	3	2	2	-	-	-	-	-	-	-	-	-	1
CO5	3	2	3	2	-	-	-	1	-	-	-	2	2	2



IT16505 **COMPUTER NETWORKS AND INTERNET PROGRAMMING LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable students to

- learnsocketprogramming.
- different algorithms in Network layer.
- havehandsonexperienceonvariousnetworkingprotocols.
- be familiar with Web page design using HTML/XML and style sheets.
- learn to create dynamic web pages using server side scripting.

LIST OF EXPERIMENTS FOR COMPUTER NETWORKS

1. Implementation of Stop and Wait protocol and sliding window protocol..
2. Write a code to simulate ARP protocol.
3. Write a code to simulate RARP protocol.
4. Example applications using TCP sockets.
5. Example applications using UDP sockets.

LIST OF EXPERIMENTS FOR INTERNET PROGRAMMING

1. Create a web page with the following using HTML
   i. To embed a map in a web page.
   ii. To fix the hot spots in that map .
   iii. Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client side Scripts for Validating Web Form Controls using DHTML .
4. Write programs in Java using sockets to implement the following:
   i. HTTP request
   ii. FTP
   iii. SMTP
   iv. POP3
5. Write a program in Java for creating simple chat application with datagram sockets and datagram packets.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- identify and understand various techniques and modes of transmission.
- describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN.
- design Web pages using HTML/XML and style sheets .

- create dynamic web pages using server side scripting.

SOFTWARE: Java, Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server Turbo C, C++.

HARDWARE: Flavor of any WINDOWS or LINUX and Standalone desktops 30 Nos.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
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CO3	2	2	3	3	3	-	-	-	-	-	2	1	3	2
CO4	2	1	2	1	-	-	-	1	-	-	-	2	2	2

IT16506 **CASE TOOLS LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable students to

- learnthebasicsofobject oriented analysisanddesignskills.
- be exposed to the UML designdiagrams.
- learn to map design tocode.
- be familiar with the various testingtechniques.
- understand the concepts of program creativity.

LIST OF EXPERIMENTS

TO DEVELOP A MINI-PROJECT BY FOLLOWING THE 9 EXERCISES LISTED BELOW.

1. To develop a problemstatement.
2. Identify Use Cases and develop the Use Casemodel.
3. Identify the conceptual classes and develop a domain model with UML Classdiagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UMLSequencediagrams.
5. Draw relevant state charts and activitydiagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagramnotation.
7. Develop and test the Technical serviceslayer.
8. Develop and test the Domain objectslayer.
9. Develop and test the User interfacelayer

SUGGESTED DOMAINS FOR MINI-PROJECT

1. Passport automationsystem.
2. Bookbank.
3. ExamRegistration.
4. Stock maintenancesystem.
5. Online course reservationsystem.
6. E-ticketing.
7. Software personnel managementsystem.
8. Credit cardprocessing.
9. e-bookmanagementsystem.
10. Recruitmentsystem.
11. Foreign tradingsystem.
12. Conference ManagementSystem.
13. BPO ManagementSystem.

14. Library ManagementSystem.
15. Student InformationSystem.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- design and implement projects using OOconcepts.
- use the UML analysis and designdiagrams.
- apply appropriate designpatterns.
- compare and contrast various testingtechniques

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and Junit

HARDWARE: Flavor of any WINDOWS and Standalone desktops 30 Nos.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
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CO3	2	2	3	3	1	-	-	-	-	-	2	2	2	2
CO4	2	2	3	1	-	-	-	2	-	-	-	3	-	1

EN16501 CAREER DEVELOPMENT LABORATORY - I 0 0 2 1

COURSE OBJECTIVES

To enable students to

- help the students to understand their capabilities & enhance their Grooming and showcasing his/her capabilities to a Prospective Employer
- Provide Opportunity for the Students to become acquainted with Corporate Opportunities relevant to their Academic Learning
- enable students to articulate their thoughts on a given topic – in English and also to make decent write ups in English on any given topic
- enable students prepare & score well in Aptitude tests conducted by Corporates/Prospective Employers
- enable students to Prepare for any Group Discussion Evaluation or Presenting their credentials during a face-to-face interview leading to selection and employment
- help individuals become a knowledgeable person on the various evaluation processes leading to Employment.

UNIT I BASICS - SELF ANALYSIS 06

Introduction - Self Explorations: Who Am I,Personal Attributes, Self Confidence and Self Esteem - Communication Skills : Introduction to communication, Flow of communication, Listening, Barriers ofcommunications, How to overcome the barriers of communications - Leadership Qualities : Skills for a good Leader, Leadership styles, SWOT Analysis, - Time Management: Time is a resource, Identify Time wasters, Time Management Styles, Techniques for better time management- Group Dynamics/ Team Building : Importance of group in organizations, Team Building, Interaction with the team, How to build the good team

UNIT II PERSONALITY DEVELOPMENT 06

Motivation : Introduction, Relevance and types of motivation, Analysis of motivation - Attitude : Factors, Influencing Attitude, Challenges and lessons from attitude - Creativity : Out of box thinking, Lateral thinking -Goal Setting : Wish list ; Blue print for success; Short, long, life time goals

UNIT III QUANTITATIVE APTITUDE 06

Number System - LCM & HCF - Square root & Cube root – Percentage - Time speed & Distance

UNIT IV QUANTITATIVE APTITUDE 06

Trains - Boats & Streams – Average – Ages – Area.

UNIT V LOGICAL AND VERBAL REASONING 06

Series Completion : Number Series, Letter series, Symbol Series - Blood Relation - Coding and decoding -Logical Sequence – Analogy - Character Puzzles – Classification - Data sufficiency

TOTAL PERIODS 30

COURSE OUTCOMES

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

- demonstrate Aptitude & Reasoning Skills

- enhance Verbal & Written Ability.
- improve his/her Grooming and Presentation Skills.
- interact effectively on any recent event/happenings/ current affairs.
- be a knowledgeable person on the various evaluation processes leading to employment and face the same with Confidence.

REFERENCES

1. Agarwal, r.s." A Modern Approach to Verbal & Non Verbal Reasoning", s.chand& co ltd, new delhi.
2. AbhijitGuha, "Quantitative Aptitude ", tata-mcgraw hill.
3. word power made easy by normanlewis ,wr.goyal publications.
4. Johnson, d.w. reaching out – interpersonal effectiveness and self actualization. boston: allyn and bacon

EVALUATION

S.no	Particular	Test portion	Marks
1.	Evaluation 1 : oral Communication	self introduction& extempore	20
2.	Evaluation 2: presentation & written skills	seminars/ assignments	20
3.	Evaluation 3: written test	60 questions: (20 each from unit 3,4 & 5)	60
TOTAL			100

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

IT16601 COMPILER DESIGN 3 0 0 3

COURSE OBJECTIVES

To enable students to

- learn the design principles of a Compiler.
- learn the various parsing techniques
- learn different levels of translation.
- learn how to optimize machine codes
- learn how to effectively generate machine codes.

UNIT I INTRODUCTION TO COMPILERS 05

Translators - Compilation and Interpretation - Language processors - The Phases of Compiler – Errors Encountered in Different Phases - The Grouping of Phases - Compiler Construction Tools – Programming Language basics.

UNIT II LEXICAL ANALYSIS 09

Need and Role of Lexical Analyzer - Lexical Errors - Expressing Tokens by Regular Expressions- Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

UNIT III SYNTAX ANALYSIS 10

Need and Role of the Parser-Context Free Grammars - Top Down Parsing -General Strategies- Recursive Descent Parser Predictive Parser -LL(1) Parser-Shift Reduce Parser-LR Parser - LR (0)Item- Construction of SLR Parsing Table - Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language.

UNIT IV SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT 12

Syntax directed Definitions - Construction of Syntax Tree – Bottom - up Evaluation of S-Attribute Definitions- Design of predictive translator – Type Systems - Specification of a simple type checker- Equivalence of Type Expressions-Type Conversions. RUN-TIME ENVIRONMENT: Source Language Issues - Storage Organization- Storage Allocation - Parameter Passing- Symbol Tables- Dynamic Storage Allocation - Storage Allocation in FORTAN.

UNIT V CODE OPTIMIZATION AND CODE GENERATION 09

Principal Sources of Optimization -DAG - Optimization of Basic Blocks -Global Data Flow Analysis -Efficient Data Flow Algorithms-Issues in Design of a Code Generator – A Simple Code Generator Algorithm.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design and implement a prototype compiler.
- use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.
- apply the various optimization techniques.
- describe the runtime structures used to represent constructs in typical programming languages.
- use the different compiler construction tools.

TEXT BOOK

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques andTools", 2nd Edition, Pearson Education, 2007.

REFERENCES

1. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, "Advanced Compiler Design and Implementation, "Morgan Kaufmann Publishers –Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers ElsevierScience, 2004.
4. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

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

IT16602 GRAPHICS AND MULTIMEDIA 3 0 0 3

COURSE OBJECTIVES

To enable students to

- introduce the graphics mode, with the help of basic algorithms and methodologies.
- equip students with fundamental knowledge and basic technical competence in the field of computer graphics.
- provide an understanding of how a computer draws the fundamental graphics primitives.
- learn the implementation of Computer Graphics Algorithms.
- learn the principles and different components of multimedia. learn the devices and tools for generating and representing multimedia.

UNIT I FUNDAMENTALS 09

Introduction to Computer Graphics - Raster and vector graphics systems - Output primitives - points and lines - line drawing algorithms - loading the frame buffer - line function - circle and ellipse generating algorithms – Pixel addressing and object geometry - filled area primitives - anti-aliasing.

UNIT II 2D-3D REPRESENTATION AND MANIPULATION 09

2D Transformation: Translation, rotation, scaling, reflection and shearing - Matrix and homogeneous coordinates - Composite 2D transformations - 2D Viewing - Clipping : line, polygon and text clipping. 3D Transformation: Translation, rotation, scaling, reflection, shearing -Composite 3D transformation - 3D Viewing - Projection - 3D clipping – Case Study.

UNIT III VISIBLE SURFACE DETECTION AND COLOR MODELS 09

Back face detection - Depth buffer method - A-Buffer method -Scan line method - Depth sorting method - BSP -Tree method - Area Subdivision method - Octree method - Ray casting - Curved surfaces - Wireframe methods - Visibility Detection Functions - Color Models - RGB, CMY, HSV, HLS, CIE models.

UNIT IV INTRODUCTION TO MULTIMEDIA 09

Branch-overlapping Aspects of Multimedia - Content - Global Structure - Multimedia: Media and Data Streams - Medium - Main Properties of a Multimedia System - Traditional Data Stream Characteristics - Data Streams Characteristics for Continuous Media - Information Units-Virtual Reality.

UNIT V AUDIO, VIDEO AND ANIMATION 09

Basic principles of animation - Sound Concepts - Music - Speech - Computer-based Animation - Data Compression - storage Space - Coding Requirements - Source - Entropy and Hybrid Coding - Some Basic Compression Techniques - JPEG, H.261, MPEG, DVI.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design two dimensional graphics and two dimensional transformations.
- design three dimensional graphics and three dimensional transformations.
- apply color models and clipping techniques to graphics.
- create basic multimedia presentations.
- design animation sequences.

TEXT BOOKS

1. Tay Vaughan, "Multimedia - Making it work", Tata McGraw Hill Edition, 8th edition 2011.
2. Donald Hearn and M. Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.

REFERENCES

1. Foley, Vandam, Feiner and Huges, “Computer Graphics: Principles and Practice”, 2 nd Edition, Pearson Education, 2003.
2. Nigel Chapman and Jenny Chapman, "Digital Multimedia", John Wiley & Sons Ltd.,2000.
3. John .F. Koegel Buford, "Multimedia Systems", Pearson education, 2005.

CO-PO MAPPING:

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

IT16603 EMBEDDED SYSTEMS 3 0 0 3

COURSE OBJECTIVES

To enable students to

- have knowledge about the basic functions of embedded systems.
- have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- provide experience to integrate hardware and software for microcontroller applications systems.
- introduce students to the modern embedded systems and to show how to understand and program suchsystems using a concrete platform built around.
- introduce students modern embedded processor like the Intel ATOM.

UNIT I EMBEDDED COMPUTING 09

Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller - ARM processor – Architecture - Instruction sets and programming.

UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT 09

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing –Interrupts handling.

UNIT III PROCESSES AND OPERATING SYSTEMS 09

Multiple tasks and processes – Context switching – Scheduling policies – Inter process communication Mechanisms – Performance issues–Real time operating sustem - PSOS and VxWorks.

UNIT IV EMBEDDED SOFTWARE 09

Programming embedded systems in assembly and C – Meeting real time constraints – Multi-state systems and Function sequences. Embedded software development tools – Emulators and debuggers.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 09

Design issues and techniques – Case studies – Complete design of example embedded systems.

TOTAL 45 PERIODS

COURSE OUTCOMES

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

- describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
- become aware of the architecture of the ATOM processor and its programming aspects (assembly Level).

- become aware of interrupts, hyper threading and software optimization.
- design real time embedded systems using the concepts of RTOS.
- analyze various examples of embedded systems based on ATOM processor.

TEXT BOOK

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education, 2007.

REFERENCES

1. Steve Heath, "Embedded System Design", Elsevier, 2005.
2. Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	3	2	-	-	-	-	-	-	-	3	-	2
CO2	2	2	-	2	2	-	-	-	-	-	-	-	-	3
CO3	2	1	2	3	1	-	-	-	-	-	1	3	2	-
CO4	3	2	3	1	2	-	-	2	-	-	-	-	-	3
CO5	1	3	3	2	-	-	-	-	-	-	2	2	-	1

BA16254 PRINCIPLES OF MANAGEMENT 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand history and development of management thought.
- know the planning activities in management.
- understand organizing, dimensions of organization structure, and choosing the right structural form.
- know how to manage human resources.
- understand various methods and techniques of control.

UNIT I INTRODUCTION TO MANAGEMENT 09

Management: Meaning – Scope - Managerial Roles. Management – Science - Art or Profession - Universality of Management - Ancient roots of management theory; Classical schools of management thought; Behavioral School - Quantitative School - Systems Approach - Contingency Approach- Contemporary Management thinkers & their contribution.

UNIT II PLANNING 09

Characteristics of planning - Planning Process - Types of plans - Decision making - Decision making tools -Groupdecision making - Forecasting & MBO.

UNIT III ORGANIZING 09

Organizational structure and design - types of organizational structures – authority – delegation– decentralizationand reengineering - Organization Size – Technology – Environment – Power – control - choosing the right structuralForm.

UNIT IV MANAGING HUMAN RESOURCES 09

Human resource planning – Recruitment – selection - training & development - performance appraisal - managingchange - compensation and employee welfare - Leadership theory - Motivation Theory - Communication.

UNIT V CONTROLLING 09

Nature of organizational control - control process - Methods and techniques of control - Designing control systems.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- demonstrate history and development of management thought.
- exhibit the planning activities in management.
- know organizing, dimensions of organization structure, and choosing the right structural form.

- gain knowledge how to manage human resources.
- develop various methods and techniques of control.

TEXT BOOKS

1. Heinz Weihrich, Mark V. Cannice, Management a Global & Entrepreneurial Perspective, Tata McGraw-Hill Education, 2010.
2. James A.F. Stoner & R. Edward Freeman, Management, Prentice-Hall of India Private Limited, New Delhi, 5/e, 2010.

REFERENCES

1. John R. Schermerhorn, Jr., Daniel G. Bachrach, Management, Wiley India, 13/e, 2015.
2. Joseph L Massie, Essentials of Management, Prentice-Hall India, New York, 4/e, 2013.
3. S.A.Sherlekar, Management, Himalaya Publications, Mumbai, 1/e, 2012.
4. L.M. Prasad, Principles of Management, Sultan Chand & Sons, New Delhi, 9/e, 2015.
5. Peter Drucker, Management, Harper Row, 2005.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	-	-	2	-	-	1	-	-	-	2	-
CO2	2	3	-	-	3	-	2	3	2	0	1	3	1	-
CO3	-	3	2	3	-	3	3	-	-	-	-	2	2	3
CO4	-	-	-	-	2	3	-	2	3	3	-	1	3	-
CO5	3	-	3	3	2	3	-	-	-	-	3	3	2	3

IT16604 GRAPHICS AND MULTIMEDIALABOROTARY 0 0 4 2

COURSE OBJECTIVES

To enable students to

- understand the need of developing graphics applications.
- learn the hardware involved in building graphics applications.
- learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
- learn the representation and transformation of graphical images and pictures.
- illustrate the impact of animations.

LIST OF EXPERIMENTS

1. Implementation of Line Drawing Algorithms a) DDA b) Bresenham
2. Implementation of Bresenham's Circle and Ellipse Generation Algorithm
3. Implementation of Two Dimensional Transformations
4. Composite 2D Transformations
5. Implementation of Cohen-Sutherland Line Clipping Algorithm
6. Implementation of 3D Transformations
7. Composite 3D Transformations
8. Animation using Image Effects Generator.
9. Game development using Flash
10. Video Editing

TOTAL PERIODS 60

COURSE OUTCOMES

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

- draw basic shapes such as lines, circle and ellipse.
- perform processing of basic shapes by various processing algorithms /techniques.
- apply the transformations to the basic shapes.
- design animation sequences

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Adobe Flash Player, Dreamweaver, Photoshop 7.0.

HARDWARE: Flavor of any WINDOWS and UNIX. Standalone desktops 30 Nos.

CO-PO MAPPING:

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

IT16605 COMPILER DESIGN LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable students to

- be exposed to compiler writing tools.
- learn to implement the different Phases of compiler.
- be familiar with control flow and data flow analysis.
- learn simple optimization techniques.

LIST OF EXPERIMENTS

1. Study of LEX and YACC
2. Lexical Analysis using LEX.
3. Syntax Analysis using YACC
4. Construction of NFA from a given regular expression.
5. Construction of minimized DFA from a given regular expression.
6. Implementation of Symbol Table.
7. Implementation of Shift Reduce Parsing Algorithm.
8. Construction of LR Parsing Table.
9. Generation of Code for a given Intermediate Code.
10. Implementation of Code Optimization techniques.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- implement the different Phases of compiler using tools.
- analyze the control flow and data flow of a typical program.
- optimize a given program.
- generate an assembly language program equivalent to a source language program.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Turbo C,LEX and YACC,UNIX.

HARDWARE: Flavor of any WINDOWS and UNIX. Standalone desktops 30 Nos.

CO-PO MAPPING:

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

EN16601 CAREER DEVELOPMENT LABORATORY - II 0 0 2 1

COURSE OBJECTIVES

To enable students to

- understand their capabilities and enhance their grooming and show casinghis /her capabilities to a prospective employer
- provide opportunity for the students to become acquainted with corporate opportunities relevant to their academic learning
- articulate their thoughts on a given topic –in English and also to make decent write upsin English on any given topic
- practice and score wellinAptitude tests conducted by corporate /prospective employers
- prepare for any group discussion evaluation or presenting their credentials during a face-to-face interview leading to selection and employment
- become a knowledge able personon the various evaluation processes leading to employment

UNIT I CORPORATE READINESS 06

Business communication – Email, Paragraph, Letter Writing Skills - Public speaking skills : Rules of Publicspeaking skills; Extempore, JAM - Inter and intra personal skills : Introduction ; Need for Inter and Intra personal skills in organizations –Stress management:Causes of stress and its impact,How to manage and distress,Circle of control,stress busters-Emotional Intelligence:What is emotional Intelligence,Why Emotional Intelligence Matters,Managing Emotions.

UNIT II INTERVIEW SKILLS 06

Interview Basics : General Selection process, Grooming, Dress code, Supporting Documents to carry - ResumeBuilding : Impact of Powerful CV, Do's and don'ts in CV - Group Discussion : Introduction to GD, Important ofListening and Speaking skills, Do's andDon't in GD- Face to faceinterview / Hireme: Rules forfaceto face interview,body language,Self Introduction-Psychometric Assessment:Importance of Psychometric assessment,Why psychometric assessment.

UNIT III QUANTITATIVE APTITUDE 06

Simplification-Time and work-Pipes and cisterns-Ratio andProportion -Partnership

UNIT IV QUANTITATIVEAPTITUDE 06

Simple interest and Compound interest-Profitand loss-Permutation and combination Probability-Calendar

UNIT V LOGICAL AND VERBAL REASONING (VR) 1 06

Seating arrangement–Direction-Arithmeticreasoning–Syllogisms-MakingJudgments-Statements and conclusions-Matching definition-Cause and effect.

TOTAL PERIODS 30

COURSE OUTCOMES

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

- demonstrate aptitude and reasoning skills
- enhance everbalandwrittenability
- improve his /her grooming and presentation skills
- interact effectively on any recentevent/ happenings/current affairs.
- be a knowledgeable person on the various evaluation processes leading to employ entand face the same with confidence.

REFERENCES

1. Agarwal, r.s." A Modern Approach to Verbal & Non Verbal Reasoning", s.chand& co ltd, newdelhi.
2. AbhijitGuha, "Quantitative Aptitude ", tata-mcgraw hill.
3. word power made easy by normanlewis ,wr.goyal publications.
4. Johnson, d.w. reaching out – interpersonal effectiveness and self actualization. boston: allyn and bacon
5. Agarwal, R.S. "Objective General Enginlish", S.Chand& Co.
6. Infosys Campus Connect Program-students'guide for softskills.
7. Mitra,barun.k,"Personalaity Development & Softskills",Oxford University

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
Cos	**Programme Outcomes (Pos)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	3	3	1	-	-	-	-	-	-	3	2
CO2	-	2	3	-	2	-	2	-	-	-	-	-	3	2
CO3	3	2	2	2	-	-	1	-	-	-	-	-	2	3
CO4	3	2	2	-	-	1	-	-	-	-	2	-	2	3
CO5	2	3	3	2	1	3	3	1	-	1	2	-	2	3

PAAVAI ENGINEERING COLLEGE, NAMAKKAL - 637018
(AUTONOMOUS)
B.Tech.- INFORMATION TECHNOLOGY
REGULATIONS – 2016
(CHOICE BASED CREDIT SYSTEM)
CURRICULUM
SEMESTER VII

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1	PC	IT16701	Data Warehousing and Data Mining	3	0	0	3
2	PC	IT16702	Cloud Computing	3	0	0	3
3	PC	IT16703	Mobile Computing	3	0	0	3
4	PC	IT16704	Cryptography and Network Security	3	0	0	3
5	PE	*******	Elective III*	3	0	0	3
6	OE	*******	Open Elective II**	3	0	0	3
Practical							
7	PC	IT16705	Cloud Computing Laboratory	0	0	4	2
8	PC	IT16706	Mobile Application Development Laboratory	0	0	4	2
9	EE	IT16707	Mini Project	0	0	4	2
			Total	**18**	**0**	**12**	**24**

SEMESTER VIII

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory							
1	HS	BA16151	Professional Ethics And Human Values	3	0	0	3
2	PE	*******	Elective IV*	3	0	0	3
3	PE	*******	Elective V*	3	0	0	3
Practical							
4	EE	IT16801	Project Work	0	0	12	6
			Total	**9**	**0**	**12**	**15**

TOTAL CREDITS: 182

ELECTIVE –III

S.No.	Category	Course Code	Course Title	L	T	P	C
1	PE	IT16351	Adhoc and Sensor Networks	3	0	0	3
2	PE	IT16352	C# And .Net Framework	3	0	0	3
3	PE	IT16353	Software Quality Assurance	3	0	0	3
4	PE	IT16354	Big Data and Analytics	3	0	0	3
5	PE	IT16355	Internet of Things	3	0	0	3

ELECTIVE –IV

S.No.	Category	Course Code	Course Title	L	T	P	C
1	PE	IT16451	J2EE	3	0	0	3
2	PE	IT16452	Agile Software Development	3	0	0	3
3	PE	IT16453	Machine Learning	3	0	0	3
4	PE	IT16454	Software Testing	3	0	0	3
5	PE	IT16455	Soft Computing	3	0	0	3

ELECTIVE –V

S.No.	Category	Course Code	Course Title	L	T	P	C
1	PE	IT16551	Digital Enterprise Resource Planning	3	0	0	3
2	PE	IT16552	Service Oriented Architecture	3	0	0	3
3	PE	IT16553	Foundations of Block chain Technology	3	0	0	3
4	PE	IT16554	Social Network Analysis	3	0	0	3
5	PE	BA16253	Total Quality Management	3	0	0	3

OPEN ELECTIVE -II

S.No.	Category	Course Code	Course Title	L	T	P	C
1	OE	IT16902	Information Technology Essentials	3	0	0	3

SEMESTER -VII

IT16701 DATA WAREHOUSING AND DATA MINING 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand the design and implementation of a data store
- acquire knowledge on data and various preprocessing techniques
- analyze the various correlation based frequent patterns mining in large data sets
- learn various classifiers in data mining
- understand the data mining techniques and methods to be applied on large data sets.

UNIT I DATA WAREHOUSING 9

Data warehouse: Basic Concepts – Modeling – Design and usage – Implementation : Data cube Computation Methods- Data Generalization by Attribute – Oriented Induction approach.

UNIT II DATA MINING 9

Introduction: Kinds of Data and Patterns – Major Issues in Data Mining – Statistical Description of Data – Measuring Data Similarity and Dissimilarity. Data preprocessing : Data Cleaning – Data Integration –Data Transformation Data Reduction – Data Discretization: Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 9

Basic concepts – Frequent Itemset Mining Methods : Apriori algorithm, A Pattern Growth Approach for Mining Frequent Itemsets - Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining

UNIT IV CLASSIFICATION 9

Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification-Classification by Back propagation - Support vector machines - Associative Classification – Lazy Learners - Other Classification Methods - Prediction.

UNIT V CLUSTERING AND DATA MINING APPLICATIONS 9

Cluster analysis – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods- Model Based Clustering Methods – Clustering High Dimensional Data – Constraint Based Clustering Analysis – Outlier Analysis – Data Mining Applications: Financial Data Analysis, Science and Engineering, Intrusion Detection and Prevention.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the design of a data warehouse
- apply preprocessing techniques

- mine frequent patterns in large data sets.
- compare and contrast the various classifiers
- apply clustering techniques and methods to large data sets.

TEXT BOOKS

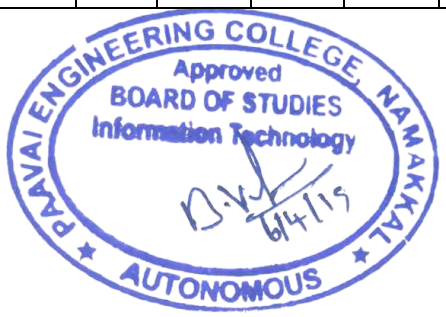
1. Jiawei Han and Miche line Kamber, ―Data Mining Concepts and Techniques‖, 3rd Edition, Elsevier, 2012.

REFERENCES

1. G. K. Gupta, ―Introduction to Data Mining with Case Studies‖, Easter Economy Edition, Prentice Hall of India, 2006.
2. Charu C. Aggarwal, :Data Mining: The Textbook‖, Kindle Edition, Springer, 2015.
3. Margret H. Dunham, ―Data Mining : Introductory and Advanced Topics‖, 17th Edition, Pearson Education, 2013

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	3	3	2
CO3	3	3	2	1	2	-	-	-	-	-	-	-	3	1
CO4	3	2	-	-	1	2	1	-	-	-	-	2	3	2
CO5	3	3	2	1	1	1	1	-	-	-	-	1	3	1



IT16702 **CLOUD COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understand the concept of cloud computing.
- appreciate the evolution of cloud from the existing technologies.
- have knowledge on the various issues in cloud computing
- be familiar with the lead players in cloud
- appreciate the emergence of cloud as the next generation computing paradigm

UNIT I INTRODUCTION **9**

Introduction to Cloud Computing – Definition of Cloud – Characteristics and Benefits of Cloud Computing – Historical Developments - Building Cloud Computing Environments- Computing Platforms and Technologies- Principles of Parallel and Distributed Computing.

UNIT II CLOUD ENABLING TECHNOLOGIES **9**

Basics of Virtualization – Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization - Technology Examples: Para virtualization, Full Virtualization.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE **9**

Cloud Reference Model : Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service- Types of Clouds : Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds - Economics of the Cloud- Open Challenges.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD **9**

Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service. Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS **9**

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine – Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- learn the key and enabling technologies that help in the development of cloud.
- develop the ability to understand the architecture of compute and storage cloud, service and delivery models.
- learn the core issues of cloud computing such as resource management and security.
- Evaluate and choose the appropriate technologies and approaches for implementation and use of cloud.

TEXT BOOKS

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

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. Toby Velte, Anthony Velte, Robert Elsenpeter, ―Cloud Computing – A Practical Approach,Tata Mcgraw Hill, 2009.
3. George Reese, ―Cloud Application Architectures: Building Applications and Infrastructure inthe Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
Cos	**Programme Outcomes(Pos)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	3	3	2
CO3	3	3	2	1	2	-	-	-	-	-	-	2	3	1
CO4	3	3	-	-	1	3	1	-	-	-	-	2	3	2
CO5	3	3	1	-	1	3	1	-	-	-	-	2	3	2

IT16703 **MOBILE COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understand the basic concepts of mobile computing.
- be familiar with the network protocol stack
- learn the basics of mobile telecommunication system.
- be exposed to Ad-Hoc networks.
- gain knowledge about different mobile platforms and application development.

UNIT I INTRODUCTION **9**

Mobile Computing – Mobile Computing Vs. wireless Networking – Mobile Computing Applications –Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols –Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II MOBILE TELECOMMUNICATION SYSTEM **9**

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS) – Cellular Networks – Frequency Reuse and Specialization.

UNIT III MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER **9**

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Improvement Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – in TCP Performance.

UNIT IV WIRELESS AD-HOC NETWORKS **9**

Introduction – Wireless Mesh Networks - Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V MOBILE PLATFORMS AND APPLICATIONS **9**

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems - Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons– Mobile Payment System – Security Issues.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the basics of mobile telecommunication system.
- choose the required functionality at each layer for given application.
- identify solution for each functionality at each layer.
- use simulator tools and design Ad hoc networks.
- Using different platforms to create a different applications.

TEXT BOOKS

1. Jochen H. Schller, ―Mobile Communications‖, Second Edition, Pearson Education, NewDelhi, 2010.

REFERENCES

1. Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, ―Principles of Mobile Computing‖, Springer, 2003.
3. William.C.Y.Lee,―Mobile Cellular Telecommunications-Analog and Digital Systems‖,Second Edition,TataMcGraw Hill Edition, 2006.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	2	3	2
CO3	3	3	2	1	2	-	1	-	-	-	-	2	3	1
CO4	3	3	-	1	1	1	1	-	-	-	-	2	3	2
CO5	3	3	-	1	1	1	1	-	-	-	-	2	3	2

IT16704 CRYPTOGRAPHY AND NETWORK SECURITY 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand Cryptography Theories, Algorithms and Systems.
- understand necessary Approaches and Techniques.
- build protection mechanisms in order.
- to secure computer networks.
- learn about how to provide security.

UNIT I INTRODUCTION 9

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II SYMMETRIC CRYPTOGRAPHY MATHEMATICS OF SYMMETRIC KEY 9

CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid‟s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT III PUBLIC KEY CRYPTOGRAPHY MATHEMATICS OF ASYMMETRIC KEY 9

CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler‗s totient function, Fermat‘s and Euler‗s Theorem - Chinese Remainder Theorem – Exponentiation and logarithm. ASYMMETRIC KEY CIPHERS : RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the fundamentals of networks security, security architecture, threats and vulnerabilities.
- apply the different cryptographic operations of symmetric cryptographic algorithms.
- apply the different cryptographic operations of public key cryptography.
- apply the various Authentication schemes to simulate different applications.
- understand various Security practices and System security standards.

TEXT BOOKS

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2012.

REFERENCES

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security,Wiley India Pvt.Ltd
2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, 2002, ISBN 0-13-046019-2.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	2	-	-	-	-	-	-	-	3	2	1
CO2	1	2	-	2	1	-	-	-	-	-	-	1	1	1
CO3	2	2	3	1	1	-	-	-	-	1	-	1	1	3
CO4	2	1	-	2	-	-	-	2	-	-	-	-	2	2
CO5	3	2	3	2	1	-	-	2	-	1	-	3	2	3

IT16705 **CLOUD COMPUTING LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable students to

- be exposed to tool kits of cloud environment.
- learn to run virtual machines of different configuration.
- learn to use Hadoop.
- apply Map-Reduce concept to applications.
- build Private Cloud.

LIST OF EXPERIMENTS

Use Open Nebula or Equivalent software to set up the cloud and demonstrate the following experiments.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Write a wordcount program to demonstrate the use of Map and Reduce tasks.
10. Setup a Private Cloud Using Open Nebula. Develop a simple application and make itavailable to the intended user.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student will be able to

- use the cloud tool kit.
- design and Implement applications on the Cloud.
- create virtual machines from available physical resources.
- implement Map-Reduce concept.

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE: OpenNebula or Equivalent, CloudSim(Open Source Software), Eualyptus(Open Source Software).

HARDWARE: Standalone desktops 30 Nos.

CO-PO MAPPING:

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

IT16706 MOBILE APPLICATION DEVELOPMENT LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable students to

- know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- understand how to work with various mobile application development frameworks.
- learn the basic and important design concepts and issues of development of mobileapplications.
- understand the capabilities and limitations of mobile devices.
- gain knowledge about different mobile platforms.

LIST OF EXPERIMENTS

1. Develop an application that uses GUI components, Font and Colours.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi-threading.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- design and Implement various mobile applications using emulators.
- deploy applications to hand-held devices.
- exposed to technology and business trends impacting mobile applications.
- competent with the characterization and architecture of mobile applications.

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE : Windows or Android or iOS or Equivalent Mobile Application Development Tool.

HARDWARE : Standalone desktops 30 Nos.

CO-PO MAPPING:

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

IT16707 **MINI PROJECT** **0 0 4 2**

Two member team is identified to carry out mini project, the goal of mini project is either one can choose the final year project or technical skill enhancement. Perform study the implementation issues, familiarize with the tools needed for implementation, study necessary simulation software (if any) and implement the initial phase of the project. Three reviews needs to be conducted project report have to be submitted by the team. Final review will be conducted by the examiner.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- Identify and formulate an IT related solution for an engineering problem.
- Analyze and review existing system.
- Choose appropriate design methodology for the problem.
- Communicate, demonstrate and document the work as a member and leader in a team.

CO-PO MAPPING:

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

SEMESTER -VIII

BA16151 PROFESSIONAL ETHICS AND HUMAN VALUES 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand the basic human values for a professional.
- discuss the significance of ethics in engineering and the theories related to it.
- familiarize oneself with the role of engineer as responsible experimenters.
- expose the students to their roles and responsibilities in assessing safety and reducing risks.
- describe the global issues in ethics and role of engineers as manager and consultants.

UNIT I HUMAN VALUES 9

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Cooperation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas- moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles – theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics – abalanced outlook on law - the challenger case study.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk – the Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights – Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES 9

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE),India, etc.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- describe the basic human values for a professional.
- understand the significance of ethics in engineering and the theories related to it.
- be familiar with the role of engineer as responsible experimenters.
- acquire knowledge about their roles and responsibilities in assessing safety and reducing risks.
- discuss the global issues in ethics and role of engineers as manager and consultants.

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, ―Ethics in Engineering‖, McGraw Hill, New York(2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, ―Engineering Ethics –Conceptsand Cases‖, Thompson Learning, (2000).

REFERENCES

1. Charles D Fleddermann, ―Engineering Ethics‖, Prentice Hall, New Mexico, (1999).
2. John R Boatright, ―Ethics and the Conduct of Business‖, Pearson Education, (2003).
3. Edmund G Seebauer and Robert L Barry, ―Fundamentals of Ethics for Scientists and Engineers‖,Oxford University Press, (2001).
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, ―Business Ethics – An IndianPerspective‖,Biztantra, New Delhi, (2004).
5. David Ermann and Michele S Shauf, ―Computers, Ethics and Society‖, Oxford UniversityPress, (2003).

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	3	-	-	-	-	-	-	-	2	3	2
CO2	3	3	2	1	2	-	1	-	-	-	-	1	3	1
CO3	3	2	-	2	2	3	-	-	-	-	-	1	2	1
CO4	3	3	-	-	1	3	1	-	-	-	-	2	3	2
CO5	3	3	2	1	1	1	1	-	-	-	-	1	3	1

IT16801 **PROJECT WORK** **0 0 12 6**

COURSE OBJECTIVES

To enable students to

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of theDepartment. A project report is required at the end of the semester. The project work is evaluatedbased on oral presentation and the project report jointly by external and internal examiners Constituted by the Head of the Department.

TOTAL PERIODS 180

COURSE OUTCOMES

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

- Identify and formulate an IT related solution for an engineering problem.
- Analyze and review existing system.
- Choose appropriate design methodology for the problem.
- Communicate, demonstrate and document the work as a member and leader in a team.

CO-PO MAPPING:

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

IT16151 **THEORY OF COMPUTATION** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- Design DFA AND NFA
- Identify different formal language classes and their relationships.
- Design grammars and recognizers for different formal languages.
- Prove or disprove theorems in automata theory using its properties.
- Determine the decidability and intractability of computational problems.

UNIT I AUTOMATA 9

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA)– Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expression – FA and Regular Expressions – Proving languages not to be regular –Closure properties of regular languages – Equivalence and minimization of Automata.

UNIT III CONTEXT-FREE GRAMMARS AND LANGUAGES 9

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages –Closure Properties of CFL.Simplifying Context Free Grammars-Normal forms-Chomsky Normal Form and Greibach Normal Form – Pumping Lemma for CFL.

UNIT IV TURING MACHINES AND PUSHDOWN AUTOMATA 9

Languages of a Pushdown Automata –Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata- Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABALITY 9

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Universal Turing Machine-Rice theorem-post correspondence problem-classes of- P and NP problems.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Designgrammars and automata (recognizers) for different language classes.
- Acquire a fundamental understanding of the core concepts in automata theory and formal languages.
- Identify formal language classes and prove language membership properties
- Prove and disprove theorems establishing key properties of formal languages and automata
- Acquire a fundamental understanding of core concepts relating to the theory of computation

and Computational models including decidability.

TEXT BOOK

1.J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory,Languages and Computations", second Edition, Pearson Education, 2007.

REFERENCES

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science, Languages and Machines", ThirdEdition, Pearson Education, 2007.
3. J. Martin, "Introduction to Languages and the Theory of computation" ThirdEdition, Tata McGraw Hill, 2007.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	1	2	1	-	-	-	-	-	-	2	2	2
CO2	1	2	1	2	2	-	-	-	-	-	-	2	-	1
CO3	1	1	2	2	2	-	-	-	-	-	2	2	1	1
CO4	2	1	1	2	-	-	-	2	-	-	2	-	-	2
CO5	2	2	2	2	-	-	-	2	-	-	2	-	2	2

IT16152 INFORMATION CODING TECHNIQUES 3 0 0 3

COURSE OBJECTIVES

To enable students to

- Understand the basic classes of compression techniques.
- Know how to apply compression techniques to practical situations.
- Applythe ideas of entropy and information content.
- Analysis coding techniques will perform in different situations.
- Understand the current state of the area for both data compression and channel coding.

UNIT I INFORMATION THEORY 9

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon – Fanon coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memory less channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II SOURCE CODING: TEXT, AUDIO AND SPEECH 9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Maskingtechniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, LinearPredictive Coding.

UNIT III SOURCE CODING: IMAGE AND VIDEO 9

Image and Video Formats– GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard .

UNIT IV ERROR CONTROL CODING: BLOCK CODES 9

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single paritycodes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder anddecoder - CRC .

UNIT V ERROR CONTROL CODING: CONVOLUTIONAL CODES 9

Convolution codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbialgorithm – Principle of Turbo coding .

TOTAL PERIODS 45

COURSE OUTCOMES

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

- apply knowledge of advanced principles to the analysis of electrical and computer engineering problems.
- apply knowledge of advanced techniques to the design of electrical and computer engineering systems.

- apply the appropriate industry practices, emerging technologies, state-of- the-art design techniques, software tools, and research methods of solving electrical and computer engineering problems.
- maintain life-long learning and continue to be motivated to learn new subject.
- understand new subjects that are required to solve problems in industry without being dependent on a classroom environment.

TEXT BOOKS

1. R Bose, "Information Theory, Coding and Crptography", TMH 2007.
2. Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002.

REFERENCES

1. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006.
2. S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007.
3. Amitabha Bhattacharya, "Digital Communication", TMH 2006.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	1	2	1	-	-	-	-	-	-	1	-	1
CO2	1	2	1	1	2	-	-	-	-	-	-	2	-	1
CO3	2	1	1	1	1	-	-	-	-	-	2	1	2	1
CO4	1	1	2	2	-	-	-	2	-	-	1	-	-	1
CO5	1	1	2	1	-	-	-	1	-	-	2	-	-	2

IT16153 USER INTERFACE DESIGN 3 0 0 3

COURSE OBJECTIVES

To enable students to

- learn about graphical system.
- study about design standards.
- learn about the controls used in windows.
- study about the multimedia.
- perform various test in windows layout.

UNIT I INTRODUCTION 9

Human–Computer Interface – Characteristics of Graphics Interface –Direct Manipulation Graphical System- Web User Interface –Popularity –Characteristic & Principles.

UNIT II HUMAN COMPUTER INTERACTION 9

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design– Human InteractionSpeed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions –Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus –Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice–Navigating Menus– Graphical Menus.

UNIT III WINDOWS 9

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations-WebSystems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes–Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV MULTIMEDIA 9

Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons–Image– Multimedia – Coloring.

UNIT V WINDOWS LAYOUT-TEST 9

Prototypes – Kinds of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– SoftwareTools.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- identify and define key terms related to user interface.
- understand the design standards.
- explain the user interface design process.
- implement the multimedia effects.
- perform various test in windows layout.

TEXT BOOK

1.Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley&Sons, 2016.

REFERENCES

1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.
2. Theo Mandel, "The Elements of User Interface Design ",John Wiley and Sons Ltd, 2007.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	3	2	-	-	-	-	-	-	2	3	2
CO2	2	3	3	2	3	-	-	-	-	-	-	2	-	3
CO3	2	3	3	2	2	-	-	-	-	-	2	3	2	2
CO4	2	3	2	2	-	-	-	2	-	-	2	-	-	1
CO5	3	3	2	3	-	-	-	2	-	-	3	-	1	2

IT16154 **ARTIFICIAL INTELLIGENCE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- learn the methods of different problem solving and searching.
- know the concepts of knowledge representation.
- understand about inferring the knowledge.
- know the concepts of planning and learning.
- understand about the expert system.

UNIT I INTRODUCTION 9

Introduction to AI-Problem formulation, Problem Definition - Production systems, Control strategies Searchstrategies.Problem characteristics, Production system characteristics –Specialized productions system- Problemsolving methods -Problem graphs, Matching, Indexing and Heuristic functions – Hill Climbing-Depth first andBreathfirst,Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II REPRESENTATION OF KNOWLEDGE 9

Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicatecalculus, Resolution, Use of predicate calculus, Knowledge representation using other - Structured representation ofknowledge.

UNIT III KNOWLEDGE INFERENCE 9

Knowledge representation -Production based system, Frame based system. Inference – Backward logic chaining,Forward chaining, Rule value approach, Fuzzy reasoning.

UNIT IV PLANNING AND MACHINE LEARNING 9

Basic plan generation systems – Strips –Advanced plan generation systems – K strips - Strategic explanations - Why,Why not and how explanations. Learning- Machine learning, adaptive Learning.

UNIT V Expert Systems 9

Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition– Meta knowledge, Heuristics, Typical expert systems – MYCIN, DART, XOON-Expert systems shells.

TOTAL HOURS 45

COURSE OUTCOMES

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

- demonstrate awareness of intelligent agents and problem solving using uninformed, informed and local search methods .
- develop knowledge about usage of propositional logic and first order logic for making inferences.
- use the knowledge and the process of inference to derive new facts.
- describe the use of planning and explain about various learning methods.
- design and develop the expert system.

TEXT BOOKS

1. Kevin Night and Elaine Rich, Nair B, "Artificial Intelligence (SIE)", McGraw Hill- 2008. (Units-I,II,IV & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

REFERENCES

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
3. DeepakKhemani "Artificial Intelligence", Tata McGraw Hill Education 2013.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3	3	3	-	-	-	-	-	2	2	3	1
CO2	3	2	3	2	3	-	-	-	-	-	-	2	-	2
CO3	3	3	3	3	2	-	-	-	-	-	1	2	-	3
CO4	3	2	2	3	-	-	-	3	-	-	2	-	2	1
CO5	2	3	2	3	3	-	-	1	-	-	3	-	-	2

IT16251 **OPEN SOURCE SOFTWARE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understand the basics of open source software.
- gain the knowledge MySQL open source database.
- be able to familiar with Server-side programming language PHP.
- be able to implement and design the advanced Concepts in PHP
- exposing the students to the concepts of R programming.

UNIT I INTRODUCTION **9**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources-Open source operating systems:LINUX: Introduction –General Overview – The Linux shell and filestructure: the Shell – The shellscripts and programming- shell configuration.

UNIT II MYSQL **9**

MySQL: Introduction – Setting up account –Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.

UNIT III INTRODUCTION TO PHP **9**

PHP : Features, Working with variables , Storing data in variables– Operator and flow control – String and arrays - Creating Functions – Arrays.

UNIT IV ADVANCED PHP **9**

Object oriented Programming -File handling and data storage – Working with database – Sessions, cookies and FTP.

UNIT V R PROGRAMMING **9**

Preview of some important data structure – Vectors- Matrices and arrays – Lists – Data Frames –R programming Structure: Control Structure – Function and scoping issues –Recursive. String Manipulation.

TOTAL HOURS 45

COURSE OUTCOMES

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

- configure the shell commands and programming
- demonstrate the working with MYSQL.
- demonstrate the simple application in PHP
- create strong application in PHP
- develop a simple problem-solving application in R programming.

TEXT BOOKS

1. Richard Petersen, "The complete Reference Linux ", Tata McGraw Hill Edition, Sixth edition 2010.
2. Steve Suchring, —MySQL Bible, John Wiley, 2002.
3. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Norman Matloff ," The Art of R Programming: A Tour of Statistical Software Design" ,1st Edition,2011.

REFERENCES

1. Mark G. Sobell. "Practical Guide to Fedora and Red HatEnterpriseLinux", 6 th Edition, Prentice Hall, 2011.
2. RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly 3rd Edition ,2011.
3. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2007
4. B.Mahendran, Understanding FOSS, GNU Developers, 2009.
5. VikramVaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw -Hill Publishing Company Limited, Indian Reprint 2009.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	2	-	-	-	-	-	-	2	3	2
CO2	2	3	3	-	3	-	-	-	2	-	-	2	1	2
CO3	3	3	2	3	2	-	-	-	-	-	3	2	2	2
CO4	2	3	3	2	-	-	-	2	-	-	2	-	-	1
CO5	3	3	2	2	-	-	-	2	-	-	3	-	-	2

IT16252 **DISTRIBUTED SYSTEMS** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- provide knowledge on principles and practice underlying in the design of distributed systems.
- layout foundations of Distributed Systems.
- introduce the idea of middleware and related issues.
- understand in detail the system level and support required for distributed system.
- understand the issues involved in studying data and design of distributed algorithms.

UNIT I INTRODUCTION 9

Introduction - Examples of Distributed Systems - Trends in Distributed Systems - Focus on resource sharing - Challenges. Case study: World Wide Web.

UNIT II COMMUNICATION IN DISTRIBUTED SYSTEM 9

System Model - Inter process Communication the API for internet protocols - External datarepresentation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI.

UNIT III REMOTE METHOD INVOCATION AND OBJECTS 9

Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote methodinvocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues –Sharedmemory approaches –Distributed objects - Case study: CORBA - from objects to components.

UNIT IV PEER TO PEER SERVICES AND FILE SYSTEM 9

Peer–to-peer Systems - Introduction - Napster and its legacy - Peer-to-peer Middleware - Routing Overlays - Overlay case studies: Pastry, Tapestry- Distributed File Systems - Introduction - File servicearchitecture - Andrew File system.

UNIT V SYNCHRONIZATION AND REPLICATION 9

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks- Global states - Coordination and Agreement– Introduction - Distributed mutual exclusion - Elections - Transactions and Concurrency Control -Transactions -Nested transactions - Locks – Optimistic concurrencycontrol - Timestamp ordering -Distributed deadlocks - Replication - Case study - Coda.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- articulate the principles and standard practices underlying the design of distributed and parallel systems.

- explain the core issues of distributed and parallel systems.
- appreciate the difficulties in implementing basic communication in parallel and distributed systems.
- have knowledge on the substantial difficulty in designing parallel and distributed algorithms in comparison to centralized algorithms.
- appreciate the issues in distributed operating system, resource management and fault tolerance.

TEXT BOOK

1.GeorgeCoulouris, Jean Dollimore, Tim Kindberg,"Distributed Systems Concepts and Design" Fifth edition – 2011- Addison Wesley.

REFERENCES

1.TanenbaumA.S.,Van Steen M.,"Distributed Systems: Principles and Paradigms", Pearson Education ,2007.

2. Liu M.L.,"Distributed Computing, Principles and Applications", Pearson and education,2004.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	3	-	-	-	2	-	-	2	1	3
CO2	3	2	1	-	3	-	-	-	-	-	-	2	3	2
CO3	2	1	3	3	2	-	-	-	3	-	2	-	2	2
CO4	3	3	2	1	2	-	-	2	2	-	-	-	1	-
CO5	2	3	3	2	-	-	-	-	-	-	-	-	3	2

BA16351 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING 3 0 0 3

COURSE OBJECTIVES

To enable students to

- know the fundamentals of managerial economics.
- be familiar with demand and supply analysis.
- understand the production and cost analysis.
- describe the various financial accounting techniques.
- understand the significance of capital budgeting.

UNIT I INTRODUCTION 9

Managerial Economics - Relationship with other disciplines - Firms: Types, objectives and goals - Managerial decisions - Decision analysis.

UNIT II DEMAND & SUPPLY ANALYSIS 9

Demand - Types of demand - Determinants of demand - Demand function - Demand elasticity - Demand Forecasting - Supply - Determinants of supply - Supply function.

UNIT III PRODUCTION AND COST ANALYSIS 9

Production function - Returns to scale - Production optimization - Least cost input - Isoquants - Managerial usesof production function. Cost Concepts - Cost function - Determinants of cost - Short run and Long run cost curves- Cost Output Decision - Estimation of Cost.

UNIT IV FINANCIAL ACCOUNTING 9

Final Accounts – Trading Accounts – Profit and Loss Accounts – Balance sheet - Cash flow analysis - Funds flowAnalysis.

UNIT V CAPITAL BUDGETING 9

Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge in the basic concepts of Managerial Economics.
- identifythe role demand and supply analysis.
- understand the Production and cost analysis.
- knowthe applications of financial accounting.
- be familiar with the scope capital budgeting

REFERENCES

1. G S Gupta, " Managerial Economics", Tata McGraw-Hill Education, 2011

2. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, NewDelhi, 2004

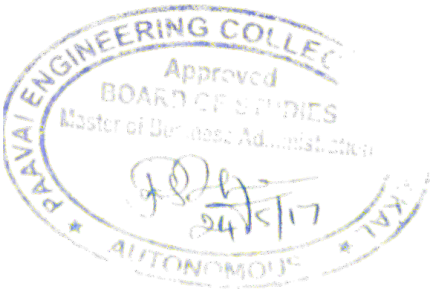
3. G S Gupta, Samuel Paul, V. L. Mote, "Managerial Economics – Concepts and Cases" McGraw Hill Education, New Delhi, 2004

4. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

5. N. Gregory Mankiw, Principles of Economics, 3rd edition, Thomson learning, New Delhi,2007.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	-	-	2	-	-	1	-	-	-	2	-
CO2	2	3	-	-	3	-	2	3	2	2	1	3	-	-
CO3	-	3	2	3	-	3	3	-	2	-	-	2	-	3
CO4	-	-	-	-	2	2	-	2	3	2	-	1	2	-
CO5	3	-	3	3	2	2	-	-	-	-	3	3	2	3



IT16253 TCP/IP PROTOCOL DESIGN AND IMPLEMENTATION 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand the IP addressing schemes.
- knowthe fundamentals of network design and implementation.
- analysis the design and implementation of TCP/IP networks.
- understand on network management issues.
- learn to design and implement network applications.

UNIT I INTRODUCTION 9

Internetworking concepts and architecture model –classful Internet addresses – CIDR – Subletting and Super netting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

UNIT II TRANSMISSION CONTROL PROTOCOL 9

Services – header – connection establishment and termination – interactive data flow – bulk data flow – timeout and retransmission – persist timer – keep alive timer – futures and performance

UNIT III IP IMPLEMENTATION 9

IP global software organization –routing table–routing algorithms – fragmentation and reassembly – errorprocessing (ICMP) – Multicast Processing (IGMP).

UNIT IV TCP IMPLEMENTATION I 9

Data structure and input processing – transmission control blocks – segment format – comparison– finite state machine implementation – Output processing – mutual exclusion –computing the computing the TCP Datalength.

UNIT V TCP IMPLEMENTATION II 9

Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptiveretransmission– congestion avoidance and control – urgent data processing and push function.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design and implement TCP/IP networks
- explain network management issues.
- design and implement network applications & Develop data structures for basic protocol functions of TCP/IP.
- apply the members in the respective structures. .
- design and implement data structures for maintaining multiple local and global time.

TEXT BOOKS

1.Douglas E Comer,"Internetworking with TCP/IP Principles, Protocols and Architecture", Vol 1,

Edition2006.

2.W.Richard Stevens “TCP/IP Illustrated” Vol 1. Pearson Education, 2003.

REFERENCES

1.Forouzan, “TCP/IP Protocol Suite” Second Edition, Tata MC Graw Hill, 2003.

2.W.Richard Stevens “TCP/IP Illustrated” Volume 2, Pearson Education 2003.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	2	-	-	-	3	-	3	3	2	3
CO2	3	3	3	2	1	-	-	-	-	-	-	-	2	3
CO3	3	2	2	2	2	-	-	-	-		-	2	2	2
CO4	3	3	2	2	-	-	-	2	-	-	-	-	-	1
CO5	3	2	2	3	-	-	-	2	-	-	2	-	-	2

IT16254 **SYSTEM SOFTWARE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understandtherelationshipbetween system software and machine architecture.
- knowthesignandimplementation of assemblers.
- understand the major concept of loader and linker.
- haveanunderstandingof macro processors.
- understand the major concept of Interactive debugging systems and software tools.

UNIT I INTRODUCTION **9**

System softwareand machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes -instruction sets - I/O and programming

UNIT II ASSEMBLERS **9**

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine Multi dependent assembler features - Instruction formats and addressing modes – Program relocation –MachineIndependent assembler features - Literals –Symbol-defining statements – Expressions - One pass assemblers andpass assemblers - Implementation example - MASM assembler.

UNIT III LOADERS AND LINKERS **9**

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

UNIT IV MACRO PROCESSORS **9**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and datastructures - Machine-independent macro processor features -Concatenation of Macro Parameters – Generation ofUnique Labels–Conditional Macro Expansion – Keyword Macro Parameters – Macro withinMacro-Implementation example -MASM Macro Processor – ANSI C Macro language

UNIT V SYSTEM SOFTWARE TOOLS **9**

Text editors - Overview of the Editing Process - User Interface – Editor Structure. -Interactive debugging systems -Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- identify the approach of machine architecture.

- compare assembler and macro assemblers and understand the concepts of machine independent loader.
- implement and contrast the concept of linker.
- apply systematic procedure for interactive debugging system.
- understand the concept system software tools.

TEXT BOOK

1 .Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rdEdition, PearsonEducation Asia, 2006.

REFERENCES

1.John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2000.

2.John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.

3. D. M. Dhamdhere, "Systems Programming and Operating Systems", SecondRevised Edition, TataMcGraw-Hill, 2000.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	2	2	3	-	-	-	-	-	-	2	3	2
CO2	3	2	2	2	3	-	-	-	-	-	-	-	-	2
CO3	3	3	2	2	3	-	-	-	-	-	-	-	3	3
CO4	3	2	3	2	-	-	-	-	-	-	2	-	-	2
CO5	3	2	3	3	-	-	-	-	-	-	-	-	2	3

ELECTIVE –III

IT16351 ADHOC AND SENSOR NETWORKS 3 0 0 3

COURSE OBJECTIVES

To enable students to

- learn the different types of MAC protocols.
- be familiar with different types of adhoc routing protocols.
- be expose to the TCP issues in adhoc networks.
- learn the architecture and protocols of wireless sensor networks.
- learn about the various quality wireless networks.

UNIT I INTRODUCTION 9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel - mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) : concepts and architectures. Applications of AdHoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS 9

Issues in designing a MAC Protocol - Classification of MAC Protocols - Contention based protocols- Contention based protocols with Reservation Mechanisms – Contention based protocols with Scheduling Mechanisms – Channel MAC-IEEE 802.11.

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORK 9

Issues in designing a routing and Transport Layer protocol for Adhoc networks – proactive routing, reactive routing (on-demand), hybrid routing - Classification of Transport Layer solutions - TCP over Adhoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS 9

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures - data relaying and aggregation strategies - MAC layer protocols: self - organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT VWSN ROUTING, LOCALIZATION & QOS 9

WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, Triangulation - QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
- describe the unique issues in ad-hoc/sensor networks.

- analyze the protocol design issues of ad hoc and sensor networks.
- design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues.
- evaluate the Quos related performance measurements of ad hoc and sensor networks.

TEXT BOOKS

1. C. Siva Ram Murthy, and B. S. Manoj, ―Ad Hoc Wireless Networks: Architectures and Protocols ― Prentice Hall Professional Technical Reference, 2008.

REFERENCES

1. Carlos De MoraisCordeiro, Dharma PrakashAgrawal ―Ad Hoc & Sensor Networks: Theoryand applications‖, World Scientific Publishing Company, 2006.
2. Feng Zhao and LeonidesGuibas, ―Wireless Sensor Networks‖, Elsevier Publication – 2002.
3. Holger Karl and Andreas Willig ―Protocols and Architectures for Wireless Sensor Networks‖, Wiley,2005.
4. Department of English and Foreign Languages SRM University, ―Rhythm of Life‖, SRM Publications, 2013.
5. KazemSohraby, Daniel Minoli, &TaiebZnati, ―Wireless Sensor Networks-Technology, Protocols, and Application‖.
6. John Wiley, 2007. Anna Hac, ―Wireless Sensor Network Designs‖, John Wiley, 2003.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	1
CO4	3	2	-	-	1	3	1	-	-	-	-	2	3	2
CO5	3	3	2	1	1	1	1	-	-	-	-	1	3	1

IT16352 **C# AND .NET FRAMEWORK** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- know the object oriented aspects of C#.
- learn about Application development in .NET.
- learn about the database connectivity for applications with ADO.NET.
- know the working of distributed applications.
- learn about the design the applications.

UNIT I.NET FREMEWORK **9**

Web framework- History – Types of Framework and Versions–Common Language Runtime (CLR) – Common Type System (CTS) – Common Language Specification (CLS) - Types of JIT Compliers - Assemblies - Shared Assemblies- Namespaces - Garbage Collection-Error handling

UNIT IIC# LANGUAGE BASICS **9**

Core C# - Variables -Data Types -Flow control -Objects and Types-Classes and Struts -Inheritance-Interface-Generics –Arrays and Tuples -Operators and Casts –Indexers.

UNIT III C# ADVANCED FEATURES **9**

Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection - Delegates - Lambdas – Lambda Expressions –ADO.Net - LINQ – Entity Framework.

UNIT IV WINDOWS BASED APPLICATION **9**

Window based applications – Windows Communication Foundation(WCF) – Introduction to web services – Windows Workflow Foundation(WWF)- Workflows – Core ASP .NET – ASP.NET Web Forms.

UNIT V MODEL VIEW CONTROLLER **9**

Model View Controller Architecture – Role of Model View Controller – Benefits of Model View Controller – MVC State Management – HTML Helpers – URLS and Routings – Areas

TOTAL PERIODS 45

COURSE OUTCOMES

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

- implement the basic and advanced features of C# and .NET.
- understand the object oriented aspects of C#.
- develop windows applications using .NET.
- design web based applications using .NET.
- comprehend CLR and the .Net framework.

TEXT BOOKS

1. Herbert Scheldt, ―The Complete Reference: C# 4.0‖, Tata McGraw Hill, 2012.

REFERENCES

1. Andrew Troelsen , ―Pro C# 2010 and the .NET 4 Platform, Fifth edition, APress, 2010.
2. I Griffiths, Matthew Adams, Jesse Liberty, ―Programming C# 4.0‖, Sixth Edition, _Reilly, 2010.
3. E. Balagurusamy, ―Programming in C# - A Primer‖, Third Edition, Tata McGraw- Hill,2010.
4. Charles Petzold, ―Preogramming in the key of C# – A Primer for Aspiring Programmers‖, Microsoft Press US; 1 edition (6 August 2003).

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	-	-	-	-	-	3	3	-	1	3	3
CO2	3	3	2	-	2	-	-	-	3	3	-	-	3	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	3	2
CO4	2	1	-	-	-	-	-	-	-	-	-	-	3	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	3	3

IT16353 **SOFTWARE QUALITY ASSURANCE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- covers components of software quality assurance systems before, during, and after software development.
- presents a framework for software quality assurance and discuss individual components in the framework such as planning, reviews, testing, configuration management.
- discusses metrics and models for software quality as a product, in process, andin maintenance.
- include case studies and hands on experiences. Students will develop an understanding of software quality and approaches to assure software quality.
- there by student can learn about the software standardization

UNIT I FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE 9

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management.

UNIT II MANAGING SOFTWARE QUALITY 9

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management.

UNIT III SOFTWARE QUALITY ASSURANCE METRICS 9

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis.

UNIT IV SOFTWARE QUALITY PROGRAM 9

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance planning – An Overview – Purpose & Scope.

UNIT V SOFTWARE QUALITY ASSURANCE STANDARDIZATION 9

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEIs CMM.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- the student will be able to identify benefits of and the needs to enforce software quality.
- the students will be able to differentiate between quality control, quality managementand quality assurance.
- the student will be able to understand and discuss the benefits, needs and techniques of

software reviews, software testing, configuration management and software metrics.

- critically evaluate alternative standards, models and techniques aimed at achieving quality assurance in a variety of software development environments.
- understand and apply key quality assurance techniques tailored for specific softwaredevelopment environments.

TEXT BOOKS

1. Mordechai Ben-Menachem / Garry S Marliss, ―Software Quality‖, Vikas PublishingHouse, Pvt, Ltd., New Delhi.(UNIT III to V).
2. Watts S Humphrey, ― Managing the Software Process‖, Pearson Education Inc.(UNIT Iand II).

REFERENCES

1. Gordon G Schulmeyer, ―Handbook of Software Quality Assurance‖, Third Edition, Artech House Publishers 2007.
2. Nina S Godbole, ―Software Quality Assurance: Principles and Practice‖, Alpha Science International, Ltd, 2004.
3. BorizBeizer, ―Software Testing Techniques‖, 2nd Edition, DreamTech, 2009.
4. AdityaP.Mathur, ―Foundations of Software Testing‖, Pearson, 2008.
5. Mauro Pezze and Mical Young, ―Software Testing and Analysis process, Principles, and Techniques‖, John Wiley 2008.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	3	2
CO2	2	1	-	-	-	-	-	-	-	-	-	-	3	2
CO3	2	2	-	-	-	-	-	-	-	2	-	1	3	2
CO4	2	-	-	-	-	-	-	-	-	2	-	1	3	2
CO5	2	-	-	-	-	-	-	-	-	-	-	-	3	2

IT16354 **BIG DATA AND ANALYTICS** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- acquire knowledge of HDFS and YARN.
- provide Map reduce concepts and Interfacing.
- gain knowledge about Eco system.
- learn about the fundamental database concepts in database system.
- learn the fundamental concept of Data Analytics with R.

UNIT I INTRODUCTION TO BIG DATA AND HADOOP **9**

Types of Digital Data, Introduction to Big Data, Big Data Analytics, Big data Technology landscape- History of Hadoop, Apache Hadoop, Analyzing - Data with Unix tools, analyzing Data with Hadoop, Hadoop Streaming, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.

UNIT II HDFS(Hadoop Distributed File System) **9**

HDFS Architecture- Daemons Related to HDFS – Working with HDFS Command – Special Features of Hadoop Processing Data with Hadoop –Managing Resources and Applications with YARN- Introduction- Limitation of Hadoop1.0- Hadoop 2: HDFS- Hadoop 2: YARN.

UNIT III MAP REDUCE **9**

Introduction- How Map Reduce Works- Types- Formats -Map Reduce Example- Word Count Example-Anatomy of a Map Reduce Job - Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Using Java, Map Reduce Features.

UNIT IV HADOOP ECO SYSTEM **9**

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. **Mango DB:** Recap of NoSQL databases - MongoDB – CRUD - MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations **Hive :** Hive Shell, HiveServices, Hive Metastore, Comparison with Traditional Databases, Hive QL, Tables, Querying Data and User Defined Functions. **Hbase**: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. **Cassandra:** Cassandra- CQLSH - CRUD, Counter, List, Set, Map, Tracing Big SQL.

UNIT V DATA ANALYTICS WITH R **9**

Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with Big R.

TOTAL PERIODS **45**

COURSE OUTCOMES

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

- identify Big Data, Hadoop and its Business Implications.
- list the components of Hadoop Distributed File System.

- manage Map Reduce in Hadoop Environment.
- develop Big Data Solutions using Hadoop Eco System.
- apply Machine Learning Techniques using R.

TEXT BOOKS

1. Tom White ―Hadoop: The Definitive Guide‖ Third Edit on, O_reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis‖, Springer, 2007.
2. Jay Liebowitz, ―Big Data and Business Analytics‖ Auerbach Publications, CRC press (2013).
3. Tom Plunkett, Mark Hornick, ―Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop‖, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jefrey David Ulman, ―Mining of Massive Datasets‖, Cambridge University Press, 2012.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	-	-	-	-	-	-	-	-	-	1	3	1
CO2	2	-	-	2	-	-	-	-	-	-	-	1	3	1
CO3	2	-	-	-	2	-	-	-	-	-	-	1	3	3
CO4	-	-	-	-	3	-	-	-	-	-	-	1	3	2
CO5	-	2	-	-	3	-	-	-	-	-	-	1	3	2

IT16355 **INTERNET OF THINGS** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understand the overview of Internet of Things with various design levels and templates.
- describe the generic design methodology for internet of things with python programming.
- analyze the characteristics and applications of domain specific IoTs for real life scenarios.
- know about raspberry pi device and use of cloud platforms & frameworks for developing IoT applications.
- evaluate the approaches for collecting and analyzing data generated by IoT systems in thecloud.

UNIT I INTRODUCTION TO IoT **9**

Introduction – Definition and Characteristics of IoT – Physical Design of IoT – Logical Design of IoT - IoT Enabling Technologies – IoT Levels and Deployment Templates.

UNIT II DEVELOPING INTERNET OF THINGS **9**

Motivation for using Python – Logical Design using Python – Python Data Types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Date / Time Operations - Classes - Python Packages of Interest for IoT.

UNIT III DOMAIN SPECIFIC IoTs **9**

Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health and Lifestyle – IoT and M2M – IoT Protocols – MQTT, CoAP, AMQP.

UNIT IV IOT PHYSICAL DEVICES, ENDPOINTS, PHYSICAL SERVERS AND CLOUD OFFERINGS **9**

IoT Device - Raspberry Pi-Raspberry Pi Interfaces - Programming Raspberry Pi with Python – Other IoT Devices - Cloud Storage Models and Communication APIs - WAMP - Xively Cloud for IoT - Django - Amazon Web Services for IoT - Sky Net IoT Messaging Platform - Case Study on Smart Parking and Air Pollution Monitoring.

UNIT V DATA ANALYTICS FOR IoT **9**

Introduction - Apache Hadoop - Using Hadoop Map Reduce for Batch Data Analysis - Apache Oozie - Apache Spark - Apache Storm - Using Apache Storm for Real-Time Data Analysis - Case Study on Weather Monitoring.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the basic concepts and technologies used in internet of things.
- apply the generic design methodology for internet of things with python programmingto design the model.
- obtain the knowledge of the different types of domain specific iots for real life applications.

- gain the knowledge of raspberry pi device and its use in cloud platforms and other frameworks for developing iot applications.
- understand the processes of collecting and analyzing data generated by iot systems in thecloud.

TEXT BOOKS

1. ArshdeepBahga, Vijay Madisetti, ―Internet of Things - A hands - on approach‖, Universities Press, 2015.

REFERENCES

1. CharalamposDoukas, ―Building Internet of Things With the Arduino‖, Volume 1, published by Createspace, 2012.
2. Andrian McEwen, Hakim Cassimally, "Designing the Internet of Things", 1st edition, John Wiley & Sons Ltd, 2014.
3. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", 1st edition, CRC Press, 2013.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	-	2	-	2	-	-	2	2	-	3	3
CO2	3	3	2	-	2	-	-	2	-	2	2	2	2	3
CO3	3	-	-	1	2	2	2	-	2	-	1	2	3	2
CO4	3	2	2	2	2	2	2	2	3	2	2	2	2	2
CO5	3	2	-	2	2	-	2	-	2	3	-	2	3	3

IT16901 **GREEN COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- gain knowledge in Green IT fundamentals and strategies
- study about Green business process management and green enterprise architecture
- understand the structure of green grid framework
- learn the Socio-cultural aspects of green IT
- figure out environmentally responsible business strategies.

PREREQUISITES: Awareness of Energy and Environment is preferred

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 CASE STUDIES **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, students will be able to

- realize the impact of green computing in IT
- identify green assets and model them
- analyze the green grid framework.
- work with green compliance and standards
- work with green business management tools

TEXT BOOKS

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.

REFERENCES

1. Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey",
2. Shoff/IBM rebook, 2011.
3. John Lamb, "The Greening of IT", Pearson Education, 2009.
4. Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com, 2008.
5. Carl speshocky, "Empowering Green Initiatives with IT", John Wiley & Sons, 2010
6. Wu Chun Feng (editor), "Green computing: Large Scale energy efficiency", CRC Press, 2012.

CO-PO MAPPING:

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

IT16902 INFORMATION TECHNOLOGY ESSENTIALS 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand various applications related to Information Technology.
- know scripting languages.
- acquire knowledge about Networks and its working principles.
- understand cell phone communication technology.
- study various applications related to Information Technology

UNIT I WEB ESSENTIALS 9

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server

UNIT II SCRIPTING ESSENTIALS 9

Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts

UNIT III NETWORKING ESSENTIALS 9

Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT IV MOBILE COMMUNICATION ESSENTIALS 9

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS

UNIT V APPLICATION ESSENTIALS 9

Creation of simple interactive applications - Simple database applications – Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design and deploy web-sites
- design and deploy simple web-applications
- create simple database applications
- develop information system
- describe the basics of networking and mobile communications

TEXT BOOKS

1.Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, 'REILLY, 2014..

2. James F. Kurose, “Computer Networking: A Top-Down Approach”, Sixth Edition, Pearson, 2012.

REFERENCES

1.GottapuSasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012

2.R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

3.it-ebooks.org

CO-PO MAPPING:

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

IT16903 **OPEN SOURCE TECHNOLOGIES** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- be exposed to the context and operation of open source software communities and associated software projects
- learn the fundamentals of SQL.
- learn PHP programming language.
- understand Python programming language
- learn Perl programming language

UNIT I INTRODUCTION **9**

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources – Application of Open Source – Open Source Operating Systems : Linux – Introduction – General Overview – Kernel Mode and User Mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux .

UNIT II OPEN SOURCE DATABASE **9**

Introduction to MySQL – Setting up Account – Starting, Terminating and Writing SQL Programs – Record Selection Technology – Working with Strings – Date and Time – Sorting Query Results – Generating Summary – Working with Metadata – Using Sequences – My SQL and Web

UNIT III OPEN SOURCE PROGRAMMING LANGUAGES **9**

Introduction to PHP Hypertext Processor(PHP) – Programming in Web Environment – Variables – Constants – Data Type – Operators – Statements – Functions – Arrays – Object Oriented Programming (OOP) – String Manipulation and Regular Expression – File Handling and Data Storage – PHP and SQL Database – PHP and Lightweight Directory Access Protocol (LDAP) – PHP Hypertext Processor (PHP) Connectivity – Sending and Receiving E–mails – Debugging and Error Handling – Security – Templates

UNIT IV PYTHON **9**

Introduction to Python – Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditional and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment .

UNIT V PERL **9**

Perl Backgrounder – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and

Control Structures – Subroutines, Packages and Modules – Working with Files – Data Manipulation.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand open domain standards.
- create simple database applications.
- work and develop projects with popular open source software tools.
- understand the object oriented concepts for implementation.
- use the language, components and tools for developing Perl applications.

REFERENCES

1. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata MCGraw Hill, Indian Reprint 2009.
2. VikramVaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata MCGraw Hill, Indian Reprint, 2009.
3. Remycard, Eric Dumas & Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
4. Steve Suchring, "MySQL Bible", John Wiley, 2002.
5. RasmusLerdorf& Levin Tatroe, "Programming PHP", O'Reilly, 2002.
6. Wesley J.Chun , " Core Python Programming ", Prentice Hall, 2001.
7. Martin C.Brown, "Perl : The Complete Reference", 2nd Edition, Tata McGraw Hill, Indian Reprint, 2009.

CO-PO MAPPING:

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

ELECTIVE –IV

IT16451 **J2EE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- be able to develop websites using J2EE.
- able to understand create a Java server page.
- gain the knowledge about Enterprise Bean.
- know about security provided by Java.
- understand the issues in securities.

UNIT IJ2EE OVERVIEW 9

Distributed Multi-tiered Applications - J2EE Containers – Web Services Support – Packaging Applications – Development Roles - J2EE APIs - Sun Java System Application – Server Platform Edition8 – Understanding Understanding XML: Introduction to XML - Generating XML Data.

UNIT IIGETTING STARTED WITH WEB APPLICATIONS 9

Web Application Life Cycle – Web modules - Web Application Examples. Java Servlet Technology: Servlet – Servlet Life Cycle – Sharing Information – Creating and Initializing a Servlet - Writing Service Methods – Filtering Requests and Responses - Invoking Other Web Resources - Accessing the Web Context - Maintaining Client State - Finalizing a Servlet - The Example Servlet.

UNIT III JAVA SERVER PAGES 9

JSP Page – The Life Cycle of a JSP Page - Creating Static Content - Creating Dynamic Content - Expression Control To Another Web Component - Including an Apple – Java server Pages Standard Tag Library: Using JSTL Core Tag Library – XML Tag Library - Internationalization Tag Library – SQL Tag Library - Functions.

UNIT IV ENTERPRISE BEANS 9

An Enterprise Bean – Session Bean - Entity Bean - Message - Driven Bean - Defining Client Access with Interfaces - The Contents of an Enterprise Bean - Naming Conventions for Enterprise Beans The Life Cycles of Enterprise Beans Getting Started With Enterprise Beans : Creating the J2EE Application Creating the Enterprise Bean - Creating the Application Client – Creating the Web Client Specifying the Web Client_s Context Root - Deploying the J2EE Application – Running the Application Client - Running the Web Client.

UNIT V SECURITY 9

Understanding Login Authentication - HTTP basic authentication - Form based login authentication - Client Certificate authentication - Mutual authentication - Digest authentication. The Java Message service API: Overview - Basic JMS API concepts - The JMS API programming model. HTTP OVERVIEW: HTTP Requests HTTP Responses.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, the students will be able to

- explain the Java platform and XML applications.
- integrate Servlets, JSP and JDBC and build a web application.
- develop web applications using Servlets and JSP.
- build Enterprise Applications using Session Bean, Entity Bean and MDB.
- to know the security levels in Java.

TEXT BOOKS

1. Herbert Schildt, J2EE -The Complete Reference, Tata McGraw-Hill, Seventh Edition (2008).

REFERENCES

1. Alur Deepak, Malks Dan and Crupi John, Core J2EE Patterns: Best Practices and Design Strategies, Prentice Hall India (2001).
2. Jim Keogh, J2EE-The Complete Reference; Tata Mcgraw-Hill, Edition(2002).
3. Austin and Pawlan, Advanced Programming for JAVA 2 Platform, Pearson Education (2004).
4. Geary M. David, Core JSTL Mastering the JSP standard Tag Library, PearsonEducation(2007).

CO-PO MAPPING:

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COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	2	-	-	-	-	-	-	-	2	-
CO2	-	3	2	1	3	-	-	-	-	-	-	-	-	2
CO3	-	3	3	-	3	2	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	2	-	-	-	-	-	-	2	-
CO5	-	-	2	3	-	2	-	-	-	2	-	3	2	-

IT16452 **AGILE SOFTWARE DEVELOPMENT** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- learn about fundamentals of agile .
- study about agile scrum framework.
- know about agile testing.
- know about agile software design and development.
- know the current trends of industry.

UNIT I FUNDAMENTALS OF AGILE **9**

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

UNIT II AGILE SCRUM FRAMEWORK **9**

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

UNIT III AGILE TESTING **9**

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

UNIT IV AGILE SOFTWARE DESIGN AND DEVELOPMENT **9**

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

UNIT V INDUSTRY TRENDS **9**

Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud Balancing Agility with Discipline, Agile rapid development technologies.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, the students will be able to

- understand the background and driving forces for taking an Agile approach to software development.
- understand the business value of adopting Agile approaches and Agile development practices.
- drive development with unit tests using Test Driven Development.
- apply design principles and refactoring to achieve Agility.
- deploy automated build tools, version control and continuous integration and Perform testing activities within an Agile project.

REFERENCES

1. Ken Schawber, Mike Beedle, Agile Software Development with Scrum , Pearson , 21 Mar2008.
2. By Robert C. Martin,‖ Agile Software Development, Principles, Patterns and Practices ,Prentice ,25 Oct 2002.
3. Lisa Crispin, Janet Gregory,‖Agile Testing: A Practical Guide for Testers and Agile Teams, Wesley, 30 Dec 2008.
4. Alistair Cockburn, Agile Software Development: The Cooperative Game , Addison Wesley, 19 Oct 2006.
5. Mike Cohn, User Stories Applied: For Agile Software , Addison Wesley, 1 Mar 2004.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	-	-	-	-	-	-	-	-	-	-	3	1
CO2	2	1	-	-	-	-	-	-	-	2	-	-	2	1
CO3	2	1	-	-	-	-	-	-	-	2	-	-	2	1
CO4	2	1	-	-	-	-	-	-	-	1	-	-	2	-
CO5	2	1	-	-	-	-	-	-	-	-	-	-	2	1

IT16453 **MACHINE LEARNING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning.
- learn the new approaches in machine learning.
- design appropriate machine learning algorithms for problem solving.
- Learn about the instants used in machine.
- design the applications by using this algorithms.

UNIT I INTRODUCTION **9**

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT IINEURAL NETWORKS AND GENETIC ALGORITHMS **9**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING **9**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces - Mistake Bound Model.

UNIT IV INSTANT BASED LEARNING **9**

K- Nearest Neighbour Learning – Locally weighted ,Regression – Radial Bases Functions – CaseBased Learning – Deep Learning.

UNIT VADVANCED LEARNING **9**

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- differentiate between supervised, unsupervised, semi-supervised machinelearning approaches.
- apply specific supervised or unsupervised machine learning algorithm for aparticular problem.

- analyze and suggest the appropriate machine learning approach for the various types ofproblem.
- Design and make modifications to existing machine learning algorithms to suit an individual application
- Provide useful case studies on the advanced machine learning algorithms.

TEXT BOOKS

1. Tom M. Mitchell, Machine Learning‖, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES

1. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning)‖, The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective‖, CRC Press, 2009.

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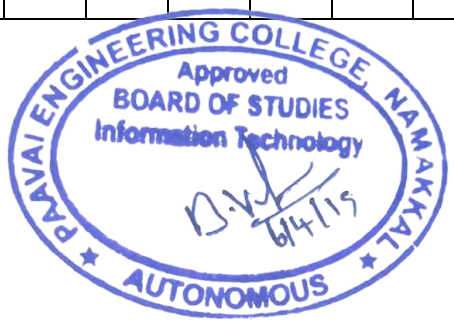
CO1	3	3	3	1	-	-	-	-	1	-	-	2	1	2
CO2	3	3	3	1	-	-	-	-	1	-	-	1	1	2
CO3	3	3	3	1	-	1	-	-	1	-	-	1	2	1
CO4	3	3	3	1	-	-	-	-	1	-	-	2	1	1
CO5	3	3	3	2	-	-	-	-	-	-	-	-	1	1



IT16454 **SOFTWARE TESTING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- understand standard principles to check the occurrence of defects and its removal.
- learn the various design analysis methods.
- know the behaviour of the testing techniques to detect the errors in the software.
- be familiar with the concepts of test and defect controlling.
- learn the functionality of automated testing tools.

UNIT I INTRODUCTION 9

Testing as an Engineering Activity - Role of Process in Software Quality - Testing as a Process- Basic.Definitions: Software Testing Principles, tester‘s role in software development organization. Origins of Defects - defect classes, defect repository and test design, analysis of defect for a project.

UNIT II TESTING DESIGN STRATEGIES 9

Introduction to Testing Design Strategies - Black Box testing, Random Testing, Equivalence Class Partitioning Boundary Value Analysis. White-Box testing, Test Adequacy Criteria, Coverage and Control Flow Graphs, Covering Code Logic Paths - Case study: Additional White box testing approaches.

UNIT III LEVELS OF TESTING 9

Need for Levels of Testing- Unit Test, designing unit tests - Integration tests, designing integration Tests – System Testing, types of system testing – Acceptance Testing – Performance Testing - Regression Testing. Alpha –Beta and Acceptance Test- Usability and Accessibility test – Website testing.

UNIT IV TEST AND DEFECT MANAGEMENT 9

Test Management- Documenting test plan and test case, effort estimation, configuration management, project progress management. Use of testopia for test case documentation and test management -Test Planning – Test Plan Components, test plan attachments, locating test items - reporting test results.

UNIT V TEST AUTOMATION 9

Introduction to automation testing, why automation, what to automate, skills needed for automation, Design and architecture for automation, tools and result modules - Introduction to Selenium, Basics of Automation testing using selenium, using selenium IDE for automation testing.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- apply software testing fundamentals and testing design strategies to enhance software quality.
- implement the different analysing techniques in software design.
- impart knowledge in identifying suitable tests to be carried out.

- understand, plan and document the defect control procedures.
- explore the test automation concepts and tools.

TEXT BOOKS

1. Srinivasan Desikan and Gopalaswamy Ramesh, ― Software Testing - Principles and practices‖, Pearson education, 2006.
2. Rex Black (2001), Managing the Testing Process (2nd edition), John Wiley & Sons.

REFERENCES

1. AdityaP.Mathur, ―Foundations of Software Testing‖, Pearson Education, 2008.
2. Ron Patton, ―Software Testing‖, Second Edition, Sams Publishing, Pearson Education, 2007.
3. Foundations of software testing ,Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, 2008.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak													
COs	**Programme Outcomes(POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	1	-	2	1	1	-	-	-	-	2	2
CO2	3	3	2	1	-	2	1	-	1	1	2	1	2	1
CO3	3	3	3	2	1	2	2	1	2	-	-	1	2	1
CO4	3	3	2	1	-	1	2	-	2	2	2	-	2	1
CO5	3	2	3	2	3	1	2	1	2	2	2	-	2	2

IT16455 **SOFT COMPUTING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- provide knowledge on knowledge based systems
- learn the fundamentals of fuzzy logic
- acquire knowledge on artificial neural networks
- know how cooperative neuro-fuzzy systems work
- gain knowledge on the preliminaries of evolutionary computing

UNIT I INTRODUCTION TO INTELLIGENT SYSTEMS AND SOFT COMPUTING 9

Intelligent Systems - Knowledge Based Systems - Knowledge Representation and Processing – Soft Computing

UNIT II FUNDAMENTALS OF FUZZY LOGIC SYSTEMS 9

Background - Fuzzy Sets - Fuzzy Logic Operations - Implication - Some Definitions - Fuzziness and Fuzzy Resolution - Fuzzy Relations - Composition and Inference – Projection - Consideration of Fuzzy Decision Making

UNIT III FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS 9

Learning and Acquisition of Knowledge - Features of Artificial Neural Networks – Fundamentals of Connectionist Modeling - Major Classes of Neural Networks - Multilayer Perceptron - Radial Basis Function Networks Kohonen‘s Self - Organizing Network - The Hopfield Network - Industrial and Commercial Applications of ANN.

UNIT IV NEURO-FUZY SYSTEMS 9

Background - Architectures of Neuro Fuzzy Systems - Cooperative Neuro Fuzzy Systems – Neural Network Driven Fuzzy Reasoning - Hybrid Neuro Fuzzy Systems - Construction of Neuro Fuzzy Systems – Structure Identification Phase - Parameter Learning Phase.

UNIT V EVOLUTIONARY COMPUTING 9

Overview of Evolutionary Computing - Genetic Algorithms and Optimization - The Schema Theorem– The Fundamental Theorem of Genetic Algorithms - Genetic Algorithm Operators - Integration of Genetic Algorithms with Neural Networks - Integration of Genetic Algorithms with Fuzzy Logic - Known Issues in GAs – Population Based Incremental Learning - Evolutionary Strategies - ES Applications.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- illustrate the key aspects of the knowledge based system and how knowledge is represented and processed
- know the basic concept of fuzzy systems

- illustrate the concept of learning and acquisition of knowledge
- identify the key concepts of Neuro Fuzzy systems
- illustrate the concept of genetic algorithm

TEXT BOOKS

1. Fakhereddine O Karray and Clarence De Silva, ―Soft Computing and Intelligent Systems Design: Theory, Tools and Applications‖, Pearson, 2009.

REFERENCES

1. Madan M Gupta and Naresh K Sinha, ―Soft Computing and Intelligent Systems: Theory and Applications‖, Academic Press, 1999
2. S Rajasekaran and G A Vijayalakshmi Pai, ―Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications‖, Prentice Hall India, 2003.
3. S N Sivanandam, S Sumathi and S N Deepa, ―Neural Networks using MATLAB‖, Tata McGraw-Hill, 2005.

CO-PO MAPPING:

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COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	1	3	-	-	-	-	-	-	-	-	-	1	3
CO2	2	2	3	-	-	-	-	-	-	-	-	-	1	3
CO3	2	2	3	-	-	-	-	-	-	-	-	-	1	3
CO4	1	1	2	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	3

ELECTIVE –V

IT16551 DIGITAL ENTERPRISE RESOURCE PLANNING 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand why information systems are so important today for business and management.
- evaluate the role of the major types of information systems in a business environment andtheir relationship to each other.
- assess the impact of the Internet and Internet technology on business electronic commerceand electronic business.
- identify the major management challenges to building and using information systems andlearn how to find appropriate solutions to those challenges.
- define an IT infrastructure and describe its components.

UNIT IRP AND TECHNOLOGY 9

Introduction – Related Technologies – Business Intelligence – E-Commerce and EBusiness – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life Cycle management – SCM – CRM.

UNIT II ERP IMPLEMENTATION 9

Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

UNIT III ERP IN ACTION & BUSINESS MODULES 9

Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources – Plant maintenance – Materials Management –Quality management – Marketing – Sales, Distribution and service.

UNIT IV ERP MARKET 9

Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc. – SSA Global – Lawson Software – Epicor – Intuitive.

UNIT V MORDEN ERP 9

Modern ERP introduction - Characteristics of Modern ERP - Deploy Modern ERP Systems – ERP with Cloud Computing – Modern ERP tools – Role of modern ERP in Marketing Industry – Latest Trends in ERP.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the basic concepts and technologies used in the field of management information Systems.

- have the knowledge of the different types of management information systems.
- be aware of the ethical, social, and security issues of information systems.
- understand the role of information systems in organizations, the strategic managementprocesses, and the implications for the management.
- develop an understanding of how various information systems work together toaccomplish the information objectives of an organization.

TEXT BOOKS

1. Alexis Leon, ―ERP DEMYSTIFIED‖, Tata McGraw Hill, Second Edition, 2008.
2. Mary Sumner, ―Enterprise Resource Planning‖, Pearson Education, 2007.

REFERENCES

1. Jim Mazzullo, ‖SAP R/3 for Everyone‖, Pearson,2007.
2. Jose Antonio Fernandz, ― The SAP R /3 Handbook‖, Tata McGraw Hill, 1998.
3. Biao Fu, ―SAP BW: A Step-by-Step Guide‖, First Edition, Pearson Education, 2000.

CO-PO MAPPING:

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COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	2	3	3	2	-	2	2	2	3	3
CO2	3	3	2	2	1	-	2	2	-	2	2	2	3	3
CO3	3	1	2	1	2	2	3	2	2	-	1	2	3	2
CO4	3	2	2	2	2	2	3	2	3	2	2	2	3	2
CO5	3	2	1	2	-	-	2	-	2	3	-	2	3	3

IT16552 **SERVICE ORIENTED ARCHITECTURE** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- gain understanding of the basic principles of service orientation.
- understand web service oriented analysis.
- learn technology underlying the service design.
- apply advanced concepts such as ASP.NET web forms, ASP.NET web services.
- know about various WS -*specification standards.

UNIT I BASICS OF SOA **9**

Fundamental SOA – Evolution of SOA – SOA Timeline, Continuing evolution of SOA, ROOTS of SOA – Comparing SOA to past Architectures – SOA vs. Client server architecture,SOA vs. Distributed internet architecture, SOA vs. Hybrid web service architecture, service orientation and object orientation.

UNIT II WEB SERVICES **9**

Web services –Web services framework- Services - Service descriptions -Messaging with SOAP - Message exchange Patterns –Service Activity - Coordination - Atomic Transactions –Business activities -Orchestration -Choreography - Service layer abstraction -Application Service Layer - Business Service Layer -Orchestration Service Layer.

UNIT III SERVICE DESIGN **9**

Introduction to Service oriented analysis –benefits of a Business-centric SOA -Deriving business services - Service modeling – Step by Step process - Services vs. Services candidates, process description - Service Oriented Design - WSDL language basics –SOAP language basics –Steps to composing SOA - Entity-centric business service design - Application service design -Task-centric business service design.

UNIT IV SOA PLATFORMS **9**

SOA platform basics –Basic Platform Building blocks, Common SOA platform Layers, Relationship between SOA layers and Technologies, Fundamental service technology architecture - SOA support in J2EE – Platform Overview Primitive SOA Support, Support for Service Orientation principles, Contemporary SOA support - SOA support in .NET Common Language Runtime -ASP.NET web forms -ASP.NET web services.

UNIT V BUILDING SOA-BASED APPLICATIONS **9**

WS-BPEL basics –Process elements, partnerLinks and partnerLinks elements,partnerLink Type element, variable element, getvariableProeperty,sequence element, invoke element, receive element, reply element, reply element, Switch case and otherwise elements,assign,copy,from and to elements, WS-Coordination overview -WS- Policy, WS-Security.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- remember the basics of SOA.
- know about the service layers of web services.
- understand and discuss service and design in SOA.
- analyze the basic platforms of SOA.
- describe the various applications of SOA.

TEXT BOOKS

1. Thomas Erl ―Service -Oriented Architecture: Concepts, Technology, and Design‖, Pearson Education, 2008.

REFERENCES

1. Thomas Erl, ―SOA Principles of Service Design ―(The Prentice Hall Service – Oriented Computing Series from Thomas Erl), 2005
2. Newcomer, Lomow, ―Understanding SOA with Web Services‖, Pearson Education, 2005.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	2	3	3	2	-	2	2	2	3	3
CO2	3	3	3	2	3	-	2	3	-	2	3	2	3	3
CO3	3	1	2	1	2	2	3	2	2	-	2	3	3	2
CO4	3	2	3	2	2	2	3	2	3	2	2	2	3	2
CO5	3	2	2	2	-	-	2	-	2	3	-	2	3	3

IT16553 FOUNDATIONS OF BLOCKCHAIN TECHNOLOGY 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand the processes in payment and funding.
- identify the risks involved in building blockchain applications.
- awareness of legal implications using smart contracts.
- obtain an overview of the present landscape of blockchain implementations.
- learn about the finalized applications.

UNIT I INTRODUCTION **9**

The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle – formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS) .

UNIT II CRYPTOCURRENCY **9**

Cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography.

UNIT III BITCOIN TECHNOLOGIES **9**

Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability – anonymity forks - double spending - mathematical analysis of properties of Bitcoin

UNIT IV ETHEREUM CONCEPTS **9**

Ethereum - Ethereum Virtual Machine - Wallets for Ethereum - Solidity – Smart – Contracts some attacks on smart contracts.

UNIT V APPLICATIONS **9**

Trends and Topics - Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves – Zcash.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- familiarise the functional/operational aspects of cryptocurrency ECOSYSTEM
- understand emerging abstract models for Blockchain Technology.
- identify major research challenges .
- describe technical gaps existing between theory and practice in cryptocurrency domain.
- Identifying the technologies and protocols used in blockchain.

TEXT BOOKS

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.

REFERENCES

1. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.
2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310.
3. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454) . A significant progress and consolidation of Several principles).
4. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916).

CO-PO MAPPING:

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	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	2	3	3	-	-	2	2	2	3	3
CO2	3	3	-	2	-	-	2	2	-	2	2	-	3	3
CO3	3	-	-	-	2	2	-	-	2	-	-	-	3	2
CO4	3	2	2	-	2	-	-	2	3	2	2	2	3	2
CO5	3	2	-	2	-	-	2	-	2	3	-	2	3	3

IT16554 **SOCIAL NETWORK ANALYSIS** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- model and visualize the social network.
- determine the users in the social network.
- understand the evolution of the social network.
- determine the interests of the users.
- understand Various applications related to Information Technology.

UNIT I INTRODUCTION **9**

Introduction - 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 IIMODELING 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 – 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 and 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.

UNIT VTEXT 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 will be able to

- explain about the internals components of the social networks.
- model and visualize the social network.
- outline the features of community mining.
- explain about the evolution of social networks.
- summarize the algorithms and systems for Expert Location in Social Networks.

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. BorkoFurht, Handbook of Social Network Technologies and Applications‖, Springer, First edition, 2010.
4. GuandongXu ,Yanchun Zhang and Lin Li, Web Mining and Social Techniques applications‖, Springer, 1st edition, 2011.
5. Lee Giles, Mark Smith, John Yen, Advances in Social Network Mining and Analysis‖ Springer, 2010.
6. Ajith Abraham, Aboul Ella Hassanien, VáclavSnášel, Computational Social Network Analysis: Trends, Tools and Research Advances‖, Springer, 2009.
7. Toby Segaran, Programming Collective Intelligence‖, O"Reilly, 2012.

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