MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC, NBA & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Curriculum/Syllabus

Programme Code	:	**MC**
Programme Name	:	**M.E- COMPUTER SCIENCE AND ENGINEERING**
Regulation	:	**R-2016**

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Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

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INSTITUTION VISION &MISSION

INSTITUTION VISION

To be a Centre of Excellence in Engineering, Technology and Management on par with International Standards.

INSTITUTION MISSION

- To prepare the students with high professional skills and ethical values
- To impart knowledge through best practices
- To instill a spirit of innovation through Training, Research and Development
- To undertake continuous assessment and remedial measures
- To achieve academic excellence through intellectual, emotional and social stimulation

INSTITUTION MOTTO

Rural upliftment through Technical Education.

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DEPARTMENT VISION & MISSION

DEPARTMENT VISION

To produce the Computer Science and Engineering students with the Innovative and Entrepreneur skills to face the challenges ahead

DEPARTMENT MISSION

- To impart knowledge in the state of art technologies in Computer Science and Engineering
- To inculcate the analytical and logical skills in the field of Computer Science and Engineering
- To produce the graduates to examine the issues and propose solutions with Ethical values

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DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

PROGRAM EDUCATIONAL OBJECTIVES

The Computer Science and Engineering Graduates should be able to

PEO1: Graduates will be able to Practice as an IT Professional in Multinational Companies

PEO2: Graduates will be able to Gain necessary skills and to pursue higher education for career growth

PEO3: Graduates will be able to Exhibit the leadership skills and ethical values in the day to day life

PROGRAM OUTCOMES

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduates should be able to design and analyze the algorithms to develop an Intelligent Systems

PSO2: Graduates should be able to apply the acquired skills to provide efficient solutions for real time problems

PSO3: Graduates should be able to exhibit an understanding of System Architecture, Networking and Information Security

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Estd. 2000

M.E. - COMPUTER SCIENCE AND ENGINEERING

GROUPING OF COURSES

FOUNDATION COURSE [FC]

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16MCA01	Advanced Numerical Methods	FC	5	3	2	0	4
2.	16MCA02	Applied Mathematics	FC	5	3	2	0	4
3.	16MCA03	Applied Probability And Statistics	FC	5	3	2	0	4

PROFESSIONAL CORE [PC]

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16MCB01	Advanced Data structures and algorithms	PC	5	3	0	2	4
2.	16MCB02	Advanced operating systems	PC	5	3	0	2	4
3.	16MCB03	Multi core architectures	PC	3	3	0	0	3
4.	16MCB04	Data mining and Data Warehousing	PC	3	3	0	0	3
5.	16MCB05	Advanced Data base Technology	PC	5	3	0	2	4
6.	16MCB06	Advances in Computer Networks	PC	3	3	0	0	3
7.	16MCB07	Machine learning techniques	PC	3	3	0	0	3
8.	16MCB08	Cloud computing technologies	PC	5	3	0	2	4
9.	16MCB09	Advanced software Engineering	PC	3	3	0	0	3
10.	16MCB10	Multimedia Communications	PC	3	3	0	0	3
11.	16MCB11	Network security techniques	PC	3	3	0	0	3
12.	16MCB12	Parallel Algorithms	PC	3	3	0	0	3

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PROFESSIONAL ELECTIVES [PE]

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16MCC01	Digital image processing	PE	3	3	0	0	3
2.	16MCC02	Computer vision and applications	PE	3	3	0	0	3
3.	16MCC03	Artificial Intelligence	PE	3	3	0	0	3
4.	16MCC04	Natural language processing	PE	3	3	0	0	3
5.	16MCC05	Distributed computing	PE	3	3	0	0	3
6.	16MCC06	Service oriented architecture	PE	3	3	0	0	3
7.	16MCC07	Mobile application development	PE	3	3	0	0	3
8.	16MCC08	Internet of things	PE	3	3	0	0	3
9.	16MCC09	Big data analytics	PE	3	3	0	0	3
10.	16MCC10	Information Retrieval Techniques	PE	3	3	0	0	3
11.	16MCC11	Ad Hoc and Wireless Sensor Networks	PE	3	3	0	0	3
12.	16MCC12	Pattern classification and Analysis	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1	16MCD01	Project work - Phase I	EEC	12	0	0	12	6
2	16MCD02	Project work - Phase II	EEC	24	0	0	24	12

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	MUTHAYAMMAL ENGINEERING COLLEGE (Autonomous) (Approved by AICTE & Affiliated to Anna University), RASIPURAM – 637 408					CURRICULUM PG R – 2016
Department	Computer Science and Engineering					
Programme	M.E					
	SEMESTER – I					
Sl. No.	Course Code	Course Name	Hours/ Week L	T	P	Credit C	Contact Hours
THEORY							
1.	16MCA02	Applied Mathematics	3	2	0	4	5
2.	16MCB01	Advanced data structures and algorithms	3	0	2	4	3
3.	16MCB02	Advanced Operating systems	3	0	2	4	3
4.	16MCB04	Data Mining and Data warehousing	3	0	0	3	3
5.	16MCB06	Advances in Computer networks	3	0	0	3	3
6.	16MCB07	Machine Learning Techniques	3	0	0	3	3
		Total Credits				21	

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Department	Computer Science and Engineering					
Programme	M.E					
	SEMESTER – II					
Sl. No.	Course Code	Course Name	Hours/ Week L	T	P	Credit C	Contact Hours
THEORY							
1.	16MCB03	Multi-core Architectures	3	0	0	3	3
2.	16MCB05	Advanced Data base Technology	3	0	2	4	5
3.	16MCB08	Cloud Computing Technologies	3	0	2	4	5
4.	PE	Professional Elective – I	3	0	0	3	3
5.	PE	Professional Elective – II	3	0	0	3	3
6.	PE	Professional Elective – III	3	0	0	3	3
		Total Credits				20	

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Programme Code & Name: MC & M.E-Computer Science and Engineering

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Department	Computer Science and Engineering	
Programme	M.E	
	SEMESTER – III	

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	PE	Professional Elective - IV	3	0	0	3	3
2.	PE	Professional Elective - V	3	0	0	3	3
3.	PE	Professional Elective - VI	3	0	0	3	3
4.	16MCD01	Project Work – Phase I	0	0	12	6	12
		Total Credits				15	

*Students going for Industrial Project/Thesis will complete these courses through MOOCs

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Department	Computer Science and Engineering	
Programme	M.E	
	SEMESTER – IV	

Sl. No.	Course Code	Course Name	Hours/week			Credit	Contact Hours
			L	T	P	C	
PRACTICAL							
1.	16MCD02	Project Work – Phase II	0	0	24	12	24
		Total Credits				12	

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16MCA01 **ADVANCED NUMERICAL METHODS** **L T P C**
3 2 0 4

COURSE OBJECTIVES

1. To learn the algebraic equations this finds applications in many engineering branches.
2. To make the student acquire sound knowledge of computational techniques in solving ordinary differential equations that model engineering.
3. To solve Elliptic equations by using computational techniques
4. To introduce numerical tools for the solutions of partial differential equations that model several physical processes
5. To impart knowledge on numerical methods that will come in handy to solve numerically the problems that arise in engineering and technology.

COURSE OUTCOMES

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

16MCA01.CO1	Demonstrate understanding and implementation of numerical solution algorithms applied to solve algebraic equations
16MCA01.CO2	Be familiar with numerical solutions of ordinary differential equation and partial differential equations.
16MCA01.CO3	Be competent with finite difference method and finite element method.
16MCA01.CO4	Understanding the theoretical and practical aspects of the use of numerical methods. Implementing numerical methods for a variety of multidisciplinary applications. Establishing the limitations, advantages, and disadvantages of numerical methods
16MCA01.CO5	The students will have a clear perception of the power of numerical Techniques. This will also serve as a precursor for future research.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCA01.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA01.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA01.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA01.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA01.CO5	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-

UNIT I **ALGEBRAIC EQUATIONS** 9+6

Systems of linear equations: Gauss Elimination method, pivoting techniques, Thomas algorithm for tridiagonal system – Jacobi, Gauss Seidel, SOR iteration methods - Systems of nonlinear equations: Fixed point iterations, Newton Method, Eigenvalue problems: power method, inverse power method, Faddeev – Leverrier Method

UNIT II **ORDINARY DIFFERENTIAL EQUATIONS** 9+6

Runge Kutta Meth ods for system of IVPs, numerical stability, Adams - Bashforth multistep method, solution of stiff ODEs, shooting method, BVP: Finite difference method, orthogonal collocation method, orthogonal collocation with finite element method, galerkin finite element method.

UNIT III **FINITE DIFFERENCE METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS** 9+6

Parabolic equations: explicit and implicit finite difference methods, weighted average approximation - Dirichlet and Neumann conditions – Two dimensional parabolic equations – ADI method; First order hyperbolic equations – method of characteristics, different explicit and implicit methods; numerical stability analysis, method of lines – Wave equation: Explicit scheme - Stability of above schemes.

UNIT IV **FINITE DIFFERENCE METHODS FOR ELLIPTIC EQUATIONS** 9+6

Laplace and Poisson's equations in a rectangular region: Five point finite difference schemes, Leibmann's iterative methods, Dirichlet and Neumann conditions – Laplace equation in polar coordinates: finite difference schemes – approximation of derivatives near a curved boundary while using a square mesh.

UNIT V **FINITE ELEMENT METHOD** 9+6

Partial differential equations – Finite element method – orthogonal collocation method, orthogonal collocation with finite element method, Galerkin finite element method.

TOTAL: L : 45 + T : 30 = 75

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.K. Jain , S.R.K. Iyengar, R.K. Jain	Computational Methods for Partial Differential Equations, 2nd Edition	New Age Publishers	2016
2.	S. K. Gupta	Numerical Methods for Engineers, 3rd Edition	New Age International Pvt Ltd Publishers	2015
3.	Saumyen Guha and Rajesh Srivastava	Numerical methods for Engineering and Science	Oxford Higher Education, New Delhi	2010
4.	M.K. Jain	Numerical Methods for Scientific & Engineering Computation, 6th Edition	New Age International Publishers	2010
5.	Burden, R.L., and Faires, J.D.	Numerical Analysis –Theory and Applications	Cengage Learning, India Edition, New Delhi	2009

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16MCA02 **APPLIED MATHEMATICS** **L T P C**
3 2 0 4

COURSE OBJECTIVES

1. To realize the use of matrix theory techniques in engineering applications and to develop for future applications.
2. To analyze and solve the fundamental problem with prescribed or free boundary conditions in simple cases
3. Demonstrate knowledge of mathematics and mechanics to construct, analyze and interpret real world problems
4. Provide a foundation and motivation for exposure to statistical ideas subsequent to the course.
5. To formulate and construct a mathematical model for a linear programming problem in real life situation

COURSE OUTCOMES

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

16MCA02.CO1	Explain geometrical concepts related to orthogonality and least squares solutions and perform calculations related to orthogonality.
16MCA02.CO2	The variational calculus makes access to mastering in a wide range of classical results of variational calculus. Students get up apply results in technical problem solutions
16MCA02.CO3	The students will have a basic knowledge of the main fields of mathematics and mechanics, including differential equations, elasticity theory, fluid mechanics.
16MCA02.CO4	The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable
16MCA02.CO5	The knowledge gained on this course helps the students to do engineering optimization.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCA02.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA02.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA02.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA02.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA02.CO5	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-

UNIT I **MATRIX THEORY** 9+6

The Cholesky decomposition - Generalized Eigen vectors, Canonical basis - QR factorization - Least squares method - Singular value decomposition.

UNIT II **CALCULUS OF VARIATIONS** 9+6

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functionals dependant on functions of several independent variables – Variational problems with moving boundaries – problems with constraints - Direct methods: Ritz and Kantorovich methods

UNIT III **ONE DIMENSIONAL RANDOM VARIABLES** 9+6

Random variables - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a Random Variable.

UNIT IV **LINEAR PROGRAMMING** 9+6

Formulation – Graphical solution – Simplex method – Two phase method - Transportation and Assignment Models

UNIT V **FOURIER SERIES AND EIGEN VALUE PROBLEMS** 9+6

Fourier Trigonometric series: Periodic function as power signals – Convergence of series – Even and odd function: cosine and sine series – Non-periodic function: Extension to other intervals - Power signals: Exponential Fourier series – Parseval's theorem and power spectrum – Eigen value problems and orthogonal functions – Regular Sturm-Liouville systems – Generalized Fourier series.

TOTAL: L : 45 + T : 30 = 75

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Mital.K.V. Mohan and Chander	Optimization Methods in Operations Research and Systems Analysis, 4th Edition	New Age International Publishers	2016
2.	Stark. H., and Woods. J.W.	Probability and Random Processes with Applications to Signal Processing, 4th Edition	Pearson Education, Asia	2014
3.	Hamdy ATaha	Operations Research, 9th Edition (Asia)	Pearson Education, Asia	2014
4.	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2011
5.	Richard Bronson	Matrix Operation, Schaum's outline series, 2nd Edition	McGraw Hill	2011

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16MCA03 **APPLIED PROBABILITY AND STATISTICS**

L	T	P	C
3	2	0	4

COURSE OBJECTIVES

1. To introduce the basic concepts of one dimensional and two dimensional Random Variables.
2. To gain knowledge in the application of family of random variables in real life situations
3. To provide information about Correlation and Regression
4. Learn about maximum likelihood estimation, unbiased estimation and least square methods.
5. To enable the students to use the concepts of multivariate normal distribution and principle components analysis.

COURSE OUTCOMES

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

16MCA03.CO1	Analyze random or unpredictable experiments and investigate important features of random experiments. Construct probabilistic models for observed phenomena through distributions which play an important role in many engineering applications.
16MCA03.CO2	Associate random variables by designing joint distributions and correlate the random variables
16MCA03.CO3	Perform and interpret correlation and regression analysis and develop correlation models to predict changes in processes and products for linear and non-linear relationships
16MCA03.CO4	Be familiar with multivariate analysis.
16MCA03.CO5	The student will able to acquire the basic concepts of Probability and Statistical techniques for solving mathematical problems which will be useful in solving Engineering problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCA03.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA03.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA03.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA03.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
16MCA03.CO5	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-

UNIT I **ONE DIMENSIONAL RANDOM VARIABLES** **9+6**

Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Functions of a Random Variable.

UNIT II **TWO DIMENSIONAL RANDOM VARIABLES** **9+6**

Joint distributions – Marginal and Conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

UNIT III **ESTIMATION THEORY** **9+6**

Unbiased Estimators – Method of Moments – Maximum Likelihood Estimation - Curve fitting by Principle of least squares – Regression Lines.

UNIT IV **TESTING OF HYPOTHESES** **9+6**

Sampling distributions - Type I and Type II errors - Tests based on Normal, t, Chi-Square and F distributions for testing of mean, variance and proportions – Tests for Independence of attributes and Goodness of fit.

UNIT V **MULTIVARIATE ANALYSIS** **9+6**

Random Vectors and Matrices - Mean vectors and Covariance matrices - Multivariate Normal density and its properties - Principal components Population principal components – Principal components from standardized variables

TOTAL: L : 45 + T : 30 = 75

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Douglas C. Montgomery, George C. Runger	Applied Statistics and Probability for Engineers (International Student Version), 6th Edition	John Wiley & Sons, Inc.	2016
2.	Richard A. Johnson and Dean W. Wichern	Applied Multivariate Statistical Analysis, 6th Edition	Pearson Education. Asia	2015
3.	Gupta S.C. and Kapoor V.K	Fundamentals of Mathematical Statistics	Sultan Chand & Sons	2014
4.	HweiP.Hsu,	Schaum"s Outline of Theory and Problems of Probability, Random Variables and Random Processes	Tata Mc Graw Hill Edition, New Delhi	2014
5.	Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., ,	Probability and Statistics for Engineers and Scientists, 8th Edition	Pearson Education, Asia	2013

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16MCB01 **ADVANCED DATASTRUCTURES AND ALGORITHMS** L T P C
3 0 2 4

COURSE OBJECTIVES

1. To review the basic data structures such as list, stack & queue and introduce concurrency on them.
2. To learn advanced search structures such as Splay tree, Red Black trees, Multi way search tree and Skip lists.
3. To study advanced heap structures such as Leftist Heaps, Binomial Heaps and Fibonacci Heaps.
4. To introduce various advanced concurrent structures .
5. To learn the various advanced algorithms.

COURSE OUTCOMES

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

16MCB01.CO1 Implement and apply concurrency in linked lists, stacks and queues.
16MCB01.CO2 Perform operations on advanced search trees.
16MCB01.CO3 Design and implement various types of advanced heaps structures.
16MCB01.CO4 Implement advanced concurrent structures such as hash table & priority queue.
16MCB01.CO5 Solve applications using advanced algorithm such as Randomized, Approximation and Parallel algorithms.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB01.CO1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
16MCB01.CO2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
16MCB01.CO3	x	x	x	x	x	x	x	x	-	x	x	x	x	x	x
16MCB01.CO4	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
16MCB01.CO5	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x

UNIT I **DATA STRUCTURES AND CONCURRENCY** 9

Review of elementary data structures – data structures and concurrency – locking linked lists – coarse-grained synchroniza – fine-grained synchronization – lazy synchronization – non-blocking synchronization – concurrent queues – bounded pa queues – unbounded lock-free queues – dual data structures – concurrent stacks – elimination back off stack.

UNIT II **ADVANCED SEARCH STRUCTURES** 9

Binary Search tree - Splay tree - Red Black trees – Interval tree - 2-D tree – Digital Search tree – Multi way Trie - S lists.

UNIT III **ADVANCED HEAP STRUCTURES** 9

Binary Search tree - Splay tree - Red Black trees – Interval tree - 2-D tree – Digital Search tree – Multi way Trie - S lists.

UNIT IV **ADVANCED CONCURRENT STRUCTURES** 9

Concurrent hashing – closed-address hash sets – lock-free hash sets – open-addressed hash sets – lock-based concurrent lists – lock-free concurrent skip lists – concurrent priority queues – bounded priority queue – unbounded priority queu concurrent heap – skip list based unbounded priority queues

UNIT V **ADVANCED ALGORITHMS** 9

Introduction to Approximation algorithms: Vertex cover - Travelling Salesman Problem - knapsack problem. Introductio Randomized algorithms – Randomized Searching and Sorting - Online hiring problem. Introduction to Parallel algorithn parallel sorting algorithms - Odd-even transposition sort - Quick sort based parallel sort.

TOTAL : L : 45

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List of Experiments:

1. Implementation of Linked lists
2. Implementation of Multi stacks
3. Implementation of Double Ended Queue (De queues) & Circular Queues
4. Implementation of Min Heap
5. Implementation of AVL Tree
6. Implementation of BTree
7. Implementation of Quick Sort
8. Implementation of Greedy algorithm
9. Implementation of Knapsack using Dynamic Programming
10. Implementation of randomized algorithms
11. Implementation of recursive backtracking algorithms.
12. Implementation of Graph coloring using backtracking

TOTAL : P : 30

REFERENCE BOOK

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.K. Chang	Data Structures and Algorithms–Series Software Engineering and Knowledge Engineering.	WorldScientific Publishing	2003.
2.	M. Herlihy and N. Shavit, Morgan Kaufmann	The Art of Multiprocessor Programming	Pearson education	2012
3.	E. Horowitz, S.Sahni and Dinesh Mehta	Fundamentals of Data structures in C++	Universities Press	2007.
4.	Thomas H Cormen, Charle Leiserson, Ronald L Rivest Clifford Stein	Introduction to Algorithms	Prentice Hall of India, New Delhi	2007
5.	Michael J. Quinn	Parallel Computing: Theory & Practice	Tata McGraw Edition	2003

WEB URLs:

1 cs-fundamentals.com/data-structures/introduction-to-data-structures.

2 https://en.wikibooks.org/wiki/Advanced_Data_Structures_and_Algorithms

3 https://www.cambridge.org/9780521880374

4 https://www.coursera.org/specializations/data-structures-algorithms

5 https://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html

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16MCB02 **ADVANCED OPERATING SYSTEMS** L T P C
3 0 2 4

COURSE OBJECTIVES

1. To learn the fundamentals of Operating Systems
2. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
3. To gain insight on to the distributed resource management components
4. To know the components of Real time, Mobile operating systems.
5. To learn the fundamentals of Operating Systems

COURSE OUTCOMES

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

16MCB02.CO1 Discuss the various synchronization, scheduling and memory management issues.
16MCB02.CO2 Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed Operating system.
16MCB02.CO3 Discuss the various resource management techniques for distributed systems.
16MCB02.CO4 Identify the different features of real time and mobile operating systems.
16MCB02.CO5 Ability To Learn the management aspects of Mobile operating systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB02.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
16MCB02.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
16MCB02.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
16MCB02.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
16MCB02.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **FUNDAMENTALS OF OPERATING SYSTEMS** 9

Overview – Synchronization Mechanisms – Processes and Threads - Process Scheduling – Deadlocks: Detection, Preventi and Recovery – Models of Resources – Memory Management Techniques.

UNIT II **DISTRIBUTED OPERATING SYSTEMS** 9

Binary Search tree - Splay tree - Red Black trees – Interval tree - 2-D tree – Digital Search tree – Multi way Trie - Skip lists.

UNIT III **DISTRIBUTED RESOURCE MANAGEMENT** 9

Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shar memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recove – Fault Tolerance – Two-Phase Commit Protocol – Non blocking Commit Protocol – Security and Protection.

UNIT IV **REAL TIME AND MOBILE OPERATING SYSTEMS** 9

Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems – Real Time Task Scheduling Handling Resource Sharing - Mobile Operating Systems –Micro Kernel Design - Client Server Resource Access – Process and Threads - Memory Management - File system.

UNIT V **CASE STUDIES** 9

Linux System: Design Principles - Kernel Modules - Process Management Scheduling - Memory Management - Input-Outp Management - File System – Inter process Communication. iOS and Android: Architecture and SDK Framework - Me Layer - Services Layer - Core OS Layer - File System.

TOTAL : L : 45

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List of Experiments:

1. Development of a reasonably sized dynamically loadable kernel module for Linux kernel
2. Study educational operating systems such as Minix (http://www.minix3.org/), Weenix (http://weenix.cs.brown.edu/mediawiki/index.php/Weenix) and develop reasonably sized interesting modules for them
3. Study the Android open source operating system for mobile devices (http://source.android.com/) and develop / modify some modules.
4. Study any embedded and real-time operating system such as eCos (http://ecos.sourceware.org/) and develop / modify some modules

TOTAL : P : 30

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mukesh Singhal and Niranjan G. Shivaratri	Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems	Tata McGraw-Hill	2001
2.	Abraham Silberschatz; Peter Baer Galvin; Greg Gagne	Operating System Concepts	John Wiley & Sons	2004
3.	Daniel P Bovet and Marco Cesati	Understanding the Linux Kernel	O'Reilly	2005
4.	Singhal	Advanced concepts in operating systems	TataMcGraw-Hill Education	2001
5.	Dang Van Duc	Operating System	Institute of Information Technology	2012

WEB URLs:

1 https://www.udacity.com/course/advanced-operating-systems--ud189

2 nptel.ac.in/syllabus/106106107/

3 www.cc.gatech.edu/classes/AY2010/cs4210_fall/

4 http://www.cs.toronto.edu/~demke/469F.06/

5 https://www.netcraft.com/

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16MCB03 **MULTICORE ARCHITECTURES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To understand the recent trends in the field of Computer Architecture and identify performance related parameters.
2. To appreciate the need for parallel processing and understand the different types of multi core architectures
3. To learn about the architecture and programming with Vector, SIMD and Graphical Processing Units.
4. To expose the students to warehouse-scale architectures.
5. To understand the embedded architectures

COURSE OUTCOMES

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

16MCB03.CO1 Identify the performance parameters in computer architecture
16MCB03.CO2 Identify the limitations of ILP and the explore the different multi core architectures.
16MCB03.CO3 Compare vector, SIMD and GPU architectures
16MCB03.CO4 Analyze the different types of inter connection networks.
16MCB03.CO5 Ability to understand the embedded architectures

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB03.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
16MCB03.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
16MCB03.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
16MCB03.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
16MCB03.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS OF COMPUTER ARCHITECTURE** 9

Classes of Computers – Trends in Technology, Power, Energy and Cost – Dependability – Measuring, Reporting and Summarizing Performance – Quantitative Principles of Computer Design – Classes of Parallelism - Instruction Level Parallelism (TLP), Data Level Parallelism (DLP), Thread Level Parallelism (TLP) and Request Level Parallelism (RLP) - Multithreading - SMT and CMP Architectures – Limitations of Single Core Processors - The Multi core era – Case Studies of Multi core Architectures – Network On Chip Routing Algorithms.

UNIT II **DLP IN VECTOR, SIMD AND GPU ARCHITECTURES** 9

Vector Architecture - SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units (GPU) - Detecting and Enhancing Loop Level Parallelism - Case Studies

UNIT III **TLP AND MULTIPROCESSORS** 9

Symmetric and Distributed Shared Memory Architectures – Cache Coherence Issues - Performance Issues – Synchronization Issues-Models of Memory Consistency - Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks.

UNIT IV **RLP AND DLP IN WAREHOUSE-SCALE ARCHITECTURES** 9

Programming Models and Workloads for Warehouse-Scale Computers – Architectures for Warehouse-Scale Computing – Physical Infrastructure and Costs – Cloud Computing – Case Studies.

UNIT V **ARCHITECTURES FOR EMBEDDED SYSTEMS** 9

Features and Requirements of Embedded Systems – Signal Processing and Embedded Applications – The Digital Signal Processor – Embedded Multiprocessors - Case Studies.

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John L. Hennessey and David Patterson	Computer Architecture – A Quantitative Approach	Morgan Kaufmann Elsevier, 5th edition	2012.
2.	Kai Hwang	Advanced Computer Architecture	Tata McGraw-Hill Education	2003
3.	Richard Y. Kain	Advanced Computer Architecture a Systems Design Approach	Prentice Hall	2011.
4.	David E. Culler, Jaswinder Pa Singh	Parallel Computing Architecture : A Hardware/ Software Approach	Morgan Kaufmann / Elsevier	1997.
5.	Yon Salihon	Fundamentals of Multicore architectures	Prentice Hall	2015

WEB URLs:

1 http://www.it.abo.fi/crest/publications/public/2006/TR779.pdf
2 http://www.cs.cmu.edu/~fp/courses/15213-s07/lectures/27multicore.pdf
3 http://rolfed.com/nehalem/nehalemPaper.pdf
4 http://accel.cs.vt.edu/files/lecture2.pdf
5 http://web.njit.edu/~rlopes/12.1.0%20-%20Cellproc-PS3.pdf

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16MCB04 **DATA MINING AND DATA WAREHOUSING** **L T P C 3 0 0 3**

COURSE OBJECTIVES

1. To learn the fundamentals of Data mining
2. To gain knowledge on association rule concepts in real time systems
3. To gain insight on various classification
4. To gain insight on different clustering methods
5. To study the different types of tools for complex mining techniques

COURSE OUTCOMES

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

16MCB04.CO1 Apply the functionalities of data warehousing and data mining in real time applications.
16MCB04.CO2 Do the preprocessing and apply association rule concepts in real time systems
16MCB04.CO3 Implement the various classification
16MCB04.CO4 Implement the different clustering methods
16MCB04.CO5 Study the different tools for complex mining techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB04.CO1	x	-	-	x	x	-	x	-	x	-	-	-	x	-	-
16MCB04.CO2	x	-	-	-	-	x	-	x	x	x	-	-	x		-
16MCB04.CO3	x	x	x	-	-	x	-	x	x	x	-	-	-	x	-
16MCB04.CO4	x	x	x	x	x	-	-	-	x	x	x	x	-	x	x
16MCB04.CO5	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x

UNIT I **INTRODUCTION** 9

Fundamentals of data mining – Data Mining Functionalities – Classification – Major issues in Data Mining Data Warehouse and OLAP Technology for Data Mining and Data Warehouse. Multidimensional Data Mode Architecture, Implementation.

UNIT II **DATA PREPROCESSING AND ASSOCIATION RULE MINING** 9

Need of preprocessing the data – Data cleaning – Data integration and transformation – Data reduction – Da discretization and Concept hierarchy generation. Efficient and Scalable Frequent Item set mining methods Mining various kinds of Association rules – Association Mining to correlation analysis – Constraint base association mining

UNIT III **CLASSIFICATION AND PREDICTION** 9

Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule base classification – Classification by back propagation – Support vector machines – Lazy learners – Other classificatic methods – Prediction – Accuracy and error measures – Evaluating the accuracy of a classifier or predictor – Ensemb methods – Model section.

UNIT IV **CLUSTER ANALYSIS** 9

Types of data in cluster analysis – Categories clustering methods – Partitioning methods – Hierarchical methods – Densi based Methods – Grid based Methods – Model based clustering methods – Clustering high dimensional data – Constrai based cluster analysis – Outlier analysis.

UNIT V **MININGCOMPLEXOBJECTSAND TOOLS** 9

Multidimensional analysis – Descriptive mining of complex data objects – Spatial data mining – Multimedia data minir – Text mining – Mining the World Wide Web – Tools: Weka Tool and R Tool.

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REFERENCE BOOKS:

Sl. No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Jiawei Han, Micheline Kamber	Data Mining Concepts and Techniques	3rd Edition, Elsevier	2011.
2.	Alex Berson, Stephen J. Smith	"Data Warehousing, Data Mining & OLAP	Tata McGraw Hill	2007.
3.	K.P. Soman, Shyam Diwakar and V. Ajay	Insight into Data mining Theory and Practice	2nd Edition, Prentice Hall of India	2006
4.	G. K. Gupta	Introduction to Data Mining with Case Study	Prentice Hall of India	2011
5.	Pang-Ning Tan, Michael Steinbach Vi Kumar	Introduction to Data Mining	2nd Edition, Pearson Education	2007

WEB URLs:

1 http://nptel.ac.in/courses/106405066

2 http://nptel.ac.in/courses/106105068

3 http://nptel.ac.in/courses/1061050875489

4 http://nptel.ac.in/courses/106105087/956

5 https://books.google.co.in/books?isbn=3540343504

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16MCB05 **ADVANCED DATA BASE TECHNOLOGY** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To understand database systems, data models, database languages.
2. To be able to design a database system by understanding the concepts of functional dependencies and normalization.
3. To acquire the knowledge on its query processing.
4. To understand the principles of object oriented databases.
5. To gain knowledge about the emerging database technologies

COURSE OUTCOMES

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

16MCB05.CO1 Study the database systems, data models, database languages.
16MCB05.CO2 Able to design a database system by understanding the concepts of functional dependencies and normalization.
16MCB05.CO3 Apply the knowledge on its query processing.
16MCB05.CO4 Analyze the principles of object oriented databases.
16MCB05.CO5 Study about the different emerging database technologies.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB05.CO1	x	-	x	x	x	-	-	-	-	-	-	-	x	x	-
16MCB05.CO2	x	x	-	x	x	-	-	-	-	-	-	-	-	x	-
16MCB05.CO3	-	x	x	x	x	-	-	-	-	-	x	-	x	-	-
16MCB05.CO4	-	x	x	-	x	-	-	-	-	-	x	x	-	x	-
16MCB05.CO5	-	x	x	x	x	-	-	-	-	-	-	-	x	-	-

UNIT I **DISTRIBUTED DATABASES** 9

Distributed Databases Vs Conventional Databases - Architecture - Fragmentation - Query Processing - Transaction Processing - Concurrency Control - Recovery.

UNIT II **OBJECT ORIENTED DATABASES** 9

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence - Query Languages - Transaction - Concurrency - Multi Version Locks - Recovery.

UNIT III **EMERGING SYSTEMS** 9

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases - Mobile Databases.

UNIT IV **DATABASE DESIGN ISSUES** 9

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues - Design of Temporal Databases - Spatial Databases.

UNIT V **CURRENT ISSUES** 9

Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases - Multimedia Databases – Image Databases - Text Database

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List of Experiments:

1. Implement parallel sorting and aggregates
2. Implement parallel joins and Hash joins
3. Implement semi join and bloom join in distributed DBMS
4. Implement two phase commit in distributed DBMS
5. Implementation of cube operator in OLAP queries in data warehousing and decision support system
6. Implement decision tree of data mining problem
7. Implement a priori algorithm in data mining
8. Simulation of a search engine
9. Implement view modification and materialization in data warehousing and decision support systems
10. Implementation of data log queries for deductive databases (Negation, Aggregate, Recursive etc.)
11. Implementation of spatial database queries

Minimum 8 to 10 experiments based on the syllabus and above experiment list should be implemented using ORACLE / MSSQL SERVER / JAVA.

TOTAL : P : 30

REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Elisa Bertino, Barbara Catania, Gian Piero Zarri	Intelligent Database Systems	Addison-Wesley	2001
2.	Carlo Zaniolo, Stefano Ceri, Christos Faloustsos,R.T.Snodgrass, V.S.Subrahmanian,	Advanced Database Systems	Pearson Publication	1997
3.	Morgan Kaufman N.Tame Ozsu Patrick Valduriez	Principles Of Distributed Database Systems	Prentice Hall International Inc	1999.
4.	Abdullah Uz Tansel Et Al	Temporal Databases: Theory, Design And Principles	Benjamin Cummings Publishers	1993.
5.	Raghu Ramakrishnan, Johannes Gehrke	Database Management Systems	Mcgraw Hill, Third Edition	2004.

WEB URLs:

1 http://rolfed.com/nehalem/nehalemPaper.pdf

2 http://accel.cs.vt.edu/files/lecture2.pdf

3 http://web.njit.edu/~rlopes/12.1.0%20-%20Cellproc-PS3.pdf

4 http://www.it.abo.fi/crest/publications/public/2006/TR779.pdf

5 http://www.cs.cmu.edu/~fp/courses/15213-s07/lectures/27DATABASE.pdf

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16MCB06 **ADVANCES IN COMPUTER NETWORKS** **L T P C 3 0 0 3**

COURSE OBJECTIVES

1. To understand the fundamental concepts of computer networks.
2. To understand the design of Network architectures.
3. To understand the working principles of different protocols in various layers.
4. To study the implementation concepts in congestion control
5. To study the implementation concepts in error detections.

COURSE OUTCOMES

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

16MCB06.CO1 Familiar with the basics of Computer Networks.

16MCB06.CO2 Understand Network architectures.

16MCB06.CO3 Understand Concepts of fundamental protocols.

16MCB06.CO4 Understand the knowledge of internetworking concepts in various applications.

16MCB06.CO5 Ability to study the implementation concepts in error detections

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB06.CO1	x	-	x	-	-	x	-	-	-	-	-	x	-	x	-
16MCB06.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
16MCB06.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
16MCB06.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
16MCB06.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **FOUNDATION** 9

ıilding a Network, Requirements, Perspectives, Scalable Connectivity, Cost-Effective Resource sharing, Support for ɔmmon Services, Manageability, Protocol layering, Performance, Bandwidth and Latency, Delay X Bandwidth Product, ɛrspectives on Connecting, Classes of Links, Reliable Transmission, Stop-and-Wait , Sliding Window

UNIT II **INTERNETWORKING- I** 9

vitching and Bridging, Data grams, Virtual Circuit Switching, Source Routing, Bridges and LAN Switches, Basic ternetworking (IP), What is an Internetwork ?, Service Model, Global Addresses, Datagram Forwarding in IP, sub ɛtting and classless addressing, Address Translation(ARP), Host Configuration(DHCP), Error Reporting(ICMP)

UNIT III **INTERNETWORKING- II** 9

etwork as a Graph, Distance Vector(RIP), Link State(OSPF), Metrics, The Global Internet, Routing Areas, Routing nong Autonomous systems(BGP), IP Version 6(IPv6), Mobility

UNIT IV **END-TO-END PROTOCOLS** 9

mple De-multiplexer (UDP), Reliable Byte Stream(TCP), End-to-End Issues, Segment Format, Connecting ɜtablishment and Termination, Sliding Window Revisited, Triggering Transmission, Adaptive Retransmission, Record ɔundaries, SLC:TCP Extensions

UNIT V **CONGESTION CONTROL AND RESOURCE ALLOCATION** 9

ɔngestion-Avoidance Mechanisms, DEC bit, Random Early Detection (RED), Source-Based Congestion Avoidance. The ɔmain Name System (DNS),Electronic Mail(SMTP,POP,IMAP,MIME),World Wide Web(HTTP)

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	James F. Kurose, Keith W. Ross	Computer Networking: A Top-Down Approach Featuring the Internet	Third Edition, Pearson Education	2007
2.	Larry Peterson and Bruce S Davis	Computer Networks:A System Approach	Elsevier	2014
3.	Nader F. Mir	Computer and Communication Networks	Pearson Education	2007
4.	Behrouz A. Forouzan	Data Communications and Networking	Fourth Edition, Tata McGraw Hill	2007
5.	Uyless Black	Computer Networks, Protocols , Standards and Interfaces	2ndEdition ,PHI	2009

WEB REFERENCE(s)

1. http://www.csc.ncsu.edu/faculty/efg/506/f07/docs/lecture_notes/lec 24.pdf
2. http://www.ece.eng.wayne.edu/~czxu/ece7660_f05/network.pdf
3. http://accel.cs.vt.edu/files/lecture2.pdf
4. http://web.njit.edu/~rlopes/12.1.0%20-%20Cellproc-PS3.pdf
5. http://web.njit.edu/~rlopes/12.1.0%20-%20Cellproc-PS3.pdf

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16MCB07 **MACHINE LEARNING TECHNIQUES** **L T P C** **3 0 0 3**

COURSE OBJECTIVES

1. To understand the machine learning theory
2. To implement linear and non-linear learning models
3. To implement distance-based clustering techniques
4. To build the rule based models
5. To apply reinforcement learning techniques

COURSE OUTCOMES

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

16MCB07.CO1 Apply the machine learning theory
16MCB07.CO2 Implement linear and non-linear learning models
16MCB07.CO3 Understand distance-based clustering techniques
16MCB07.CO4 Build tree based models
16MCB07.CO5 Gain the knowledge reinforcement learning techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB07.CO1	x	x	x	x	-	x	-	-	x	x	-	x	x	-	x
16MCB07.CO2	x	x	x	x	-	-	x	-	-	-	x	x	-	x	-
16MCB07.CO3	x	x	x	-	-	x	-	-	-	-	x	-	x	-	x
16MCB07.CO4	x	x	x	-	x	-	-	-	x		-	x	-	x	-
16MCB07.CO5	x	x	x	-	-	x	-	x	-	x	x	-	x	-	x

UNIT I **FOUNDATIONS OF LEARNING** 9

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

UNIT II **LINEAR MODELS** 9

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

UNIT III **DISTANCE-BASED MODELS** 9

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

UNIT IV **TREE AND RULE MODELS** 9

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

UNIT V **REINFORCEMENT LEARNING** 9

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

TOTAL : L : 45

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	P. Flach	Machine Learning: The art and science of algorithms that make sense of data	Cambridge University Press	2012
2.	D. Barber	Bayesian Reasoning and Machine Learning	Cambridge University Press	2012
3.	S.Russel and P. Norvig	Artificial Intelligence: A Modern Approach	Third Edition, Prentice Hall	2009
4.	S.Russel and P. Norvig	Artificial Intelligence: A Modern Approach	Third Edition, Prentice Hall	2009
5.	C. M. Bishop	Pattern Recognition and Machine Learning	Springer	2007

WEB REFERENCE(s)

1. W1:http://www.geeksforgeeks.org/ machine learning-8-suffixtree-introduction/
2. W2:http://iamwww.unibe.ch/~wenger/DA/SkipList/
3. W3:http://www.cs.au.dk/~gerth/slides/soda98.pdf
4. W4:http://www.cs.sunysb.edu/~algorith/files/suffix-trees.shtml
5. W5:http://pages.cs.wisc.edu/~shuchi/courses/880-S07/scribenotes/lecture20.pdf

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16MCB08 **CLOUD COMPUTING TECHNOLOGIES** **L T P C 3 0 2 4**

COURSE OBJECTIVES

1. To familiarize with the types of virtualization.
2. To understand the concept of cloud
3. To understand the concept of utility computing.
4. To understand the various system models and issues in cloud computing.
5. To familiarize with the cloud programming model.

COURSE OUTCOMES

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

16MCB08.CO1 Apply virtualization for efficient resource utilization.
16MCB08.CO2 Explore cloud computing models and services.
16MCB08.CO3 Apply cloud platforms for different applications.
16MCB08.CO4 Implement various services using cloud programming models.
16MCB08.CO5 Interpret the security and resource allocation issues of cloud computing.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB08.CO1	x	x	x	x	-	-	-	-	-	-	-	-	x	-	-
16MCB08.CO2	x	x	x	-	x	-	-	-	-	-	x	-	-	x	-
16MCB08.CO3	x	x	x	-	-	-	-	-	-	-	x	-	x	-	-
16MCB08.CO4	x	x	x	-	x	x	-	-	-	-	-	x	-	x	-
16MCB08.CO5	x	-	-	-	x	-	-	-	-	-	x	x	x	-	-

UNIT I **VIRTUALIZATION STRUCTURES** 9

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

UNIT II **CLOUD INFRASTRUCTURE** 9

Scalable Computing over the Internet – Technologies for Network based Systems - System Models for Distributed and Cloud Computing – Service Oriented Architecture – NIST Cloud Computing Reference Architecture. Cloud Computing and Services Model – Public, Private and Hybrid Clouds – Cloud Eco System - IaaS - PaaS – SaaS.

UNIT III **CLOUD SYSTEM MODEL** 9

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Public Cloud Platforms- GAE, AWS, and Azure- Inter Cloud Resource Management – VM Management - Resource Provisioning and Platform Deployment - Global Exchange of Cloud Resources - Cloud Security and Trust Management. Case Study: Amazon Web Service reference, GoGrid, Rackspace.

UNIT IV **PROGRAMMING MODEL** 9

Parallel and Distributed Programming Paradigms – Map Reduce , Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments - Eucalyptus, Open Nebula, Open Stack. Cloud Sim – Architecture - Cloudlets – VM creation – Broker – VM allocation – Hosts – Data Center.

UNIT V **SECURITY IN THE CLOUD AND RESOURCE MANAGEMENT** 9

Cloud Computing Risk Issues – Cloud Computing Security Challenges – Cloud Computing Security Architecture – Trusted cloud Computing – Identity Management and Access Control – Autonomic Security. Dynamic Resource Allocation Using Virtual Machines for Cloud Computing Environment.

TOTAL : L : 45

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Sl.No	List of Experiments
1.	Usage of Google Apps.
2.	Installation of Guest OS using virtual box.
3.	Implement PaaS using Amazon AWS.
4.	Simulate VM allocation algorithm using CloudSim.
5.	Simulate Task Scheduling algorithm using CloudSim.
6	Simulate Energy-conscious model using CloudSim.
7	Simulate Datacenter Network topologies using CloudSim.
8	Analyze Cloud Computing Environments or Applications using Cloud Analyst.
9	Setup a Private Cloud Using Eucalyptus / Open stack
10	Solve applications using Map Reduce Concept

TOTAL : P : 30

REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John W.Rittinghouse, James F.Ransome	Cloud Computing: Implementation, Management, and Security	CRC Press	2010
2.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra	Distributed and Cloud Computing, From Parallel Processing to the Internet of Things	Morgan Kaufmann Publishers	2012
3.	Ronald L. Krutz, Russell Dean Vines	A comprehensive Guide to Secure Cloud Computing, Cloud Security	Wiley – India	2010
4.	Rodrigo N.Calheiros, Rajiv Ranjan, Anton Beloglazov, César A. F. De Rose, and Rajkumar Buyya,	A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms	Cloud Computing and Distributed Systems(CLOUDS) Laboratory	2006
5.	Rajkumar Buyya Christian Vecchiola, S.Tamarai Selvi	Mastering Cloud Computing	TMGH	2013

WEB REFERENCE(s)

1. http://www.buyya.com/papers/CloudSim2010.pdf
2. www.explainthatstuff.com/cloud-computing-introduction.html
3. www.cloudcomputingtechnologies.com/
4. www.wikinvest.com/concept/Cloud_Computing
5. citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.206.4191

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16MCB09 **ADVANCED SOFTWARE ENGINEERING** **L T P C 3 0 0 3**

COURSE OBJECTIVES

1. To realize the relationship between UML diagrams
2. To design and test software project
3. To understand the concept of system design
4. To understand the concept of object design.
5. To understand the concepts of testing

COURSE OUTCOMES

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

16MCB09.CO1 Execute the software project using software engineering methodologies
16MCB09.CO2 Design various UML diagrams and inter relate them
16MCB09.CO3 Design, test and manage the software project using various tools
16MCB09.CO4 Analyze the concept of system design
16MCB09.CO5 Analyze the concept of object design

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB09.CO1	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-
16MCB09.CO2	X	-	X	-	-	-	-	-	-	-	-	X	-	-	-
16MCB09.CO3	X	-	-	X	X	-	-	-	-	-	-	-	-	X	-
16MCB09.CO4	X	-	X	X	-	-	-	-	X	-	-	X	-	X	X
16MCB09.CO5	-	-	X	X	X	-	-	-	X	-	-	X	X	-	X

UNIT I **INTRODUCTION SOFTWARE ENGINEERING** 9

Software engineering concepts -Software engineering development activities - Managing software development - Introduction to UML- Modeling concepts – UML diagrams - Project organizations - Project communication concepts- Organizational activities

UNIT II **REQUIREMENTS ELICITATION AND ANALYSIS** 9

An overview of requirements elicitation – Requirements elicitation concepts - Requirements elicitation activities - Managing requirements elicitation - Analysis overview – Concepts of analysis - Activities: from use cases to objects- Managing analysis

UNIT III **SYSTEM DESIGN AND OBJECT DESIGN** 9

Decomposing the system- An overview of system design - System design concepts - System design activities – From objects to subsystems - Addressing design goals - Managing system design - Object design - Reusing pattern solutions - Reuse concepts - Solution objects – Inheritance - Design patterns - Reuse activities - Managing reuse.

UNIT IV **TESTING AND MANAGING CHANGES** 9

Testing concepts - Testing activities - Component inspection- Managing testing - Rationale management – Rationale concepts - Rationale activities - From issues to decisions - Managing rationale heuristics for communicating about rationale - Issue modeling and negotiation - Conflict resolution strategies.

UNIT V **CONFIGURATION MANAGEMENT AND PROJECT MANAGEMENT** 9

Configuration management concepts - Configuration management activities - Managing configuration management- Project management - Project management concepts - Classical project management activities - Agile project management activities

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Sommer ville	Software Engineering	Pearson Education	2009
2.	Roger S. Pressman	Software Engineering - A Practitionar's Approach	McGraw-Hill International Edition,	2012
3.	Robert N. Britcher	The Limits of Software: People, Projects, and Perspectives	Addison-Wesley Pub Co; 1st edition	2007
4.	Frederick P. Brooks	Essays on Software Engineering,	Addison-Wesley Pub Co; 1st edition	2005
5.	Richard H. Thayer	Requirements Engineering: A Good Practice Guide	Software Requirements Engineering.	2007

WEB REFERENCE(s)

1. http://nptel.ac.in/courses/106105087/9
2. http://nptel.ac.in/courses/106105087/26
3. http://nptel.ac.in/courses/106105087/1
4. http://nptel.ac.in/courses/106105087/6
5. https://www.shu.ac.uk//beng-honours-software-engineering-

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16MCB10 **MULTIMEDIA COMMUNICATIONS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To gain experience about Multimedia
2. To understand the concept of representation
3. To understand the concept of compression
4. To help students to understand information networks
5. To understand the concepts of transport protocol

COURSE OUTCOMES

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

16MCB10.CO1 Understand algorithmic thinking and apply it to programming.
16MCB10.CO2 Implementation of representation techniques
16MCB10.CO3 Implementation of compression techniques.
16MCB10.CO4 Understand the features of transport protocol
16MCB10.CO5 Analyze the concept of broadband ATM networks

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB10.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
16MCB10.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
16MCB10.CO3	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
16MCB10.CO4	-	X	X	-	X	-	-	-	-	-	-	X	-	X	-
16MCB10.CO5	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-

UNIT I **MULTIMEDIACOMMUNICATIONS** 9

Introduction, multimedia information representation, multimedia networks, multimedia applications, media types, communication modes, network types, multipoint conferencing, network QoS application QoS

UNIT II **INFORMATION REPRESENTATION AND COMPRESSION** 9

Representation Introduction, digital principles, text, images, audio, video. Compression: Introduction, compression principles, text compression, image compression. proportional selection and fitness scaling – Ranking methods – Tournament selection.

UNIT III **AUDIO AND VIDEO COMPRESSION** 9

Introduction, audio compression, DPCM, ADPCM, APC, LPC, video compression, video compression principles, H.261, H.263, MPEG, MPEG-1, MPEG-2, and MPEG-4.

UNIT IV **MULTIMEDIA INFORMATION NETWORKS** 9

Introduction, LANs, Ethernet, Token ring, Bridges, FDDI High-speed LANs, LAN protocol .The Internet- Introduction, IP Datagrams, Fragmentation, IP Address, ARP and RARP, QoS Support, IPv8.

UNIT V **BROADBAND ATM NETWORKS AND TRANSPORT PROTOCOL** 9

Introduction, Cell format, Switfh and Protocol Architecture ATM LANs. Transport Protocol: Introduction, TCP/IP, TCP, UDP, RTP and RTCP.

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REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Fred Halsall	Multimedia Communications: Applications, Networks, Protocols and Standards	Pearson Education, Asia, Second Indian reprint	2002
2.	Nalin K. Sharda,	Multimedia Information Networking	PHI	2003
3.	Ralf Steinmetz, Klara Narstedt,	Multimedia Fundamentals: Vol 1 - Media Coding and Content Processing,	Pearson Education	2004
4	Prabhat K. Andleigh, Kiran Thakrar	Multimedia Systems Design	PHI	2004
5.	Mario Marques da Silva	Multimedia Communications and Networking	CRC	2012

WEB REFERENCE(s)

1. http://www.academyart.edu/academics/communications-media-technologies
2. http://www.academia.edu/9171517/Data_Compression_in_Multimedia_Text_Image_Audio_and_Video_
3. https://www.w3.org/AudioVideo/9610_Workshop/paper11/paper11.html
4. http://dl.acm.org/citation.cfm?id=560578
5. http://wikieducator.org/Multimedia_Systems/Broadband,_ATM_%26_FDDI_Networks

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16MCB11 **NETWORK SECURITY TECHNIQUES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To understand the fundamentals of Cryptography.
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity anauthenticity.
3. To understand the various key distribution and management schemes.
4. To secure data in transit across data networks.
5. To design security applications in the field of Information technology.

COURSE OUTCOMES

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

16MCB11.CO1 Understand the fundamentals of Cryptography.
16MCB11.CO2 Easily acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
16MCB11.CO3 Easily understand how to deploy encryption techniques
16MCB11.CO4 Easily understand the various key distribution and management schemes
16MCB11.CO5 Analyze the security applications in the field of Information technology.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB11.CO1	x	-	-	x	x	-	x	-	x	-	-	-	x	-	-
16MCB11.CO2	x	-	-	-	-	x	-	x	x	x	-	-	x		-
16MCB11.CO3	x	x	x	-	-	x	-	x	x	x	-	-	-	x	-
16MCB11.CO4	x	x	x	x	x	-	-	-	x	x	x	x	-	x	x
16MCB11.CO5	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x

UNIT I **INTRODUCTION** 9

Attacks - Services - Mechanisms - Conventional Encryption - Classical and Modern Techniques - Encryption Algorithms - Confidentiality.

UNIT II **PUBLIC KEY ENCRYPTION** 9

RSA - Elliptic Curve Cryptography - Number Theory Concepts

UNIT III **MESSAGE AUTHENTICATION** 9

Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

UNIT IV **NETWORK SECURITY PRACTICES** 9

Authentications, Applications - Electronic Mail Security - IP Security - Web Security.

UNIT V **SYSTEM SECURITY** 9

Intruders - Viruses - Worms - Firewalls Design Principles - Trusted Systems.

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REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Stallings	Cryptography & Network Security	Principles & Practice, Prentice Hall, 3rd Edition	2002.
2.	Bruce, Schneier	Applied Cryptography	2nd Edition, Toha Wiley & Sons	1996.
3.	Man Young Rhee	Internet Security	Wiley	2003.
4.	Pfleeger & Pfleeger	Security in Computing	Pearson Education, 3rd Edition	2003
5.	Carmit Hazay, Yehuda Lindell	Efficient Secure Two Party Protocols: Techniques and Constructions	Springer-Verlag	2010

WEB REFERENCE(s)

1. https://www.sans.org/network-security/
2. https://en.wikipedia.org/wiki/Network_security
3. www.interhack.net/pubs/network-security
4. https://onlinecourses.nptel.ac.in/noc16_cs21
5. https://msdn.microsoft.com/en-us/library/ff648457.aspx

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16MCB12 **PARALLEL ALGORITHMS** L T P C
3 0 0 3

COURSE OBJECTIVES

1. Understand the scope, design and model of parallelism
2. Know the parallel computing architecture.
3. Know the Characteristics, model and design of parallel algorithms.
4. Solve a complex problem with message passing model
5. Solve a complex problem and programming with MPI.

COURSE OUTCOMES

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

16MCB12.CO1 Recall fundamental concepts of parallelism.
16MCB12.CO2 Develop message-passing parallel programs with MPI
16MCB12.CO3 Apply shared memory parallel program concepts with Java threads and Open MP.
16MCB12.CO4 Illustrate multi-threaded and message passing parallel algorithms.
16MCB12.CO5 Implement them on available parallel computer systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCB12.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
16MCB12.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
16MCB12.CO3	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
16MCB12.CO4	-	X	X	-	X	-	-	-	-	-	-	X	-	X	-
16MCB12.CO5	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-

UNIT I **INTRODUCTION** 9

Sequential model, need of alternative model, parallel computational 8 models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

UNIT II **PERFORMANCE MEASURES** 9

Performance Measures of Parallel Algorithms, speed-up and 8 efficiency of PA, Cost- optimality, An example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models.

UNIT III **PARALLEL MERGING ALGORITMS** 9

Parallel Sorting Networks, Parallel Merging Algorithms on 8 CREW/EREW/MCC, Parallel Sorting Networks CREW/EREW/MCC/, linear array.

UNIT IV **PARALLEL SEARCHING ALGORITHMS** 9

Parallel Searching Algorithm, Kth element, Kth element in X+Y on 8 PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

UNIT V **GRAPH ALGORITHMS** 9

Graph Algorithms - Connected Graphs, search and traversal, 8 Combinatorial Algorithms-Permutation, Combinations, Rearrangements.

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REFERENCE BOOKS

Sl. No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.J. Quinn	Designing Efficient Algorithms for Parallel Computer	Mc Graw Hill	2009
2.	S.G. Akl	Design and Analysis of Parallel Algorithms	Academic Press	2011
3.	T. Lewis	Foundations of parallel Programming	IEEE Computer Society Press	2010
4.	Chandy and Misra	Parallel Program Design	Addison Wesley	2009
5.	Lester	The Art of Parallel Programming	Prentice-Hall	2008

WEB REFERENCE(s)

1. www.umiacs.umd.edu/users/vishkin/TEACHING/enee651-s14.html
2. www.math.cmu.edu/~florin/M21-765/
3. eecs.oregonstate.edu/sites/eecs.oregonstate.edu/files/cs475.pdf
4. https://ais.ku.edu.tr/etc/Syllabus/19547.pdf
5. www.cs.fsu.edu/~asriniva/courses/parco07/

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16MCC01 **DIGITAL IMAGE PROCESSING** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. Students will understand the digital image processing covering all the sub branches of this subject.
2. Students will know the basics of MATLAB Image Processing Toolbox.
3. To understand the concepts of preprocessing techniques
4. To analyze the compression techniques
5. Students will know the concepts of segmentation techniques

COURSE OUTCOMES

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

16MCC01.CO1	Students will understand the digital image processing covering all the sub branches of this subject.
16MCC01.CO2	Students will know the basics of MATLAB Image Processing Toolbox.
16MCC01.CO3	Students will be able to do projects in digital image processing.
16MCC01.CO4	Easily understand the concepts of filtering techniques
16MCC01.CO5	Understand the concepts of Image morphology techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC01.CO1	X	-	-	-	X	-	-	-		-	X	X	-	X	-
16MCC01.CO2	X	X	X	-	X	-	-	-	-	-	X	X	-	X	-
16MCC01.CO3	X	X	X	-	X	-	-	-	-	-	X	X	-	X	-
16MCC01.CO4	X	X	X	-	X	-	-	-	-	-	X	X	-	X	-
16MCC01.CO5	X	X	X	X	X	-	-	-	-	-	X	X	-	X	-

UNIT I **FUNDAMENTALS OF DIGITAL IMAGES** 9

Graphics/Image data type, Fundamental steps in digital image processing, Components of an image processing system, Light and electromagnetic spectrum, Simple image formation model, Image sampling and quantization, Relationship between pixels, Mathematical tools used in digital image processing.

UNIT II **HISTOGRAMS, SPATIAL FILTERS AND FREQUENCY DOMAIN FILTERS** 9

Histogram processing, Histogram equalization, Fundamentals of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Frequency domain filtering - Preliminary concepts, Sampling theorem, 1D DFT, 2D DFT, Ideal low pass filter for smoothing under frequency domain, Ideal high pass filter for sharpening under frequency domain.

UNIT III **IMAGE RESTORATION, COLOR MODELS AND WAVELETS** 9

Image restoration – Restoration process model, Noise model, Restoration in the presence of noise only spatial filtering, Mean filters, Order-statistic filters, Periodic noise reduction by frequency domain filtering – Band reject filters, Band pass filters. Color image processing – Fundamentals and Models. Wavelets – Image pyramids and Sub band coding.

UNIT IV **IMAGE COMPRESSION AND MORPHOLOGY** 9

Image compression – Fundamentals, Redundancy, Measuring image information, Fidelity criteria, Compression models, Compression methods, Huffman coding, LZW coding, Block transform coding. Morphology – Preliminaries, Erosion, Dilation and Duality.

UNIT V **SEGMENTATION, REPRESENTATION, DESCRIPTION AND MATLAB IMAGE PROCESSING TOOLBOX** 9

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segmentation – Fundamentals of Point, Line and Edge detection, Line detection, Edge models, Basic edge detection. Thresholding – Foundation and Basic global thresholding. Representation and Description – Boundary following, Chain codes, Simple boundary descriptors and shape numbers. Introduction to MATLAB Image Processing Toolbox – Digital image representation, Reading images, Displaying images and Data classes of images.

TOTAL : L : 45

REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Rafael C. Gonzalez, Richard E. Woods	Digital Image Processing	Third Edition, Pearson Education	2009.
2.	Ze-Nian Li, Mark S. Drew	Fundamentals of Multimedia	Fundamentals of Multimedia	2004.
3.	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins	Digital Image Processing using MATLAB	Fifth impression, Pearson Education	2009.
4.	John C. Russ	The Image Processing Handbook	Sixth Edition, CRC Press	2011.
5.	William K.Pratt	Digital Image Processing	John Wiley, New York	2002.

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Digital_image_processing
2. www.nist.gov/lispix/imlab/improc_ref.html
3. www.comp.dit.ie/bmacnamee/materials/dip/.../ImageProcessing1-Introduction.ppt
4. library.wolfram.com › ... › Digital Image Processing
5. https://zara4.com/docs/**image-processing/image-url**

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16MCC02 **COMPUTER VISION AND APPLICATIONS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. Students will understand the basics of machine vision
2. Students will understand the design for a specific application.
3. Students will be able to analyze the basic mathematical elements used in vision algorithms.
4. Easily study the concepts of 3D techniques.
5. To able to Identify the applications of Vision Processing

COURSE OUTCOMES

16MCC02.CO1 Identify security aspects of each cloud model.
16MCC02.CO2 Develop a risk-management strategy for moving to the cloud.
16MCC02.CO3 Implement a public cloud instance using a public cloud service provider.
16MCC02.CO4 Apply trust based security model to different layer.
16MCC02.CO5 Examine the concept of audit and compliance.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC02.CO1	x	x	x	x	-	-	-	-	-	-	-	-	x	-	-
16MCC02.CO2	x	x	x	-	x	-	-	-	-	-	x	-	-	x	-
16MCC02.CO3	x	x	x	-	-	-	-	-	-	-	x	-	x	-	-
16MCC02.CO4	x	x	x	-	x	x	-	-	-	-	-	x	-	x	-
16MCC02.CO5	x	-	-	-	x	-	-	-	-	-	x	x	x	-	-

UNIT I **INTRODUCTION AND BINARY IMAGE PROCESSING** 9

Machine vision, Relationship to other fields, Role of knowledge, Image geometry, Sampling and quantization, Image definitions, Levels of computation - Binary image processing: Thresholding, Geometric properties, Projections, Run-length encoding, Binary algorithms, Morphological operators, Optical character recognition.

UNIT II **IMAGE ANALYSIS BASICS, REGIONS AND IMAGE FILTERING** 9

Data structures for image analysis: Levels of image data representation, Traditional image data structures and Hierarchical data structures - Regions: Regions and edges, Region segmentation, Region representation, Split and merge - Image filtering: Histogram modification, Linear systems, Linear filter and Median filter.

UNIT III **OBJECT RECOGNITION** 9

Knowledge representation, Statistical pattern recognition: Classification principles, Classifier setting, Classifier learning, Cluster analysis. Neural nets: Feed-forward networks, unsupervised learning, Hopfield neural nets. Syntactic pattern recognition: Grammars and languages, Syntactic analysis and classifier, Syntactic classifier learning & grammar inference - Recognition as graph matching: Isomorphism of graphs and sub-graphs, Similarity of graphs.

UNIT IV **COMPUTER VISION** 9

Basics of 3D vision, Edge detection: Gradient, Steps in edge detection. Contours: Geometry of curves, Digital curves. Textures: Texture and statistical texture description. Mathematical Morphology – Concepts, Principles, Binary dilation and erosion.

UNIT V **APPLICATIONS** 9

Motion analysis – Differential motion analysis methods, Optical flow. Case study: Optical music recognition system, Automated image analysis in cardiology, Automated identification of airway trees, Passive surveillance.

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REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	E. R. Davies	Computer & Machine Vision	Computer & Machine Vision	2012.
2.	Milan Sonka, Vaclav Hlavac, Roger Boyle	Image Processing, Analysis, and Machine Vision	Thomson Learning Inc	2001
3.	Mark Nixon and Alberto S. Aquado	Feature Extraction & Image Processing for Computer Vision	Third Edition, Academic Press	2012.
4.	D. L. Baggio	Mastering OpenCV with Practical Computer Vision Projects	Packt Publishing	2012.
5.	Milan Sonka, Vaclav Hlavac, Roger Boyle	Digital Image Processing and Computer Vision	Cengage Learning	2008

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Computer_vision
2. https://en.wikipedia.org/wiki/Category:Applications_of_computer_vision
3. https://ipsjcva.springeropen.com/
4. www.springer.com › Home › Computer Science › Image Processing
5. www.cs.ubc.ca/~lowe/**vision**.html

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16MCC03 **ARTIFICIAL INTELLIGENCE** L T P C
3 0 0 3

COURSE OBJECTIVES

1. To have basic knowledge in the fundamental concepts of Artificial Intelligence, applications of Artificial Intelligence.
2. To have a thorough understanding about the agent design.
3. To be able to apply and design an intelligent system or any applications
4. To be able to understanding the concepts of knowledge representation, reasoning, planning and learning methods in solving engineering and computational problems.
5. To develop an interest in the field sufficient to take more advanced subjects.

COURSE OUTCOMES

16MCC03.CO1 Ability to understand the problem solving in AI.
16MCC03.CO2 Ability to apply problem solving methods to solve engineering problems
16MCC03.CO3 Ability to design an intelligent system by using knowledge representation techniques.
16MCC03.CO4 Ability to design the reasoning, planning and learning methods.
16MCC03.CO5 Ability to develop interest in learning advanced application oriented subjects of Artificial Intelligence

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC03.CO1	x	x	x	x	-	-	-	-	-	-	-	x	x	x	-
16MCC03.CO2	x	x	x	x	x	-	-	x	-	x	x	-	x	x	-
16MCC03.CO3	x	x	x	x	-	x	x	-	-	-	-	x	-	x	x
16MCC03.CO4	x	x	-	x	-	-	-	-	-	-	x	x	x	x	-
16MCC03.CO5	x	x	x	-	x	x	-	x	x	-	x	-	x	x	x

UNIT I **INTRODUCTION AND PROBLEM SOLVING** 9

Definition of AI-Intelligent Agents- Problem Solving-Searching-Uninformed and Informed Search Strategies-Heuristic Search-Constraint Satisfaction Problems-Game Playing.

UNIT II **KNOWLEDGE REPRESENTATION AND REASONING** 9

First order logic- Syntax and Semantics of FOL- Using FOL - Inference in FOL- Reasoning: Unification and Lifting – Forward Chaining - Backward Chaining- Resolution.

UNIT III **PLANNING** 9

Planning- Representation for planning-Partial order planning-Conditional planning- Execution monitoring and Re planning – Continuous Planning – Multi-Agent Planning.

UNIT IV **LEARNING** 9

Learning from Observations: Forms of Learning - Inductive Learning – Learning Decision Trees - Ensemble Learning - Knowledge in Learning - Logical Formulation of Learning – Explanation based Learning - Relevance based Learning - Reinforcement learning: Passive & Active Reinforcement learning.

UNIT V **APPLICATIONS** 9

Natural Language Processing for communication - Probabilistic Language Processing - Information Retrieval - Information Extraction - Machine Translation. STATE OF ART (Not for Exam) Ambient Intelligence- Semantic Web – Challenges in Semantic Web

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REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Stuart Russel and Peter Norvig	Artificial Intelligence-A Modern Approach	Second Edition Prentice Hall International	2010.
2.	Elain Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill - Second Edition	2003.
3.	Nils J.Nilsson	Artificial Intelligence - A New Synthesis	Harcourt Asia PTE Ltd, Morgan Kaufmann	2003.
4.	Patrick Henry Winston	Artificial Intelligence	Third Edition, ISE reprint,Addison Wesley	2004.
5.	Alan Mackworth David Poole	Artificial Intelligence: Foundations of Computational Agents	Addison wesley	2010

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Artificial_intelligence
2. https://en.wikipedia.org/wiki/Artificial_intelligence
3. www.journals.elsevier.com › Journals
4. www.cbinsights.com/blog/artificial-intelligence-startup-hype-ai-suffix/
5. www.hutter1.net/ai/uaibook.html

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16MCC04 **NATURAL LANGUAGE PROCESSING** L T P C
3 0 0 3

COURSE OBJECTIVES

1. To gain knowledge about the fundamentals and applications of natural language processing.
2. To have a thorough understanding about Computational framework for natural language.
3. To understand and analyze the syntax of natural language processing.
4. To understand and analyze the semantics of natural language processing.
5. To learn the tool for various applications of NLP.

COURSE OUTCOMES

16MCC04.CO1 Ability to understand the fundamentals and applications of NLP.
16MCC04.CO2 Ability to understand the applications of NLP.
16MCC04.CO3 Ability to apply natural language techniques to solve engineering problems.
16MCC04.CO4 Ability to apply natural language techniques to solve computational problems
16MCC04.CO5 Ability to design an NLP system for various applications by using the tools for NLP.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC04.CO1	x	x	x	x	-	-	-	-	-	-	-	x	x	x	-
16MCC04.CO2	x	x	x	x	x	-	-	x	-	x	x	-	x	x	-
16MCC04.CO3	x	x	x	x	-	x	x	-	-	-	-	x	-	x	x
16MCC04.CO4	x	x	-	x	-	-	-	-	-	-	x	x	x	x	-
16MCC04.CO5	x	x	x	-	x	x	-	x	x	-	x	-	x	x	x

UNIT I **INTRODUCTION** 9

Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata.

UNIT II **SYNTAX** 9

Word classes and part-of-speech tagging: English word classes – Tag sets for English – Part-of-speech tagging – Rule-based part-of-speech tagging – Stochastic part-of-speech tagging – Transformation-based tagging –Context-Free Grammars for English: Constituency – Context-Free rules and trees – Sentence level constructions – The noun phrase - The verb phase and sub categorization– Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free grammars – Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search – A Basic Top-Down parser – Problems with the basic Top-Down parser – The early algorithm – Finite-State parsing methods.

UNIT III **ADVANCED FEATURES AND SYNTAX** 9

Features and Unification: Feature structures – Unification of feature structures – Features structures in the grammar – Implementing unification – Parsing with unification constraints – Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar – problems with PCFGs – Probabilistic lexicalized CFGs – Dependency Grammars – Human parsing.

UNIT IV **SEMANTICS** 9

Representing Meaning: Computational desiderata for representations – Meaning structure of language – First order predicate calculus – Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis – Attachments for a fragment of English – Integrating semantic analysis into the early parser – Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon.

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UNIT V **APPLICATIONS AND TOOLS** 9

Information Retrieval –Summarization –Question Answering -Case Study of NLTK Toolkit.

TOTAL : L : 45

REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Daniel Jurafsky & James H.Martin	Speech and Language Processing	Pearson Education (Singapore) Pte. Ltd	2008.
2.	James Allen	Natural Language Understanding	Pearson Education	2003
3.	Lucja M Iwanska	Natural Language Processing and Knowledge Representation: Language For Knowledge And Knowledge For Language	University Press	2008
4.	Daniel Bikel and Imed Zitouni	Multilingual Natural Language Processing Applications	Theory to Practice, IBM Press	2012
5.	Steven Bird, Ewan Klein	Edward Loper, Natural Language Processing with Python	O'Reilly Media	2009

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Natural_language_processing
2. https://www.coursera.org/course/nlp
3. www.mind.ilstu.edu/curriculum/protothinker/natural_language_processing.php
4. www.nltk.org/**book**/
5. https://karczmarczuk.users.greyc.fr/.../Hand**book**%20Of%20**Natural**%20.

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16MCC05 **DISTRIBUTED COMPUTING** L T P C
3 0 0 3

COURSE OBJECTIVES

1. To list the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles
2. To evaluate the effectiveness and shortcomings of their solutions.
3. To recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.
4. To design a distributed system that will be able to recognize when this is not possible, and explain why.
5. To build distributed system software using basic OS mechanisms as well as higher-level middleware and languages

COURSE OUTCOMES

16MCC05.CO1 Identify models of distributed computing.'
16MCC05.CO2 Evaluate the effectiveness and shortcomings of their solutions.
16MCC05.CO3 Analyze algorithms for coordination, communication, security and synchronization in distributed systems.
16MCC05.CO4 Classify distributed shared memory models.
16MCC05.CO5 Design distributed algorithms for deadlocks.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC05.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
16MCC05.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
16MCC05.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
16MCC05.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
16MCC05.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **INTRODUCTION TO DISTRIBUTED SYSTEMS** 9

Characterization of Distributed Systems- Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models- Introduction, Architectural and Fundamental models, Networking and Internetworking, Inter process Communication. Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT II **OPERATING SYSTEM SUPPORT AND DISTRIBUTED FILE SYSTEMS** 9

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture, case study- SUN network file systems. Name Services-Introduction; Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service.

UNIT III **TIME AND GLOBAL STATES** 9

Peer to Peer Systems-Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store. Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement - Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT IV **DISTRIBUTED TRANSACTIONS** 9

Transactions and Concurrency control - Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency controls. Distributed Transactions - Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery, Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

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UNIT V **SECURITY TECHNIQUES** 9

Security - Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 WiFi. Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, other consistency models, CORBA case study-Introduction, CORBA RMI, CORBA Services.

TOTAL : L : 45

REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	S.Mahajan and S.Shah	Distributed Computing	Oxford University Press	2006
2.	Pradeep K.Sinha	Distributed Operating Systems Concepts and Design	PHI	2007
3.	R.Chow, T.Johnson,	Distributed Operating Systems and Algorithm Analysis	Pearson	2009
4.	S.Ghosh, Chapman & Hall/CRC	Distributed System	Taylor & Francis Group	2010.
5.	Carlos A. Varela	Programming Distributed Computing Systems	MIT Press	2012

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Grid_computing
2. www.springer.com › Home › Computer Science › Communication Networks
3. cpsc.yale.edu/research/distributed-computing
4. https://azmuri.files.wordpress.com///george-coulouris-**distributed**-syste.
5. https://www.amazon.com/Elements-**Distributed-Computing**.../047103600.

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16MCC06 **SERVICE ORIENTED ARCHITECTURE** L T P C
3 0 0 3

COURSE OBJECTIVES

1. To gain understanding of the basic principles of service orientation.
2. To learn service oriented analysis techniques.
3. To learn technology underlying the service design.
4. To learn the concepts SOA platforms
5. To know about various WS specification standards

COURSE OUTCOMES

16MCC06.CO1 Know the SOA concepts and architecture.
16MCC06.CO2 Analyze the service oriented analysis techniques.
16MCC06.CO3 Understand principles of Web services and SOA.
16MCC06.CO4 Steps in Service oriented Analysis.
16MCC06.CO5 Analyze the WS standard extensions.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC06.CO1	-	-	x	x	x	-	-	x	-	-	x	-	x	-	-
16MCC06.CO2	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
16MCC06.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
16MCC06.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
16MCC06.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **SOA EVOLUTION – ARCHITECTURE** 9

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT II **WEB SERVICES AND PRIMITIVE SOA** 9

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

UNIT III **SERVICE ORIENTED ANALYSIS** 9

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task centric business service design

UNIT IV **SOA PLATFORMS** 9

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT V **WS EXTENSIONS** 9

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS Security

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Thomas Erl	Service-Oriented Architecture: Concepts, Technology, and Design	Pearson Education	2005
2.	Thomas Erl	SOA Principles of Service Design	The Prentice Hall Service-Oriented Computing Series from Thomas Erl	2005
3.	Newcomer, Lomow	Understanding SOA with Web Services	Pearson Education	2005
4.	Sandeep Chatterjee, James Webber	Developing Enterprise Web Services, An Architect"s Guide	Pearson Education	2005
5.	Dan Woods and Thomas Mattern	Enterprise SOA Designing IT for Business Innovation O"REILLY	First Edition	2006

WEB REFERENCE(s)

1. https://www.ibm.com/software/solutions/**soa**/
2. www.oracle.com › Products and Services › Oracle Fusion Middleware /SOA
3. https://www.opengroup.org/**soa**/source-book/**soa**/**soa**.htm
4. https://www.safari**books**online.com/.../**service-oriented-architecture**.../01
5. https://www.packtpub.com/application.../**service-oriented-architecture**-java.

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16MCC07 **MOBILE APPLICATION DEVELOPEMENT** **L T P C** **3 0 0 3**

COURSE OBJECTIVES

1. Understand system requirements for mobile applications.
2. To learn the basics of embedded system design
3. Generate suitable design using specific mobile development frameworks.
4. Implement the design using specific mobile development frameworks.
5. Deploy the mobile applications in marketplace for distribution.

COURSE OUTCOMES

16MCC07.CO1 Describe the requirements for mobile applications.
16MCC07.CO2 Explain the challenges in mobile application design and development.
16MCC07.CO3 Develop design for mobile applications for specific requirements
16MCC07.CO4 Deploy mobile applications in android and ipone marketplace for distribution
16MCC07.CO5 Analyze the Generate mobile application design

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC07.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
16MCC07.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
16MCC07.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
16MCC07.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
16MCC07.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **INTRODUCTION** 9

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.

UNIT II **BASIC DESIGN** 9

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III **ADVANCED DESIGN** 9

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications - Applications of Community Mining Algorithms - Node Classification in Social Networks.

UNIT IV **TECHNOLOGY I - ANDROID** 9

Introduction – Establishing the development environment – Android architecture– Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V **TECHNOLOGY II - IOS** 9

Introduction – Establishing the development environment – Android architecture– Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

TOTAL : L : 45

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Jeff McWherter and Scott Gowell	Professional Mobile Application Development	Wrox	2012.
2.	Charlie Collins	Michael Galpin and Matthias Kappler Android in Practice	DreamTech	2012.
3.	James Dovey and Ash Furrow	Beginning Objective C	A press	2012.
4.	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson	Beginning iOS 6 Development: Exploring the iOS SDK	A press	2013.
5.	Jayavardhana Gubbi, Rajkumar Buyya[b]	Internet of Things (IoT): A vision, architectural elements, and future directions	Elsevier	2013

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Mobile_application_development
2. www.informationweek.com/mobile/mobile-applications/...mobile-development/.../132
3. https://www.netsolutionsindia.com/mobile-development-india
4. www.cs.cmu.edu/~./bam/.../BFeiginMobileApplicationDevelopment.pdf
5. https://www.ibm.com/developerworks

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16MCC08 **INTERNET OF THINGS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To get acquainted with the building blocks of Internet of Things (IoTs), characteristics and taxonomy of IoT levels.
2. To learn a generic design methodology
3. To learn a programming aspects of IoT.
4. To know about various packages, frameworks and cloud services.
5. To get acquainted with data analytics for IoT.

COURSE OUTCOMES

16MCC08.CO1 Identify and design the new models for market strategic interaction.
16MCC08.CO2 Design business intelligence and information security for WoB.
16MCC08.CO3 Analyze various protocols for IoT.
16MCC08.CO4 Analyze programming aspects of IoT.
16MCC08.CO5 To know about various packages, frameworks and cloud services.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC08.CO1	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
16MCC08.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
16MCC08.CO3	x	x	x	x	-	x	-	-	x	x	x	x	-	x	-
16MCC08.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
16MCC08.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **INTRODUCTION TO IoT** 9

Definition and Characteristics – Physical Design Things – Protocols - Logical Design – Functional Blocks – Communication Models – Communication APIs – Introduction to measure the physical quantities – IoT Enabling Technologies – Wireless Sensor Networks - Cloud Computing – Big Data Analytics – Communication Protocols – Embedded Systems – IoT Levels and Deployment Templates

UNIT II **DEVELOPING INTERNET OF THINGS** 9

Introduction to Smart Systems using IoT – IoT Design Methodology – Case Study: Weather Monitoring – Logical Design using 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

UNIT IV **IoT PHYSICAL DEVICES, ENDPOINTS AND CLOUD OFFERINGS** 9

IoT Device – Raspberry Pi – Interfaces – Programming Raspberry Pi with Python – Other IoT Devices – IoT Physical Servers and Cloud Offerings – Cloud Storage Models and communication APIs – WAMP – Xively Cloud – Django – Amazon Web Services for IoT – SkyNet IoT Messaging Platform – Basics of Secure IoT Programming – Case Study: Home Automation.

UNIT V **DATA ANLYTICS FOR IoT** 9

Introduction – Apache Hadoop –Using Hadoop MapReduce for Batch Data Analysis –Apache Oozie – Apache Spark – Apache Strom – Using Apache Strom for Real-time Data Analysis – Case Study: Structural Health Monitoring.

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REFERENCE BOOKS

Sl. No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Arshadeep Bahga, Vijay Madisetti	Internet of Things: A Hands-On Approach	Published by Arshdeep Bahga & Vijay Madisetti	2014
2.	Mike Kuniavsky	Smart Things: Ubiquitous Computing User Experience Design	Morgan Kaufmann Publishers	2010
3.	Wimer Hazenberg	Meta Products: Building the Internet of Things. Sara Cordoba	Menno Huisman BIS Publishers	2011
4.	Massimo Banzi	Getting Started with Arduino (Make: Projects).	O'Reilly Media	2008
5.	Barnaghi	Semantics for the Internet of things	Addison Wesley	2012

WEB REFERENCE(s)

1. www.internetsociety.org/Internet-Things
2. www.theguardian.com › Technology › Internet of things
3. www.mckinsey.com/industries/high-tech/our-insights/the-internet-of-things
4. https://mitpress.mit.edu/books/internet-things
5. www.apress.com/us/book/9781484212943

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16MCC09 **BIG DATA ANALYTICS** L T P C
3 0 0 3

COURSE OBJECTIVES

1. To understand the fundamental concepts of big data analytics.
2. To learn to use various techniques for mining data stream.
3. To explore the technologies associated with big data analytics such as NoSQL,
4. To understand the technique like distributed file system
5. To learn the overview of Hadoop

COURSE OUTCOMES

16MCC09CO1 Ability to understand the concepts of big data analytics.
16MCC09.CO2 Ability to understand the stream data model
16MCC09.CO3 Ability to mine data streams
16MCC09.CO4 Ability to design schema less database
16MCC09.CO5 Ability to perform map reduce using Hadoop

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC09CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
16MCC09.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
16MCC09.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
16MCC09.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
16MCC09.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

UNIT I **INTRODUCTION** 9

Big data overview – State of the Practice in Analytics - Key Roles – Data Analytics Lifecycle – Discovery - Data Preparation - Model Planning - Model Building - Communicate Results – Operationalize.

UNIT II **MINING DATA** 9

Stream Data Model - Sampling Data in a Stream–Filtering Streams–Counting Distinct Elements in a Stream–Estimating Moments–Counting Ones in a Window–Decaying Window

UNIT III **LARGE –SCALE FILE SYSTEMS AND MAP-REDUCE** 9

Distributed File Systems – MapReduce - Algorithms Using MapReduce - Extensions to MapReduce - Communication Cost Model - Complexity Theory for MapReduce

UNIT IV **NoSQL DATA MANAGEMENT** 9

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication – consistency – relaxing consistency

UNIT V **OVERVIEW OF HADOOP** 9

Hadoop Introduction - Data format – Analyzing data with Hadoop – Scaling out – Hadoop streaming – Hadoop pipes – Hadoop Distributed File System (HDFS) – HDFS Design – HDFS Concepts – Hadoop I/O – Data integrity – compression – serialization – sequence file – map file

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Anand Rajaraman and Jeffrey David Ullman	Mining of Massive Datasets	Cambridge University Press	2012.
2.	Tom White	Hadoop: The Definitive Guide	Third Edition, O'Reilly	2012
3.	P.J.Sadalage and M.Flower	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Addison – Wesely Professional	2013
4.	Leonidas Guibas	Data science and Big data analytics	EMC Education services	2015
5.	Thomas Krag	Information and Stroage Management	EMC Education services	2015

WEB REFERENCE(s)

1. www.sisense.com/
2. www.sas.com/en_us/insights/analytics/big-data-analytics.html
3. https://en.wikipedia.org/wiki/Big_data
4. www.sciencedirect.com/science/book/9780124173194
5. https://www.crcpress.com/Big-Data-Analytics.../book/9781482234510

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16MCC10 **INFORMATION RETRIEVAL TECHNIQUES** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To understand the basics of Information Retrieval with pertinence to modeling,
2. To learn the query operations and indexing.
3. To understand the machine learning techniques for text classification
4. To understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search.
5. To understand the concepts of digital libraries.

COURSE OUTCOMES

16MCC10.CO1	Upon completion of the course, the students will be able to Build an Information Retrieval system using the available tools.
16MCC10.CO2	Analyze the query operations and indexing.
16MCC10.CO3	Identify and design the various components of an Information Retrieval system.
16MCC10.CO4	Analyze the concepts of digital libraries.
16MCC10.CO5	Design an efficient search engine.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC10.CO1	-	-	-	-	x	-	-	x	-	-	-	-	-	-	x
16MCC10.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
16MCC10.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
16MCC10.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
16MCC10.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I INTRODUCTION 9

Motivation – Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval –Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR — IR Versus Web Search–Components of a Search engine

UNIT II MODELING 9

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing

UNIT III INDEXING 9

Static and Dynamic Inverted Indices – Index Construction and Index Compression Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages–Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency.

UNIT IV CLASSIFICATION AND CLUSTERING 9

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V SEARCHING AND RANKING 9

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking - Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries.

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Christopher D. Manning Prabhakar Raghavan Hinrich Schütze	Introduction to Information Retrieval	The .MIT Press, Cambridge,	2009
2.	Ricardo Baeza – Yates, Berthier Ribeiro – Neto, Modern Information Retrieval	The concepts and Technology behind Search (ACM Press Books)	Second Edition	2011.
3.	Christopher D. Manning, Prabhakar Raghavan, HinrichSchutze	Introduction to Information Retrieval Cambridge University Press	First South Asian Edition	2012.
4.	Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack	Information Retrieval Implementing and Evaluating Search Engines	The MIT Press, Cambridge, Massachusetts London, England	2010
5.	Paul S. Jacobs	Text-Based Intelligent Systems: Current Research and Practice in Information Extraction and Retrieval	Lawrence Erlbaum Associates,	2012

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/information_retrieval
2. www.doc.ic.ac.uk/~nd/surprise_97/journal/vol2/hks/infor_ret.html
3. www.seas.upenn.edu/~zives/03s/cis650/ir.pdf
4. nlp.stanford.edu/IR-book/pdf/19web.pdf
5. https://web.fe.up.pt/~mgi00005/paginas/2.../ari/search_engines.html

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16MCC11 **AD-HOC AND WIRELESS SENSOR NETWORS**

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3	0	0	3

COURSE OBJECTIVES

1. To learn the basics of sensor networks.
2. To impart knowledge on the design and development of the data link and network layers in the WSN protocol stack.
3. To understand the working of protocols in different layers of sensor networks.
4. To learn the establishment of wireless sensor networks.
5. To familiarize the students with the hardware and software platforms used in the design of WSN.

COURSE OUTCOMES

16MCC11.CO1	Ability to learn the basics of sensor networks.
16MCC11.CO2	To impart knowledge on the design and development of the data link and network layers in the WSN protocol stack.
16MCC11.CO3	Analyze the working of protocols in different layers of sensor networks.
16MCC11.CO4	To learn the establishment of wireless sensor networks.
16MCC11.CO5	Analyze to understand the hardware
16MCC11.CO6	Design the software platforms used in the design of WSN

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC11.CO1	-	-	-	-	x	-	-	x	-	-	-	-	-	-	x
16MCC11.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
16MCC11.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
16MCC11.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
16MCC11.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-
16MCC11.CO6															

UNIT I **AD-HOC MAC** 9

Introduction - Issues in Ad-Hoc Wireless Networks. MAC Protocols - Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II **AD-HOC NETWORK ROUTING & TCP** 9

Issues - Classifications of routing protocols - Hierarchical and Power aware. Multicast routing - Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc - Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

UNIT III **WSN –MAC** 9

Introduction - Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols - self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IV **WSN ROUTING, LOCALIZATION & QOS** 9

Issues in WSN routing - OLSR, AODV. Localization - Indoor and Sensor Network Localization. QoS in WSN.

UNIT V **MESH NETWORKS** 9

Necessity for Mesh Networks - MAC enhancements- IEEE802.11s Architecture- Opportunistic routing - Self configuration and Auto configuration - Capacity Models - Fairness - Heterogeneous Mesh Networks - Vehicular Mesh Networks.

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	C.Siva Ram Murthy and B.Smanoj	Ad Hoc Wireless Networks - Architectures and Protocols	Pearson Education	2004.
2.	Feng Zhao and Leonidas Guibas	Wireless Sensor Networks	Morgan Kaufman Publishers	2004.
3.	C.K.Toh	Ad Hoc Mobile Wireless Networks	Pearson Education	2002.
4.	Thomas Krag and Sebastin Buettrich	Wireless Mesh Networking	O"Reilly Publishers	2007.
5.	H Karl, A Willig	Protocols and architectures for wireless sensor networks	Pearson Education	2007

WEB REFERENCE(s)

1. www.journals.elsevier.com/ad-hoc-networks
2. https://en.wikipedia.org/wiki/Mobile_ad_hoc_network
3. www.sciencedirect.com/science/journal/15708705
4. https://www.scribd.com/doc/.../Adhoc-and-Wireless-Networks-D-P-Agar
5. https://www.safaribooksonline.com/library/.../ad-hoc-wireless/01314702.

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16MCC12 **PATTERN CLASSIFICATION AND ANALYSIS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. Study the fundamental algorithms for pattern recognition.
2. To instigate the various Pattern classification techniques.
3. To originate the various structural pattern recognition and feature extraction techniques
4. To understand the clustering concepts
5. To learn the recent advances in neural networks.

COURSE OUTCOMES

16MCC12.CO1 Understand performance related parameters and the concepts of Instruction Set architectures
16MCC12.CO2 Describe Instruction Level parallelism and identify the limitations of ILP
16MCC12.CO3 Discuss the approaches of exposing and exploiting ILP
16MCC12.CO4 Design hierarchical memory System
16MCC12.CO5 Analyze the types of multiprocessor architecture and storage devices

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16MCC12.CO1	x	x	x	x	-	-	-	-	-	-	-	-	x	-	x
16MCC12.CO2	x	x	x	x	-	-	-	-	-	-	x	-	-	x	-
16MCC12.CO3	x	x	x	-	-	-	-	-	-	-	x	-	x	-	-
16MCC12.CO4	x	x	x	x	x	-	-	-	-	-	-	x	-	-	x
16MCC12.CO5	x	x	x	-	-	-	-	-	-	-	-	x	x	-	-

UNIT I **PATTERN CLASSIFIER** 9

Overview of pattern recognition - Discriminant functions - Supervised learning - Parametric estimation Maximum likelihood estimation - Bayesian parameter estimation - Perceptron algorithm - LMSE algorithm - Problems with Bayes approach - Pattern classification by distance functions - Minimum distance pattern classifier.

UNIT II **UNSUPERVISED CLASSIFICATION** 9

Clustering for unsupervised learning and classification - Clustering concept - C-means algorithm – Hierarchical clustering procedures - Graph theoretic approach to pattern clustering - Validity of clustering solutions.

UNIT III **STRUCTURAL PATTERN RECOGNITION** 9

Elements of formal grammars - String generation as pattern description - Recognition of syntactic description -Parsing - Stochastic grammars and applications - Graph based structural representation

UNIT IV **FEATURE EXTRACTION AND SELECTION** 9

Entropy minimization - Karhunen - Loeve transformation - Feature selection through functions approximation -Binary feature selection.

UNIT V **RECENT ADVANCES** 9

Neural network structures for pattern recognition - Neural network based pattern associators – Unsupervised learning in neural pattern recognition - Self organizing networks - Fuzzy logic - Fuzzy pattern classifiers –Pattern classification using Genetic Algorithms. STATE OF ART (Not for Exam) Image Transforms: DFT, DCT, Haar, SVD and KL-Introduction to Matlab Toolbox.

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Robert J.Schalkoff, Pattern Recognition	Statistical, Structural and Neural	John Wiley &Sons Inc., New York	2007.
2.	Tou and Gonzales	Pattern Recognition Principles	Wesley Publication Company, London	2008
3.	Duda R.O., and Hart.P.E	Pattern Classification and Scene Analysis	Wiley, New York	2009
4.	Morton Nadier and Eric Smith P	Pattern Recognition Engineering	John Wiley & Sons, New York	2009
5.	LFD Costa, RM Cesar Jr	Shape analysis and classification: theory and practice	ACM Digital Library	2011

WEB REFERENCE(s)

1. https://en.wikipedia.org/wiki/Pattern_recognition
2. www.springer.com › Home › Computer Science › Image Processing
3. www.amazon.in/Pattern-Classification-Scene-Analysis-Richard/dp/0471223611
4. homepages.inf.ed.ac.uk/rbf/BOOKS/NEVATIA/Chap002.pdf
5. samples.sainsburysebooks.co.uk/9780471725282_sample_385871.p

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