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-2019**

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Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

Ph. No.: 04287-220837

Email: principal@mec.edu.in

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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.	19MCA01	Advanced Numerical Methods	FC	5	3	2	0	4
2.	19MCA02	Applied Mathematics	FC	5	3	2	0	4
3.	19MCA03	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.	19MCB01	Soft Computing	PC	3	3	0	2	4
2.	19MCB02	Advanced Data Structures and Algorithms	PC	5	3	0	2	4
3.	19MCB03	Multimedia communications	PC	3	3	0	0	3
4.	19MCB04	Data Mining Techniques	PC	3	3	0	0	3
5.	19MCB05	Advanced operating systems	PC	5	3	0	0	3
6.	19MCB06	Network Design and Technologies	PC	3	3	0	0	3
7.	19MCB07	Machine learning techniques	PC	3	3	0	0	3
8.	19MCB08	Machine learning techniques Laboratory	PC	4	0	0	4	2
9.	19MCB09	Advanced software Engineering	PC	3	3	0	0	3
10.	19MCB10	Advanced Database Technology	PC	3	3	0	2	4
11.	19MCB11	Advanced Database Technology Laboratory	PC	4	0	0	4	2
12.	19MCB12	Big data Analytics	PC	3	3	0	0	3
13.	19MCB13	Research Methodology and IPR	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.	19MCC01	Advanced Algorithms	PE	3	3	0	0	3
2.	19MCC02	Advanced Algorithm Laboratory	PE	4	0	0	2	1
3.	19MCC03	Cloud Computing	PE	3	3	0	0	3
4.	19MCC04	Cloud Computing Laboratory	PE	4	0	0	4	2
5.	19MCC05	Web Data Mining	PE	3	3	0	0	3
6.	19MCC06	Web Analytics and Development	PE	3	3	0	0	3
7.	19MCC07	Data Storage Technologies and Networks	PE	3	3	0	0	3
8.	19MCC08	Pattern classification and Analysis	PE	3	3	0	0	3
9.	19MCC09	Mobile and Pervasive Computing	PE	3	3	0	0	3
10.	19MCC10	Ad Hoc and Wireless Sensor Networks	PE	3	3	0	0	3
11.	19MCC11	Internet of things	PE	3	3	0	0	3
12.	19MCC12	Data Preparation and Analysis	PE	3	3	0	0	3
13.	19MCC13	Advanced Computer Architecture	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	19MCD01	Mini Project with Seminar	EEC	2	2	0	0	2
2	19MCD02	Dissertation I	EEC	12	0	0	12	6
3	19MCD03	Dissertation II	EEC	24	0	0	24	12
4	19MCD04	Value Education	AC	2	2	0	0	0
5	19MCD05	Disaster Management	AC	2	2	0	0	0
6	19MCD06	Sanskrit for Technical Knowledge	AC	2	2	0	0	0
7	19MCD07	English for Research Paper Writing	AC	2	2	0	0	0
8	19MCD08	Constitution of India	AC	2	2	0	0	0
9	19MCD09	Pedagogy Studies	AC	2	2	0	0	0
10	19MCD10	Stress Management by Yoga	AC	2	2	0	0	0

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Department	Computer Science and Engineering						
Programme	M.E						
SEMESTER – I							
Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	19MCA02	Applied Mathematics	3	2	0	4	5
2.	19MCB04	Data Mining Techniques	3	0	0	3	3
3.	19MCB05	Advanced Operating System	3	0	0	3	3
4.	19MCB07	Machine Learning Techniques	3	0	0	3	3
5.	19MCB13	Research Methodology and IPR	3	0	0	3	3
6.	PE	Professional Elective – I	3	0	0	3	3
PRACTICALS							
7.	19MCB08	Laboratory 1(Based On Core) Machine learning techniques Laboratory	0	0	4	2	4
8.	PE	Professional Laboratory 2(Based On Elective)	0	0	2	1	4
			Total Credits			22	

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Department	Computer Science and Engineering						
Programme	M.E						
SEMESTER – II							
Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	19MCB10	Advanced Database Technology	3	0	0	4	3
2.	19MCB12	Big Data Analytics	3	0	0	3	3
3.	19MCB06	Network Design and Technologies	3	0	0	3	3
4.	PE	Professional Elective – II	3	0	0	3	3
5.	PE	Professional Elective – III	3	0	0	3	3
PRACTICALS							
6.	19MCB11	Laboratory 3 (Based on Core) Advanced Database Technology Lab	0	0	4	2	4
7.	PE	Professional Laboratory 4 (Based on Elective)	0	0	4	2	4
8.	19MCD01	Mini Project with Seminar	2	0	0	2	2
			Total Credits			22	

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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
PRACTICAL							
3.	19MCD02	Dissertation-I	0	0	12	6	12
			Total Credits			12	

*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.	19MCD03	Dissertation II	0	0	24	12	24
		Total Credits				12	

19MCA01	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

19MCA01.CO1	Demonstrate understanding and implementation of numerical solution algorithms applied to solve algebraic equations
19MCA01.CO2	Be familiar with numerical solutions of ordinary differential equation and partial differential equations.
19MCA01.CO3	Be competent with finite difference method and finite element method.
19MCA01.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
19MCA01.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
19MCA01.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA01.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA01.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA01.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA01.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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19MCA02	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

19MCA02.CO1	Explain geometrical concepts related to orthogonality and least squares solutions and perform calculations related to orthogonality.
19MCA02.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
19MCA02.CO3	The students will have a basic knowledge of the main fields of mathematics and mechanics, including differential equations, elasticity theory, fluid mechanics.
19MCA02.CO4	The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable
19MCA02.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
19MCA02.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA02.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA02.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA02.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA02.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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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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19MCA03	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

	Analyze random or unpredictable experiments and investigate important features of random experiments.
19MCA03.CO1	Construct probabilistic models for observed phenomena through distributions which play an important role in many engineering applications.
19MCA03.CO2	Associate random variables by designing joint distributions and correlate the random variables
19MCA03.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
19MCA03.CO4	Be familiar with multivariate analysis.
19MCA03.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
19MCA03.CO1	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA03.CO2	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA03.CO3	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA03.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	-
19MCA03.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
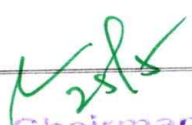
TOTAL: L : 45 + T : 30 = 75

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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

19MCB01	SOFT COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. Classify the various soft computing frame works
2. Be familiar with the design of neural networks, fuzzy logic and fuzzy systems
3. Learn mathematical background for optimized genetic programming
4. Be exposed to neuro-fuzzy hybrid systems and its applications

COURSE OUTCOMES

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

19MCB01.CO1	Apply various soft computing concepts for practical applications
19MCB01.CO2	Choose and design suitable neural network for real time problems
19MCB01.CO3	Use fuzzy rules and reasoning to develop decision making and expert system
19MCB01.CO4	Explain the importance of optimization techniques and genetic programming
19MCB01.CO5	Review the various hybrid soft computing techniques and apply in real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCB01.CO1	X	-	X	-	-	-	-	-	-	-	-	X	X	-	-
19MCB01.CO2	X	X	-	-	-	-	-	X	-	-	-	X	X	X	-
19MCB01.CO3	X	X	-	X	-	-	-	-	-	-	-	X	-	X	X
19MCB01.CO4	X	X	X	X	X	-	-	X	X	X	-	-	-	X
19MCB01.CO5	X	X	X	X	X	-	--	-	-	-	X	X	-	X

UNIT I INTRODUCTION TO SOFT COMPUTING 9

Soft Computing Constituents-From Conventional AI to Computational Intelligence- Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks - basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.

UNIT II NEURAL NETWORKS 9

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network –unsupervised learning networks: Kohonen self-organizing feature maps, LVQ – CP networks, ART network.

UNIT III FUZZY LOGIC 9

Membership functions: features, fuzzification, methods of membership value assignments-Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT IV GENETIC ALGORITHM 9

Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts - operators – Encoding scheme – Fitness evaluation – crossover - mutation - genetic programming -- multilevel optimization – real life problem- advances in GA .

UNIT V HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS 9

Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems -- simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL : L : 45

REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	J.S.R.Jang, C.T. Sun and E.Mizutani	Neuro-Fuzzy and Soft Computing	PHI / Pearson Education	2004
2.	S.N.Sivanandam and S.N.Deepa	Principles of Soft Computing	Wiley India Pvt Ltd	2011
3.	S.Rajasekaran and G.A.Vijayalakshmi Pai	Neural Networks, Fuzzy Logic and Genetic Algorithm Synthesis and Applications	Prentice-Hall of India Pvt. Ltd.,	2006
4.	George J. Klir, Ute St. Clair, Bo Yuan,	Fuzzy Set Theory	Foundations and Applications Prentice Hall,	1997
5.	David E. Goldberg	Algorithm in Search Optimization and Machine Learning	Genetic Pearson Education India	2013
6	James A. Freeman, David M. Skapura	Neural Networks Algorithms, Applications, and Programming Techniques	Pearson Education India	1991
7	Simon Haykin	Neural Networks	Comprehensive Foundation Second Edition Pearson Education	2005

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19MCB02	ADVANCED DATASTRUCTURES AND ALGORITHMS	L T P C
		3 0 0 3

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

19MCB02.CO1	Implement and apply concurrency in linked lists, stacks and queues.
19MCB02.CO2	Perform operations on advanced search trees.
19MCB02.CO3	Design and implement various types of advanced heaps structures.
19MCB02.CO4	Implement advanced concurrent structures such as hash table & priority queue.
19MCB02.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
19MCB02.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
19MCB02.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
19MCB02.CO3	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
19MCB02.CO4	-	X	X	-	X	-	-	-	-	-	-	X	-	X	-
19MCB02.CO5	-	-	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 synchronization – fine-grained synchronization – lazy synchronization – non-blocking synchronization – concurrent queues – bounded partial 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 - Skip lists.

UNIT III   ADVANCED HEAP STRUCTURES   9

Min heap - Min-Max heap - Double ended heap – Leftist Heaps - Binomial Heaps – Fibonacci Heaps – Skew Heaps - Interval HeaP.

UNIT IV   ADVANCED CONCURRENT STRUCTURES   9

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

UNIT V   ADVANCED ALGORITHMS   9

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

TOTAL : L : 45

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Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	S.K. Chang	Data Structures and Algorithms– Series of Software Engineering and Knowledge Engineering.	World Scientific 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, Charles E Leiserson, Ronald L Rivest and Clifford Stein	Introduction to Algorithms	Prentice Hall of India, New Delhi	2007
5.	Michael J. Quinn	Parallel Computing: Theory & Practice	Tata McGraw Hill Edition.	2003

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19MCB03	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

19MCB03.CO1	Execute the software project using software engineering methodologies
19MCB03.CO2	Design various UML diagrams and inter relate them
19MCB03.CO3	Design, test and manage the software project using various tools
19MCB03.CO4	Analyze the concept of system design
19MCB03.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
19MCB03.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
19MCB03.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
19MCB03.CO3	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
19MCB03.CO4	-	X	X	-	X	-	-	-	-	-	-	X	-	X	-
19MCB03.CO5	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-

UNIT I   MULTIMEDIA COMMUNICATIONS   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, DPCM, ADPCM, APC audio compression, 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

TOTAL : L : 45

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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

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19MCB04	DATA MINING TECHNIQUES	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

19MCB04.CO1 Apply the functionalities of data mining in real time applications.
19MCB04.CO2 Do the preprocessing and apply association rule concepts in real time systems
19MCB04.CO3 Implement the various classification
19MCB04.CO4 Implement the different clustering methods
19MCB04.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
19MCB04.CO1	X	X	X	X	-	-	-	X	-	X	-	X	X	-	-
19MCB04.CO2	-	-	X	X	X	-	X	-	X	-	X	-	-	X	X
19MCB04.CO3	X	X		-	-	-	X	-		X			-	X	-
19MCB04.CO4	X	-	X	-	-	X		X		-	-	X	X	X	-
19MCB04.CO5	X	X	-	X	-	X	X	-	X		X	-	-	-	X

UNIT I   INTRODUCTION   9

Data Mining-Steps in Knowledge Discovery Process- Kinds of Data and Patterns – Technologies used-Targeted applications - Major issues in Data Mining - Data objects and attribute types - Statistical descriptions of data - Data Visualization- Measuring data similarity and dissimilarity.

UNIT II   DATA PREPROCESSING   9

Data Cleaning, Integration, Reduction, Transformation and Discretization, Mining Frequent Patterns – Frequent Item set Mining Methods.

UNIT III   CLASSIFICATION   9

Decision Tree Induction-Bayesian Classification - Rule based Classification - classification by Back Propagation – Support Vector Machines – Lazy Learners – Model Evaluation and Selection – Techniques to improve Classification Accuracy - k-Nearest Neighbor Classifier.

UNIT IV   CLUSTER ANALYSIS   9

Clusters Analysis: Partitioning Methods – Hierarchical Methods – Density based Methods – Grid based Methods - Evaluation of Clustering – Outliers and Outlier analysis -- Outlier detection Methods - Statistical Approaches.
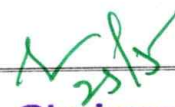
UNIT V   APPLICATIONS   9

Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases - Multimedia Databases - Image Databases - Text Database Mining Complex data types - Statistical Data Mining - Data Mining foundations – Visual and Audio Data Mining – Applications - Ubiquitous and invisible Data Mining - Social impacts of Data Mining .

TOTAL : L : 45

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

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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 Vipin Kumar	Introduction to Data Mining	2nd Edition, Pearson Education	2007

| 19MCB05 | ADVANCED OPERATING SYSTEMS | L T P C |
| | | 3 0 0 3 |

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 management aspects of Mobile operating systems

COURSE OUTCOMES

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

19MCB05.CO1	Discuss the various synchronization, scheduling and memory management issues.
19MCB05.CO2	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed Operating system.
19MCB05.CO3	Discuss the various resource management techniques for distributed systems.
19MCB05.CO4	Identify the different features of real time and mobile operating systems.
19MCB05.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
19MCB05.CO1	X	X	X	-	-	-	-	-	X	X	-	X	-	X	-
19MCB05.CO2	X	X	X	-	X	-	-	-	X	-	X	-	X	-	X
19MCB05.CO3	X	X	X	-	-	-	-	-	X	X	-	-	X	X	-
19MCB05.CO4	X	X	X	-	-	-	-	-	-	-	X	X	-	X	X
19MCB05.CO5	X	X	X	-	X	-	-	-	X	X	X	-	X	X	X

UNIT I   **FUNDAMENTALS OF OPERATING SYSTEMS**   9

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

UNIT II   **DISTRIBUTED OPERATING SYSTEMS**   9

Issues in Distributed Operating System – Architecture – Communication Primitives – Lamport's Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols.

UNIT III   **DISTRIBUTED RESOURCE MANAGEMENT**   9

Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – 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 – Processes and Threads - Memory Management - File system.

UNIT V   **CASE STUDIES**   9

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

TOTAL : L : 45

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

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19MCB06	NETWORK DESIGN AND TECHNOLOGIES	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

19MCB06.CO1 Familiar with the basics of Computer Networks.
19MCB06.CO2 Understand Network architectures.
19MCB06.CO3 Understand Concepts of fundamental protocols.
19MCB06.CO4 Understand the knowledge of internetworking concepts in various applications.
19MCB06.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
19MCB06.CO1	X	X	-	-	X	-	X	-	-	-	-	X	X	-	X
19MCB06.CO2	-	-	X	X	-	X	-	-	X	-	-	-	-	-	X
19MCB06.CO3	X	-	X	-	X	-	-	-	-	X	-	-	X	-	-
19MCB06.CO4	-	X	-	X	X	-	-	X	-	-	-	X	-	X	-
19MCB06.CO5	-	-	X	X	X	-	-	X	-	-	-	-	-	-	X

UNIT I	NETWORK DESIGN FUNDAMENTALS	9

Introduction -Cooperative communications -The OSI model -The TCP/IP model -The Internet protocols-Networking hardware-Physical connectivity-Virtual connectivity

UNIT II	NETWORK MONITORING AND ANALYSIS	9

Network monitoring and Analysis: An effective network monitoring LAN and WAN - Monitoring your network -The dedicated monitoring server – monitoring various network parameters - characteristics of monitoring tools - Types of monitoring tools-Spot check tools-Log analysers-Trending tools-Realtime tools-Benchmarking-Interpret the traffic graph - Monitoring RAM and CPU usage.

UNIT III	WIRELESS NETWORKS	9

IEEE802.16 and WiMAX – Security – Advanced 802.16 Functionalities – Mobile WiMAX - 802.16e – Network Infrastructure – WLAN – Configuration – Management Operation – Security – IEEE 802.11e and WMM – QoS – Comparison of WLAN and UMTS.

UNIT IV	4G AND 5G NETWORKS	9

4G and 5G Networks : LTE – Network Architecture and Interfaces – FDD Air Interface and Radio Networks – Scheduling – Mobility Management and Power Optimization – LTE Security Architecture – Interconnection with UMTS and GSM – LTE Advanced (3GPPP Release 10)- 4G Networks and Composite Radio Environment – Protocol Boosters – Hybrid 4G Wireless Networks Protocols – Green Wireless Networks –"Physical Layer and Multiple Access – Introduction to 5G.

UNIT V	SOFTWARE DEFINED NETWORKS	9

Software Defined Networks: Introduction – Centralized and Distributed Control and Data Planes – Open Flow – SDN Controllers .

TOTAL :45

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Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Martin Sauter	From GSM to LTE, An Introduciton to Mobile Networks and Mobile Broadband	1st Edition Wiley	2014
2.	Thoman D. Nadeau, and Ken Gray	SDN - Software Defined Networks	1st Edition, O''Reilly Publishers	2013
3.	-	Packet Analyzer and Network Management Tools	-	-

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2. http://www.ece.eng.wayne.edu/~czxu/ece7660_f05/network.pdf

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

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19MCB07	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances
3. Explore supervised and unsupervised learning paradigms of machine learning
4. To explore Deep learning technique and various feature extraction strategies
5. To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes

COURSE OUTCOMES

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

19MCB07.CO1	Identify the perspectives of machine learning
19MCB07.CO2	Apply decision tree and Artificial neural networks for real world problems
19MCB07.CO3	Design a Bayesian classifier for solving a problem
19MCB07.CO4	Illustrate the principles of instance based learning and genetic algorithm
19MCB07.CO5	Describe the algorithms for rule and reinforcement learning

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCB07.CO1	X	X	X	X	-	X	-	-	X	X	-	X	X	-	X
19MCB07.CO2	X	X	X	X	-	-	X	-	-	-	X	X	-	X	-
19MCB07.CO3	X	X	X	-	-	X	-	-	-	-	X	-	X	-	X
19MCB07.CO4	X	X	X	-	X	-	-	-	X	-	-	X	-	X	-
19MCB07.CO5	X	X	X	-	-	X	-	X	-	X	X	-	X	-	X

| UNIT I | INTRODUCTION | 9 |

Learning Problems - Designing a Learning System - Perspectives and Issues in Machine Learning – Concept Learning – task – search – finding maximally specific Hypotheses – version spaces and candidate elimination algorithm-inductive bias

| UNIT II | DECISION TREE LEARNING AND ARTIFICIAL NEURAL NETWORKS | 9 |

Decision Tree Representation – Problems – basic decision tree learning algorithms – hypotheses search – Issues – Artificial Neural Networks: Introduction -- Representations – Problems -- Perceptrons – Multilayer networks and Back Propagation Algorithm – example.

| UNIT III | BAYESIAN LEARNING | 9 |

Bayes Theorem – Concept Learning – Maximum Likelihood and Least-Squared Error Hypothesis - Maximum Likelihood Hypotheses for Predicting Probabilities - Bayes Optimal Classifier - Gibbs Algorithm - Naïve Bayes Classifier – Example

| UNIT IV | INSTANCE BASED LEARNING AND GENETIC ALGORITHM | 9 |

Introduction – k-Nearest Neighbour Learning – Locally Weighted Regression - Radial Basis Functions - Case-Based Reasoning. Genetic Algorithm – Example – Hypothesis Space Search – Genetic Programming- Models of Evolution and Learning – Parallelizing Genetic Algorithms

| UNIT V | LEARNING SETS OF RULES | 9 |

Learning sets of rules: Introduction – sequential covering algorithms – First order rules – FOIL – Induction as Inverted deduction – inverting resolution – Reinforcement learning – Introduction – Learning task – Q learning

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Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Tom M. Mitchell	Machine Learning	Indian Edition, McGraw-Hill Education (India)	2013
2.	Simon Rogeres and Mark Girolami	A First Course in Machine Learning	CRC Press	2015
3.	Ethem Alpaydin	Introduction to Machine Learning	3rd Edition, Prentice Hall India	2015
4.	Christopher Bishop	Pattern Recognition and Machine Learning	Springer	2007

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(AUTONOMOUS)
RASIPURAM-637 408, NAMAKKAL Dist.
TAMILNADU.

			L	T	P	C
19MCB08	**MACHINE LEARNING TECHNIQUES LAB**		0	0	4	2

COURSE OBJECTIVES

1. To understand the concept of algorithms and illustrate the hypothesis using sets of trained data
2. To learn and understand the concept of building the decision tree and Artificial neural networks using sample data sets.
3. To evaluate and understand the concept of Bayesian classifier using sample trained data sets.
4. To understand the EM algorithm and k-mean algorithms using trained data set
5. To understand the concept of Regression algorithm and nearest neighbor algorithm

COURSE OUTCOMES

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

19MCB08.CO1	Identify the algorithms for trained data samples.
19MCB08.CO2	Understanding the concept of decision tree and Artificial neural networks
19MCB08.CO3	Develop the sample data sets by calculating the accuracy, precision and recall.
19MCB08.CO4	Compare the results of two different algorithms based on ML library classes and API
19MCB08.CO5	Implement the algorithm for data sets based on predictions using data graph in order to fit the data points.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCB08.CO1	x	x	X	-	x	x	-	x	x	x	-	x	x	x	x
19MCB08.CO2	x	x	X	x	x	x	-	-	x	-	-	x	x	x	-
19MCB08.CO3	x	x	X	-	x	-	x	-	-	x	x	x	x	--	x
19MCB08.CO4	x	x	X	x	x	-	-	x	-	x	x	x	-	x	-
19MCB08.CO5	x	x	X	-x	x	-	x	-	x	-	x	x	-	x	x

Sl.No	List of Experiments
1.	Implement and demonstrate the FIND S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2.	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate
3.	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4.	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6	Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

TOTAL: P : 30

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19MCB09	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

19MCB09.CO1 Execute the software project using software engineering methodologies
19MCB09.CO2 Design various UML diagrams and inter relate them
19MCB09.CO3 Design, test and manage the software project using various tools
19MCB09.CO4 Analyze the concept of system design
19MCB09.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
19MCB09.CO1	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-
19MCB09.CO2	X	-	X	-	-	-	-	-	-	-	-	X	-	-	-
19MCB09.CO3	X	-	-	X	X	-	-	-	-	-	-	-	-	X	-
19MCB09.CO4	X	-	X	X	-	-	-	-	X	-	-	X	-	X	X
19MCB09.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.

TOTAL : L : 45

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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-

19MCB10	ADVANCED DATABASE 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

19MCB10.CO1	Study the database systems, data models, database languages.
19MCB10.CO2	Able to design a database system by understanding the concepts of functional dependencies and normalization.
19MCB10.CO3	Apply the knowledge on its query processing.
19MCB10.CO4	Analyze the principles of object oriented databases.
19MCB10.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
19MCB10.CO1	X	-	X	X	X	-	-	-	-	-	-	-	X	X	-
19MCB10.CO2	X	X	-	X	X	-	-	-	-	-	-	-	-	X	-
19MCB10.CO3	-	X	X	X	X	-	-	-	-	-	X	-	X	-	-
19MCB10.CO4	-	X	X	-	X	-	-	-	-	-	X	X	-	X	-
19MCB10.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   **DESIGN DATABASE 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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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 KaufmanN.Tame Ozsu, Patrick Valduriez	Principles Of Distributed Database Systems	Prentice Hall International Inc	1999.
4.	bdullah Uz Tansel Et Al	Temporal Databases:Theory,Design And Principles	BenjaminCummings Publishers	1993.
5.	Raghu Ramakrishnan, Johannes Gehrke	Database Management Systems	Mcgraw Hill, Third Edition	2004.

WEB REFERENCE(s)

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

19MCB11	ADVANCED DATABASE TECHNOLOGY LABORATORY	L	T	P	C
		0	0	4	2

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

19MCB11.CO1 Study the database systems, data models, database languages.

19MCB11.CO2 Able to design a database system by understanding the concepts of functional dependencies and normalization.

19MCB11.CO3 Apply the knowledge on its query processing.

19MCB11.CO4 Analyze the principles of object oriented databases.

19MCB11.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
19MCB11.CO1	-	X	X	X	X	-	-	-	X	-	X	-	-	-	X
19MCB11.CO2	-	-	X	X	X	-	-	-	X	-	X	-	-	-	X
19MCB11.CO3	-	-	X	X	X	-	-	-	X	-	X	-	-	-	X
19MCB11.CO4	-	-	X	X	X	-	-	-	X	-	X	-	-	-	X
19MCB11.CO5	-	-	X	X	X	-	-	-	X	-	X	-	-	-	X

List of Experiments

Sl.No	
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.)

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

TOTAL : P : 30

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19MCB12	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To understand the various algorithms for handling big data
2. To understand the techniques for handling big data
3. To learn No SQL database system
4. To learn concepts for Data stream mining
5. To analyse the stream computing

COURSE OUTCOMES

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

19MCB12.CO1 Understand how to leverage the insights from big data analytics through various algorithms
19MCB12.CO2 Analyze data by utilizing various statistical and data mining approaches
19MCB12.CO3 Perform analytics on real time data using Hadoop related tools
19MCB12.CO4 Comprehend the various methods for mining the data
19MCB12.CO5 Analyze the concepts of real time data streaming

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCB12.CO1	X	X	X	X	-	-	-	X	-	X	-	X	X	-	-
19MCB12.CO2	-	-	X	X	X	-	X	-	X	-	X	-	-	X	X
19MCB12.CO3	X	X		-	-	-	X	-		X			-	X	-
19MCB12.CO4	X	-	X	-	-	X		X		-	-	X	X	X	-
19MCB12.CO5	X	X	-	X	-	X	X	-	X	-	X	-	-	-	X

UNIT I   BIG DATA   9

Big Data: Definition – Wholeness of big data: Understanding – Capturing –Benefits and management – Organizing and analyzing – Challenges – Big data architecture – Big data sources and applications: Big data sources – Machine to machine Communications- Big data Applications.

UNIT II   MAPREDUCE FRAMEWORK   9

Introducing Hadoop – Starting Hadoop – Components of Hadoop: Working with files in HDFS - Anatomy of a MapReduce program – Reading and writing - Writing basic MapReduce programs: Getting the patent data set-Constructing the basic template of a MapReduce program-Counting things-Adapting for Hadoop''s API changes-Streaming in Hadoop- Improving performance with combiners – Hadoop Ecosystem

UNIT III   NOSQL DATABASE SYSTEMS   9

Introduction to NoSQL – CAP theorem - MongoDB : Data types – MongoDB Query Language – Cassandra: Features of Cassandra- Data types – CRUD- Collections Alter Commands – Import and Export- Querying system tables.

UNIT IV   MINING DATA STREAMS   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 - Stream processing with SPARK and Kafka.

UNIT V   CASE STUDIES   9

Implement using open source frameworks/tools : Time Series Analysis - Text analysis – Social Network Analysis - Data streams.

TOTAL : L : 45

REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Anil Maheshwari	Big Data	1 st Edition, McGraw Hill Education	2017
2.	Chuck Lam	Hadoop in Action	2 nd Edition, Manning Publications	2011
3.	Seema Acharya and Subhashini Chellappan	Big Data and Analytics	1st Edition, Wiley	2015
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. 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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19MCB13	RESEARCH METHODOLOGY AND IPR	L T P C
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COURSE OBJECTIVES

1. To learn the basics of research problem, effective technical writing and developing a research proposal.
2. To study about Nature of Intellectual Property and Patent Rights.

COURSE OUTCOMES

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

19MCB13.CO1	Understand research problem formulation.
19MCB13.CO2	Analyze research related information
19MCB13.CO3	Follow research ethics
19MCB13.CO4	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity
19MCB13.CO5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCB13.CO1	X	-	-	X	-	-	X	-	X	-	X	-	-	X	-
19MCB13.CO2	-	X	-	-	X	-	-	X	-	-	X	-	X	-	-
19MCB13.CO3	-	X	-	X	-	X	X	-	-	-	X	-	-	-	-
19MCB13.CO4	-	X	X	-	X	-	-	-	X	-	-	X	-	-	-
19MCB13.CO5	-	-	X	-	X	-	-	-	X	-	X	-	-	X	-

UNIT I   BASICS OF RESEARCH PROBLEM

9

Meaning of research problem – Sources of research problem – Criteria Characteristics of a good research problem – Errors in selecting a research problem – Scope and objectives of research problem. Approaches of investigation of solutions for research problem – Data collection – Analysis – Interpretation – Necessary instrumentations

UNIT II   TECHNICAL WRITING AND PROPOSAL

9

Effective literature studies approaches – Analysis Plagiarism – Research ethics – Effective technical writing – How to write Report – Paper – Developing Research Proposal – Format of research proposal – Presentation and Assessment by a review committee.

UNIT III   INTELLECTUAL PROPERTY

9

Nature of Intellectual Property: Patents – Designs –Trade and Copyright. Process of Patenting and Development: Technological research – Innovation – Patenting – Development. International Scenario: International cooperation on Intellectual Property – Procedure for grants of patents – Patenting under PCT.

UNIT IV   PATENT RIGHTS

9

Patent Rights: Scope of Patent Rights – Licensing and transfer of technology – Patent information and databases – Geographical Indications.

UNIT V   DEVELOPMENTS IN IPR

9

New Developments in IPR: Administration of Patent System – New developments in IPR – IPR of Biological Systems – Computer Software – Traditional knowledge Case Studies – IPR and IITs.

TOTAL : L : 45

REFERENCE BOOKS

Sl. No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Wayne Goddard and Stuart Melville	Research methodology: an introduction for science & engineering students	Juta and Company Ltd, 2nd Edition	2004
2.	Ranjit Kumar	Research Methodology: A Step by Step Guide for beginners	2nd Edition	2004
3.	Halbert,	Resisting Intellectual Property	Taylor & Francis Ltd	2007
4.	Mayal	Industrial Design	McGraw Hill	1992
5.	Niebel	Product Design	McGraw Hill	1974
6.	Asimov	Introduction to Design	Prentice Hall	1962
7.	Robert P. Merges, Peter S Menell, Mark A. Lemley,	Intellectual Property in New Technological Age	McGraw Hill	2016

19MCC01	ADVANCED ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
1. Introduce students to the advanced methods of designing and analyzing algorithms.
2. The student should be able to choose appropriate algorithms and use it for a specific problem.
3. To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems
4. Students should be able to understand different classes of problems concerning their computation difficulties.
5. To introduce the students to recent developments in the area of algorithmic design

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

19MCC01.CO1   Analyze the complexity/performance of different algorithms.

19MCC01.CO2   Determine the appropriate data structure for solving a particular set of problems.

19MCC01.CO3   Categorize the different problems in various classes according to their complexity.

19MCC01.CO4   Students should have an insight of recent activities in the field of the advanced data structure.

19MCC01.CO5   Evaluate the linear programming of different algorithms

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC01.CO1	X	X	-	-	X	-	-	-	X	-	X	X	X	-	-
19MCC01.CO2	X	X	-	-	-	-	-	-	X	-	X	-	X	-	-
19MCC01.CO3	-	X	-	X	-	-	-	-	X	-	X	-	X	-	-
19MCC01.CO4	-	X	X	-	-	-	-	-	X	-	X	-	X	-	-
19MCC01.CO5	-	X	-	X	-	-	-	-	X	-	X	-	X	-	-

UNIT I   SORTING AND GRAPHING   9

Sorting: Review of various sorting algorithms, topological sorting Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, Emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT II   MATROIDS AND GRAPH MATCHING   9

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST. Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT III   FLOW-NETWORKS AND MATRIX COMPUTATIONS   9

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT IV   GRAPHS, POLYNOMIALS AND DISCRETE FOURIER TRANSFORM   9

Shortest Path in Graphs: Floyd-Warshall algorithm and dynamic programming paradigm. More Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm

UNIT V   LINEAR PROGRAMMING   9

Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness-Approximation algorithms - Randomized Algorithms

TOTAL : L : 45

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REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Cormen, Leiserson, Rivest, Stein	Introduction to Algorithms	MIT Press, 3rd Edition,	2009
2.	Aho, Hopcroft, Ullman	The Design and Analysis of Computer Algorithms	Addison-Wesley Longman	1985
3.	EthemAlpaydin	Introduction to Machine Learning	Data *Kleinberg*, Jon	2005
4.	Hari Mohan Pandy	Design analysis and Algorithms	University Science Press	2009
5.	Kleinberg and Tardos	"Algorithm Design"	Pearson	2006

WEB REFERENCE(s)

1. https://www.teacherspayteachers.com/Browse/Search:sorting%20and%20graphing%20worksheet
2. https://math.mit.edu/~goemans/18438F09/lec8.pdf
3. https://www.geeksforgeeks.org/ford-fulkerson-algorithm-for-maximum-flow-problem/
4. https://www.geeksforgeeks.org/fast-fourier-transformation-poynomial-multiplication/
5. https://www.analyticsvidhya.com/blog/2017/02/1introductory-guide-on-linear-programming-explained-in-simple-english/

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19MCC02	ADVANCED ALGORITHM LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

1. To understand the concept of sorting and searching algorithms.
2. Analyze various algorithm to find minimum spanning tree.
3. To Study the Euclidean algorithm
4. To implement modular exponentiation techniques.
5. To apply matrix for various algorithms.

COURSE OUTCOMES

19MCC02.CO1   Understand the concept of sorting and searching algorithms
19MCC02.CO2   Implement Prim's algorithm to find minimum spanning tree.
19MCC02.CO3   Apply Dijkstra's algorithm to find shortest path.
19MCC02.CO4   Implement warshall's algorithm to find all pair shortest path.
19MCC02.CO5   Perform matrix calculation for various applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC02.CO1	X	X	X	-	X	-	-	-	-	-	X	-	X	-	-
19MCC02.CO2	-	X	X	-	X	-	-	-	-	-	X	-	X	-	-
19MCC02.CO3	-	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC02.CO4	-	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC02.CO5	-	X	X	-	X	-	-	-	-	-	X	-	X	-	-

List of Experiments

Sl.No
1. Write a menu based program for sorting algorithms.
2. Write a menu based program for searching algorithms.
3. Write a menu driven program to perform DFS and BFS.
4. Implementation of Prim's algorithm to find minimum cost spanning tree.
5. Implementation of Dijkstra's algorithm.
6. Implementation of Warshall's Algorithm.
7. Implementation of the extended Euclidean algorithm.
8. Implementation of the Modular exponentiation technique on an input data set.
9. Implementation of matrix multiplication Algorithm.
10. Implementation of Matrix Chain Multiplication.

TOTAL : P : 30

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19MCC03	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To learn how to apply trust-based security model to real-world security problems.
2. To study the concepts, processes and best practices needed to successfully secure information within Cloud infrastructures.
3. To know the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and challenges for each Cloud type and service delivery model.

COURSE OUTCOMES

19MCC03.CO1   Identify security aspects of each cloud model.
19MCC03.CO2   Develop a risk-management strategy for moving to the cloud.
19MCC03.CO3   Implement a public cloud instance using a public cloud service provider.
19MCC03.CO4   Apply trust based security model to different layer.
19MCC03.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
19MCC03.CO1	X	X	X	X	-	-	-	-	-	-	-	-	X	-	-
19MCC03.CO2	X	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC03.CO3	X	X	X	-	-	-	-	-	-	-	X	-	X	-	-
19MCC03.CO4	X	X	X	-	X	X	-	-	-	-	-	X	-	X	-
19MCC03.CO5	X	-	-	-	X	-	-	-	-	-	X	X	X	-	-

UNIT I   BASICS OF CLOUD COMPUTING   9

Online Social Networks and Applications – Cloud introduction and overview –Different clouds – Risks – Novel applications of cloud computing–Cloud Computing Architecture: Requirements – Introduction Cloud computing architecture –On Demand Computing Virtualization at the infrastructure level –Security in Cloud computing environments - - CPU Virtualization –Hypervisors Storage Virtualization Cloud Computing Defined –SPI Framework for Cloud Computing –Traditional Software Model– Cloud Services Delivery Model.

UNIT II   CLOUD DEPLOYMENT MODELS AND SECURITY ISSUES   9

Key Drivers to Adopting the Cloud – The Impact of Cloud Computing on Users –Governance in the Cloud – Barriers to Cloud Computing Adoption In the Enterprise. Infrastructure Security: The Network Level – The Host Level – The Application Level – Data Security and Storage – Aspects of Data Security – Data Security Mitigation Provider Data and Its Security.

UNIT III   ACCESS AND SECURITY MANAGEMENT   9

Identity and Access Management: Trust Boundaries and IAM – IAM Challenges – Relevant IAM Standards and Protocols for Cloud Services – IAM Practices in the Cloud – Cloud Authorization Management. Security Management in the Cloud: Security Management Standards – Security Management in the Cloud – Availability Management: SaaS, PaaS, IaaS.

UNIT IV   PRIVACY ISSUES   9

Privacy Issues – Data Life Cycle – Key Privacy Concerns in the Cloud – Protecting Privacy – Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing – Legal and Regulatory Implications – U.S. Laws and Regulations – International Laws and Regulations.

UNIT V   AUDIT AND COMPLIANCE   9

Internal Policy Compliance – Governance – Risk and Compliance (GRC) –Regulatory/External Compliance – Cloud Security Alliance – Auditing the Cloud for Compliance – Security-as-a-Cloud.

TOTAL : L : 45

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REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Rhoton	Cloud Computing Explained: Implementation Handbook for Enterprises	Amazon.com	2009
2.	Tim Mather	Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice)"	O'Reilly Media	2009
3.	RajkumarBuyya,	Christian Vecchiola, and ThamaraiSelvi, "Mastering Cloud Computing	Tata McGraw Hill Edition	2013
4.	Tom White	Hadoop: The Definitive Guide	Yahoo Press	2012

WEB REFERENCE(s)

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2. https://nptel.ac.in/courses/106104182/
3. https://swayam.gov.in/nd1_noc19_cs64/preview
4. https://www.guru99.com/cloud-computing-for-beginners.html
5. https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/

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19MCC04	CLOUD COMPUTING LABORATORY	L T P C 0 0 4 2

COURSE OBJECTIVES

1. To learn how to apply trust-based security model to real-world security problems.
2. To study the concepts, processes and best practices needed to successfully secure information within Cloud infrastructures.
3. To know the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and challenges for each Cloud type and service delivery model.

COURSE OUTCOMES

19MCC04.CO1 Identify security aspects of each cloud model.
19MCC04.CO2 Develop a risk-management strategy for moving to the cloud.
19MCC04.CO3 Implement a public cloud instance using a public cloud service provider.
19MCC04.CO4 Apply trust based security model to different layer.
19MCC04.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
19MCC04.CO1	X	X	X		-	X	-	-	-	-	-	-	X	-	-
19MCC04.CO2	X	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC04.CO3	X	X	X	-	-	-	-	-	X	-	X	-	X	-	-
19MCC04.CO4	X	X	-	X	-	X	-	-	-	-	-	X	-	X	-
19MCC04.CO5	X	-	-	-	X	-	-	X	-	-	X	X	X	-	-

Sl.No	List of Experiments
1.	a) Installation of various hypervisors and instantiation of VMs with image file using open source hypervisors such as Virtual Box, VMWare Player, Xen and KVM. b) Client server communication between two virtual machine instances, execution of chat application.
2.	Creation of simple network topology using open source network virtualization tools (like mini net and others).
3.	Implementation of simple network protocols using open source network controllers (like Open Daylight).
4.	Implementation of various scheduling mechanisms using open source cloud simulator.
5.	Familiarization and usage of the following cloud services with open source cloud tools(like Eucalyptus, Open stack, Open Nebula and others) a) Scheduling mechanisms b) Load balancing mechanisms c) Hashing and encryption mechanisms
6	Familiarization and usage of collaborative applications (SaaS).
7	Implementing applications using Google App Engine (PaaS).
8	Develop MapReduce application (example-URL Pattern count and others) using Hadoop cluster set up (Single node and multi node).

TOTAL : P : 30

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19MCC05	WEB DATA MINING	L T P C
		3 0 0 3

COURSE OBJECTIVES
1. Introduces basic concepts, tasks, methods, and techniques in web mining
2. Develop an understanding of the web mining process and issues, learn various techniques for data mining
3. Learn the techniques in solving data mining problems using tools

COURSE OUTCOMES
19MCC05.CO1 Gain the knowledge of basic concepts data mining and its functionalities.
19MCC05.CO2 Familiar with data mining and knowledge discovery process
19MCC05.CO3 Learn various techniques for web usage mining process and techniques
19MCC05.CO4 Learn classification and prediction algorithms for web data mining
19MCC05.CO5 Apply the techniques in solving data mining problems using data mining tools and systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC05.CO1	X	X	X	-	-	-	-	-	-	-	-	X	X	-	-
19MCC05.CO2	X	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC05.CO3	X	X	-	-	-	-	-	-	X	-	X	-	X	-	-
19MCC05.CO4	X	X	-	-	X	-	-	-	-	X	-	X	-	X	-
19MCC05.CO5	X	X	-	-	X	-	-	-	X	-	-	-	-	-	X

UNIT I INTRODUCTION 9
What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases - Advanced Database Systems - Data Mining Functionalities - Interestingness of a pattern Classification of Data Mining Systems - Major issues in Data Mining .

UNIT II DATA MINING AND KNOWLEDGE DISCOVERY 9
The KDD process and methodology - Data preparation for knowledge discovery - Overview of data mining techniques - Market basket analysis - Classification and prediction – Clustering - Memory-based reasoning - Evaluation and Interpretation.

UNIT III WEB USAGE MINING PROCESS AND TECHNIQUES 9
Data collection and sources of data- Data preparation for usage mining - Mining navigational patterns - Integrating e-commerce data - Leveraging site content and structure - User tracking and profiling - E-Metrics: measuring success in e-commerce Privacy issues.

UNIT IV CLASSIFICATION AND PREDICTION 9
Concepts and Issues regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification - Classification by Back-propagation - Classification Based on Concepts from Association Rule Mining.
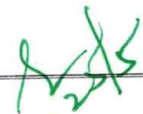
UNIT V WEB MINING APPLICATIONS AND OTHER TOPICS 9
Data integration for e-commerce - Web personalization and recommender systems - Web content and structure mining - Web data warehousing - Review of tools, applications, and systems.

TOTAL : L : 45

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REFERENCE BOOK

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Michael Berry and Gordon Linoff, John Wiley	Data Mining Techniques for Marketing, Sales, and Customer Relationship Management	Second Edition	2004
2.	Ralph Kimball and Richard Merz,	The Data Web house Toolkit	John Wiley	2000
3.	RajkumarBuyya,	Mining the Web: Transforming Customer Data into Customer Value	Tata McGraw Hill Edition	2013
4.	Gordon Linoff and Michael Berry	Hadoop: The Definitive Guide	John Wiley & Sons	2001

WEB REFERENCE(s)

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2. https://ieeexplore.ieee.org/document/7809663
3. https://thesai.org/Downloads/Volume9No6/Paper_30-Data_Mining_Web_Data_Mining_Techniques.pdf
4. https://www.researchgate.net/publication/326180019_Data_Mining_Web_Data_Mining_Techniques_Tools_and_Algorithms_An_Overview
5. https://www.springer.com/gp/book/9783642194597

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19MCC06	WEB ANALYTICS AND DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
1. The course explores use of social network analysis
2. To understand growing connectivity and complexity in the world ranging from small groups to WWW

COURSE OUTCOMES
19MCC06.CO1   Gain the knowledge of Social network and Web data
19MCC06.CO2   Familiar with web analytics tools and development
19MCC06.CO3   Illustrate Web Search and Retrieval techniques
19MCC06.CO4   Identify the Affiliation and identity of social connects
19MCC06.CO5   Aware the robustness in social involvements and diffusion of innovation

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC06.CO1	X	X	X	-	-	-	-	-	-	-	-	X	X	-	-
19MCC06.CO2	X	X	X	-	X	-	-	-	-	-	X	-	-	X	-
19MCC06.CO3	X	X	-	-	-	-	-	-	X	-	X	-	X	-	-
19MCC06.CO4	X	X	-	-	X	-	-	-	-	X	-	X	-	X	-
19MCC06.CO5	X	X	-	-	X	-	-	-	X	-	-	-	-	-	X

UNIT I   **INTRODUCTION**   9

Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization.

UNIT II   **WEB ANALYTICS TOOLS**   9

Click Stream Analysis, A/B testing, Online Surveys.

UNIT III   **WEB SEARCH AND RETRIEVAL**   9

Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models

UNIT IV   **MAKING CONNECTION**   9

Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity.

UNIT V   **CONNECTION**   9

Connection Search, Collapse, Robustness Social involvements and diffusion of innovation.

TOTAL : L : 45

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Hansen, Derek, Ben Sheiderman, Marc Smith	Analyzing Social Media Networks with NodeXL: Insights from a Connected World.	Morgan Kaufmann	2011
2.	Avinash Kaushik	Web Analytics 2.0: The Art of Online Accountability	Sybex	2009
3.	Easley, D. & Kleinberg, J.	Networks, Crowds, and Markets: Reasoning About a Highly Connected World.	New York: Cambridge University Press	2010
4.	Wasserman, S. & Faust, K.	Social network analysis: Methods and applications	New York: Cambridge University Press	1994
5.	P. R. & Contractor, N. S.	Theories of communication networks.	New York: Oxford University Press.	2003

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2. http://girnarsoft.com/web-analytics-social-platforms-development-tycxOd
3. https://en.wikipedia.org/wiki/Web_analytics
4. https://www.usability.gov/what-and-why/web-analytics.html
5. https://www.primeadvertising.com/capabilities/web-design-development/web-analytics/

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19MCC07	DATA STORAGE TECHNOLOGIES AND NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
1. To understand the working of protocols in different layers of sensor networks.
2. To learn the establishment of wireless sensor networks.
3. To familiarize the students with the hardware and software platforms used in the design of WSN.
4. To learn the establishment of wireless sensor networks.
5. To Analysis of various critical parameters in deploying a WSN

COURSE OUTCOMES

19MCC07.CO1	Ability to learn the basics of sensor networks.
19MCC07.CO2	To impart knowledge on the design and development of the data link and network layers in the WSN protocol stack.
19MCC07.CO3	Analyze the working of protocols in different layers of sensor networks.
19MCC07.CO4	Technical knowhow in building a WSN network.
19MCC07.CO5	Analyze to understand the hardware

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC07.CO1	-	X	-	-	X	-	-	-	-	-	-	X	-	X	-
19MCC07.CO2		-	X	X	-	X	-	X	-	-	X	-	-	-	X
19MCC07.CO3	X	-	-	-	-	-	X	-	-	-	X	-	X	-	X
19MCC07.CO4		X		X	-	-	-	-	-	-	-	-	X	-	-
19MCC07.CO5	X	X	X	-	-	-	-	-	X	X	-	-	X	-	-

UNIT I   **STORAGE MEDIA AND TECHNOLOGIES**   9

Storage Media and Technologies -Magnetic, Optical and Semiconductor Media, Techniques for read/write Operations, Issues and Limitations.

UNIT II   **USAGE AND ACCESS**   9

Usage and Access -Positioning in the Memory Hierarchy, Hardware and Software Design for Access, Performance issues.

UNIT III   **LARGE STORAGES**   9

Large Storages -Hard Disks, Networked Attached Storage, Scalability issues, Networking issues

UNIT IV   **STORAGE ARCHITECTURE SYSTEMS**   9

Storage Architecture - Storage Partitioning, Storage System Design, Caching, Legacy Systems.

UNIT V   **STORAGE AREA NETWORKS AND STORAGE QOS**   9

Storage Area Networks – Hardware and Software Components, Storage Clusters/Grids. Storage QoS–Performance, Reliability, and Security issues.

TOTAL : L : 45

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Franklyn E. Dailey	The Complete Guide to Data Storage Technologies for Network-centric Computing-Paperback	Computer Technology Research Corporation	1998
2.	Nigel Poulton	Data Storage Networking : Real World Skills for the CompTIA Storage	Sybex	2014

WEB REFERENCE(s)

1. https://www.webopedia.com/TERM/S/storage_networking.html
2. http://bits-pilani-wilp.blogspot.com/2015/11/data-storage-technologies-and-networks_10.html
3. https://www.crn.com/slide-shows/storage/229000257/10-network-storage-technologies-you-need-to-know.htm
4. http://codingtechlife.blogspot.com/2017/04/data-storage-technologies-and-networks_30.html
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		L	T	P	C
19MCC08	**PATTERN CLASSIFICATION AND ANALYSIS**	3	0	0	3

COURSE OBJECTIVES

1. To 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

19MCC08.CO1	Understand and apply various algorithms for pattern recognition.
19MCC08.CO2	Realize the clustering concepts and algorithms.
19MCC08.CO3	Bring out feature extraction techniques
19MCC08.CO4	Easily understand the concept of fundamental algorithms for pattern recognition.
19MCC08.CO5	Analyze the recent advances in neural networks.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC08.CO1	X	X	X	X	-	-	-	-	-	-	-	-	X	-	X
19MCC08.CO2	X	X	X	X	-	-	-	-	-	-	X	-	-	X	-
19MCC08.CO3	X	X	X	-	-	-	-	-	-	-	X	-	X	-	-
19MCC08.CO4	X	X	X	X	X	-	-	-	-	-	-	X	-	-	X
19MCC08.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.

TOTAL : L : 45

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
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19MCC09	MOBILE AND PERVASIVE COMPUTING	L T P C
		3 0 0 3

COURSE OBJECTIVES
1. To learn the basic architecture and concepts till Third Generation Communication systems
2. To understand the latest 4G Telecommunication System Principles
3. To introduce the broad perspective of pervasive concepts and management
4. To explore the HCI concepts in Pervasive environment
5. To apply the pervasive concepts in mobile environment

COURSE OUTCOMES

19MCC09.CO1	Obtain a thorough understanding of basic architecture and concepts of till Third Generation Communication systems
19MCC09.CO2	Explain the latest 4G Telecommunication System Principles
19MCC09.CO3	Incorporate the pervasive concepts
19MCC09.CO4	Implement the HCI in Pervasive environment
19MCC09.CO5	Work on the pervasive concepts in mobile environment

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC09.CO1	X	-	X	X	-	-	-	-	X	-	-	-	X	-	-
19MCC09.CO2	-	-	X	X	-	-	-	-	-	-	X	X	-	X	-
19MCC09.CO3	-	X	-	X	-	-	X	-	-	-	-	-	X	-	X
19MCC09.CO4	X	X	-	-	X	-	-	-	-	-	X	-	-	X	-
19MCC09.CO5	X	-	X	-	-	-	X	-	-	-	-	-	X	-	X

UNIT I   INTRODUCTION   9
History – Wireless communications: GSM – DECT – TETRA – UMTS – IMT – 2000 – Blue tooth, WiFi, WiMAX, 3G ,WATM.- Mobile IP protocols -WAP push architecture-Wml scripts and applications. Data networks – SMS – GPRS – EDGE – Hybrid Wireless100 Networks – ATM – Wireless ATM.

UNIT II   OVERVIEW OF A MODERN 4G TELECOMMUNICATIONS SYSTEM   9
Introduction. LTE-A System Architecture. LTE RAN. OFDM Air Interface. Evolved Packet Core. LTE Requirements. LTE-Advanced. LTE-A in Release. OFDMA – Introduction. OFDM Principles. LTE Uplink—SC-FDMA. Summary of OFDMA.

UNIT III   PERVASIVE CONCEPTS AND ELEMENTS   9
Technology Trend Overview - Pervasive Computing: Concepts - Challenges - Middleware - Context Awareness - Resource Management - Human–Computer Interaction - Pervasive Transaction Processing - Infrastructure and Devices - Wireless Networks - Middleware for Pervasive Computing Systems - Resource Management - User Tracking- Context Management -Service Management - Data Management - Security Management - Pervasive Computing Environments - Smart Car Space - Intelligent Campus .

UNIT IV   HCI IN PERVASIVE COMPUTING   9
Prototype for Application Migration - Prototype for Multimodalities - Human–Computer Interface in Pervasive Environments - HCI Service and Interaction Migration - Context-Driven HCI Service Selection - Interaction Service Selection Overview - User Devices - Service-Oriented Middleware Support - User History and Preference - Context Manager - Local Service Matching - Global Combination - Effective Region - User Active Scope - Service Combination Selection Algorithm

UNIT V   PERVASIVE MOBILE TRANSACTIONS   9
Pervasive Mobile Transactions - Introduction to Pervasive Transactions - Mobile Transaction Framework - Unavailable Transaction Service - Pervasive Transaction Processing Framework - Context-Aware Pervasive Transaction Model - Context Model for Pervasive Transaction Processing - Context-Aware Pervasive Transaction Model - A Case of Pervasive Transactions - Dynamic Transaction Management - Context-Aware Transaction Coordination Mechanism - Coordination Algorithm for Pervasive Transactions - Participant Discovery - Formal Transaction Verification - Petri Net with Selective Transition

TOTAL : L : 45

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REFERENCE BOOKS

Sl. No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Alan Colman, Jun Han, and Muhammad Ashad Kabir	Pervasive Social Computing Socially-Aware Pervasive Systems and Mobile Applications	Springer	2016
2.	J.Schiller	Mobile Communication	Addison Wesley	2000
3.	Juha Korhonen	Introduction to 4G Mobile Communications	Artech House Publishers	2014

WEB REFERENCE(s)

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2. https://www.journals.elsevier.com/pervasive-and-mobile-computing
3. https://www.csd.cs.cmu.edu/research-areas/mobile-and-pervasive-computing
4. https://en.wikipedia.org/wiki/Ubiquitous_computing
5. https://www.morganclaypool.com/toc/mpc/1/1

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19MCC10	AD HOC AND WIRELESS SENSOR NETWORKS	L	T	P	C
		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
19MCC10.CO1	Ability to learn the basics of sensor networks.
19MCC10.CO2	To impart knowledge on the design and development of the data link and network layers in the WSN protocol stack.
19MCC10.CO3	Analyze the working of protocols in different layers of sensor networks.
19MCC10.CO4	To learn the establishment of wireless sensor networks.
19MCC10.CO5	Analyze to understand the hardware
19MCC10.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
19MCC10.CO1	X	-	X	-	-	X	-	X	X	-	X	-	-	X	-
19MCC10.CO2	-	-	X	X	-	-	-	-		-	X	-	X	X	X
19MCC10.CO3	X	X	-	-	X	-	X		X	X	-	-	-	X	-
19MCC10.CO4	X	X	-	X	-	-		-	X	-	X	X	X	X	X
19MCC10.CO5	X	-	X	-	-	X	-	X	-	X	-	X	-	-	X

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

TOTAL : L : 45

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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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19MCC11	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

19MCC11.CO1   Identify and design the new models for market strategic interaction.
19MCC11.CO2   Design business intelligence and information security for WoB.
19MCC11.CO3   Analyze various protocols for IoT.
19MCC11.CO4   Analyze programming aspects of IoT.
19MCC11.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
19MCC11.CO1	X	-	X	-	X	-	-	X	-	X	-	X	X	X	-
19MCC11.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
19MCC11.CO3	X	X	X	X	-	X	-	-	X	X	X	X	-	X	-
19MCC11.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
19MCC11.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.

TOTAL : L : 45

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)

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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

19MCC12	DATA PREPARATION AND ANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To prepare the data for analysis
2. To develop meaningful Data
3. Learn the different ways of Data Analysis
4. Be familiar with data streams
5. Be familiar with the visualization

COURSE OUTCOMES

19MCC12.CO1	Work in a business environment in which data preparation occurs.
19MCC12.CO2	Apply data cleaning techniques on real world data and prepare data for analysis
19MCC12.CO3	Perform exploratory analysis on data, such as calculating descriptive and comparative statistics
19MCC12.CO4	Experiment visualization techniques for various data analysis tasks
19MCC12.CO5	Illustrate Clustering and association techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCC12.CO1	X	-	-	X	-	-	X	-	-	-	X	-	X	-	-
19MCC12.CO2	-	-	X	X	X	-	-	-	-	-	-	X	-	X	-
19MCC12.CO3	-	X	-	-	-	-	-	-	-	-	X	X	X	-	X
19MCC12.CO4	X	X	-	-	X	-	-	-	-	X	-	-	-	X	-
19MCC12.CO5	X	-	X	-	-	X	-	-	-	-	X	-	X	-	-

UNIT I	DATA GATHERING AND PREPARATION	9

Defining Data analysis problems: Knowing the client-understanding the questions- Data Gathering and Preparation: Data formats-parsing and transformation-Scalability and real-time issues

UNIT II	DATA CLEANING	9

Data Cleaning: Consistency checking-Heterogeneous and missing data- Data Transformation and segmentation.

UNIT III	EXPLORATORY ANALYSIS	9

Exploratory Analysis: Descriptive and comparative statistics- Clustering and association-Hypothesis Generation

UNIT IV	VISUALIZATION	9

Visualization: Designing visualizations- Time series-Geolocated data- Correlations and connections- Hierarchies and networks- interactivity.

UNIT V	STATISTICS	9

Descriptive statistics-Inferential statistics-Comaparative statistics
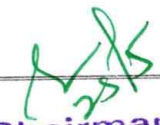
TOTAL : L : 45

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Glenn J. Myatt	Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining	John Wiley & Sons, Inc Second edition	2014
2.	Michael Berthold, David J. Hand	Intelligent Data Analysis	Springer	2007.
3.	Donald J. Wheeler	Making Sense of Data	SPC Press	2003
4.	Dorian Pyle	Data Preparation for Data Mining	Morgan Kaufmann	1999
5.	Gerhard Svolba	Data Preparation for Analytics Using SAS	SAS Institute	2006

WEB REFERENCE(s)

1. https://www.youtube.com/watch?v=54u3vw5KKVY
2. https://www.youtube.com/watch?v=_fNzk_0u3S4
3. https://ikujdcbe.firebaseapp.com/aa254/making-sense-of-data-by-donald-j-wheeler-0945320728.pdf
4. https://www.youtube.com/watch?v=p8pdxLU1zMI
5. https://www.youtube.com/watch?v=lTAeMU2XI4U

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19MCC13	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To analyze various performance related parameters in computer architecture and understand instruction set architectures
2. To understand Instruction Level Parallelism(ILP) with its limitations
3. To utilize the ILP concept for memory design
4. To review various issues in multiprocessor
5. To understand the design of the memory hierarchy and analyze the types of multiprocessors

COURSE OUTCOMES

19MCC13.CO1	Understand performance related parameters and the concepts of Instruction Set architectures
19MCC13.CO2	Describe Instruction Level parallelism and identify the limitations of ILP
19MCC13.CO3	Discuss the approaches of exposing and exploiting ILP
19MCC13.CO4	Design hierarchical memory System
19MCC13.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
19MCC13.CO1	X	-	X	-	X	-	-	-	X	-	-	-	X	-	-
19MCC13.CO2	X	X	-	-	-	X	X	-	-	-	-	-	-	X	-
19MCC13.CO3	-	-	X	-	X	-	-	X	-	X	-	-	X	-	-
19MCC13.CO4	-	-	X	X	-	-	-	-	-	-	X	X	-	X	-
19MCC13.CO5	-	X	X	-	X	-	-	-	X	-	-	-	-	-	X

UNIT I   FUNDAMENTALS OF COMPUTER DESIGN   9

Introduction-measuring and reporting performance- Quantitative principles of computer design-Instruction set principles and examples- classifying instructions- set architectures-memory addressing-addressing modes for signal processing-type and size of operands.

UNIT II   INSTRUCTION LEVEL PARALLELISM   9

Concepts and challenges – overcoming data hazards with dynamic scheduling – examples- reducing branch costs with dynamic hardware prediction- high performance instruction delivery- taking advantages of ILP with multiple issues- limitations of ILP.

UNIT III   ILP WITH SOFTWARE APPROACHES   9

Basic compiler techniques for exposing ILP- static branch prediction- static multiple issues: VLIW approach- Advanced compiler support for exposing and exploiting ILP-Hardware support-cross cutting issues- Intel IA64 architecture.

UNIT IV   MEMORY HIERARCHY DESIGN   9

Introduction- review of caches- cache performance- reducing cache miss penalty-reducing miss rate- miss rate via parallelism –reducing hit time – main memory and organizations for improving performance- memory technology- virtual memory.

UNIT V   MULTIPROCESSORS AND THREAD LEVEL PARALLELISM   9

Symmetric shared memory architectures-performance of symmetric shared memory multiprocessors – Distributed shared memory architectures-synchronization- storage systems – types of storage devices- buses- reliability- availability and dependability- RAID – errors and failures in real systems- I/O performance measures- Introduction to queuing theory.

TOTAL:45

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John L. Hennessy and David A. Patterson	Computer Architecture: A Quantitative Approach	Morgan Kaufmann, 3rd Edition	2003
2.	Sima D. FountainT. And Kacsuk P	Advanced Computer Architectures: A Design Space Approach	Addison Wesley	2000
3.	Kai Hwang	Advanced Computer Architecture: Parallelism, Scalability,Programmability	Tata McGraw Hill Edition	2001

WEB REFERENCE(s)

1. https://www.classcentral.com/course/swayam-advanced-computer-architecture-13884
2. https://www.udemy.com/course/advance-computer-architecture-and-organization/
3. https://www.researchgate.net/publication/255178777_UNIT_1_Advanced_Computer_Architecture_Introduction
4. https://learn.saylor.org/course/CS301
5. https://nptel.ac.in/courses/106103206/

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19MCD04	VALUE EDUCATION	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES
1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character

COURSE OUTCOMES
19MCD04.CO1	Knowledge of self-development
19MCD04.CO2	Learn the importance of Human values
19MCD04.CO3	Developing the overall personality
19MCD04.CO4	Infer the importance of behavior development.
19MCD04.CO5	Know the self-management and good health

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCD04.CO1	-	-	-	-	-	X	X	X	-	X	-	X	-	-	-
19MCD04.CO2	-	-	-	-	-	X	X	X	-	X	X	-	-	X	-
19MCD04.CO3	-	-	-	-	-	X	X	X	X	X	X	-	-	-	-
19MCD04.CO4	-	-	-	-	-	X	X	X	-	X	-	X	-	-	-
19MCD04.CO5	-	-	-	-	-	X	X	X.	-	X	-	X	-	-	-

UNIT I   VALUES AND SELF-DEVELOPMENT   5

Social Values And Individual Attitudes -Work ethics, Indian vision of humanism- Moral and non- moral valuation- Standards and principles- Value judgments

UNIT II   CULTIVATION OF VALUES   5

Importance of cultivation of values – Sense of duty – Devotion – Self-reliance – Confidence –Concentration – Truthfulness – Cleanliness – Honesty – Humanity – Power of faith – National Unity –Patriotism – Love for nature – Discipline.

UNIT III   PERSONALITY   5

Personality and Behavior Development – Soul and Scientific attitude – Positive Thinking – Integrity and discipline – Punctuality – Love and Kindness – Avoid fault Thinking – Free from anger – Dignity of labour.

UNIT IV   BEHAVIOR DEVELOPMENT   5

Universal brotherhood and religious tolerance – True friendship – Happiness Vs suffering – Love for truth – Aware of self-destructive habits – Association and Cooperation – Doing best for saving nature.

UNIT V   CHARACTER AND COMPETENCE   5

Character and Competence – Holy books Vs Blind faith – Self-management and Good health – Science of reincarnation – Equality – Nonviolence – Humility – Role of Women – All religions and same message – Mind your Mind – Self-control Honesty – Studying effectively.

TOTAL : L : 25

REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Y.K. Singh	Value Education	APH Publishing,New Delhi	2008
2.	R. P. Shukla,	Value education and human rights	Sarup& Sons, New Delhi, 1st edition	2004
3.	Chakroborty, S.K.	Values and Ethics for organizations Theory and practice	Oxford University Press, New Delhi	1998

		L	T	P	C
19MCD05	DISASTER MANAGEMENT	2	0	0	0

COURSE OBJECTIVES

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country.

COURSE OUTCOMES

19MCD05.CO1	Demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
19MCD05.CO2	Realize critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
19MCD05.CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
19MCD05.CO4	Understand the strengths and weaknesses of disaster management approaches, planning and Programming in different countries, particularly their home country.
19MCD05.CO5	Gain Knowledge in emerging trend mitigation of disasters.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MCD05.CO1	X	-	X	X	X	-	X	-	-	X	-	-	X	-	-
19MCD05.CO2	X	X	X	X	-	X	-	X	-	-	X	-	-	X	-
19MCD05.CO3	X	X	-	-	-	X	-	X	-	X	X	-	X	-	-
19MCD05.CO4	X	-	X	-	X	-	-	-	-	-	-	X	-	X	-
19MCD05.CO5	X	X	X	-	X	-	X	X	-	-	-	-	X	-	-

UNIT I   INTRODUCTION   5

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II   REPERCUSSIONS OF DISASTERS AND HAZARDS   5

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease And Epidemics, War And Conflicts..

UNIT III   DISASTER PRONE AREAS IN INDIA   5

Study of Seismic Zones; Areas Prone To Floods And Droughts, Landslides and Avalanches; Areas Prone to Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases and Epidemics.

UNIT IV   DISASTER PREPAREDNESS AND MANAGEMENT   5

Preparedness: Monitoring of Phenomena Triggering A Disaster Or Hazard; Evaluation of Risk: Application of Remote Sensing

UNIT V   RISK ASSESSMENT   5

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

TOTAL : L : 25

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	R. Nishith, Singh AK	Disaster Management in India: Perspectives, issues and strategies	New Royal book Company	-
2.	Sahni, Pardeep et.al. (Eds.)	Disaster Mitigation Experiences And Reflections	Prentice Hall Of India, New Delhi	-
3.	Goel S. L	Disaster Administration And Management Text And Case Studies	Deep & Deep Publication Pvt. Ltd, New Delhi	-

19MCD06	SANSKRIT FOR TECHNICAL KNOWLEDGE	L T P C
		2 0 0 0

COURSE OBJECTIVES
1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning

COURSE OUTCOMES

19MCD06.CO1	Understanding basic Sanskrit language
19MCD06.CO2	Ancient Sanskrit literature about science & technology can be understood
19MCD06.CO3	Improve brain functioning

| UNIT I | INTRODUCTION | 10 |

Alphabets in Sanskrit-Past/Present/Future Tense-Simple Sentences

| UNIT II | REPERCUSSIONS OF DISASTERS AND HAZARDS | 10 |

Order-Introduction of roots -Technical information about Sanskrit Literature

| UNIT III | DISASTER PRONE AREAS IN INDIA | 5 |

Technical concepts of Engineering-Electrical, Mechanical,Architecture, Mathematics

TOTAL : L : 25

REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Abhyaspustakam# $ Dr.Vishwas, Sanskrit	Bharti Publication	New Delhi Publication	-
2.	Day R	Teach Yourself Sanskrit# Prathama Deeksha- VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam	New Delhi Publication	-
3.	Suresh Soni,	India"s Glorious Scientific Tradition	Ocean books (P) Ltd., New Delhi.	-

19MCD07	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

1. To know writing skills and level of readability
2. To learn about what to write in each section.
3. To ensure the good quality of paper at very first-time submission

COURSE OUTCOMES

19MCD07.CO1	Be familiar with planning and preparation for paper writing.
19MCD07.CO2	Recognize how to avoid the plagiarism.
19MCD07.CO3	Know how to prepare for literature survey.
19MCD07.CO4	Get skills for writing title, abstract and introduction.
19MCD07.CO5	Summarize skills for writing methods results and discussion

UNIT I **PLANNING AND PREPARATION** 5

Planning and Preparation – Word Order – Breaking up long sentences – Structuring Paragraphs and Sentences – Being Concise and Removing Redundancy – Avoiding Ambiguity and Vagueness.

UNIT II **PARAPHRASING AND PLAGIARISM**

Clarifying Who Did What – Highlighting Your Findings – Hedging and Criticizing – Paraphrasing and Plagiarism – Sections of a Paper – Abstracts.

UNIT III **LITERATURE SURVEY**

Review of the Literature – Methods – Results – Discussion – Conclusions –Final Check.

UNIT IV **ABSTRACT AND LITERATURE REVIEW**

Key skills are needed when writing a Title – Key skills are needed when writing an Abstract – Key skills are needed when writing an Introduction – Skills needed when writing a Review of the Literature.

UNIT V **RESULTS AND CONCLUSIONS**

Skills are needed when writing the Methods – Skills needed when writing the Results – Skills are needed when writing the Discussion – Skills are needed when writing the Conclusions.

TOTAL:25

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Adrian Wallwork	English for Writing Research Papers	Springer New York Dordrecht Heidelberg London	2016
2.	Day R	How to Write and Publish a Scientific Paper	Cambridge University Press	2011
3.	Highman N	Handbook of Writing for the Mathematical Sciences", SIAM	Highman's book	2011
4.	GoldbortR	Writing for Science	Yale University Press	2006

19MCD08	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

1. To learn the premises informing the twin themes of liberty and freedom from a civil rights perspective.
   To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement
2. to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
   To know the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its
3. impact on the initial drafting of the Indian Constitution

COURSE OUTCOMES

19MCD08.CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
19MCD08.CO2	Describe the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
19MCD08.CO3	Identify the circumstances surrounding the foundation of the congress socialist party [CSP] under the leadership of Jawaharlal Nehru.
19MCD08.CO4	Illustrate the eventual failure of the proposal of direct elections through adult suffrage in the indian constitution.
19MCD08.CO5	Outline the passage of the hindu code bill of 1956

UNIT I **HISTORY AND PHILOSOPHY** 5

History of Making of the Indian Constitution: History – Drafting Committee (Composition andWorking) – Philosophy of the Indian Constitution: Preamble – Salient Features.

UNIT II **CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES** 5

Contours of Constitutional Rights and Duties: Fundamental Rights – Right to Equality – Right to Freedom – Right against Exploitation – Right to Freedom of Religion – Cultural and Educational Rights – Right to Constitutional Remedies – Directive Principles of State Policy – Fundamental Duties.

UNIT III **ORGANS OF GOVERNANCE** 5

Organs of Governance: Parliament – Composition – Qualifications and Disqualifications – Powers and Functions – Executive – President – Governor – Council of Ministers – Judiciary, Appointment and Transfer of Judges, Qualifications – Powers and Functions.

UNIT IV **LOCAL ADMINISTRATION** 5

Local Administration: Districts Administration head: Role and Importance –Municipalities: Introduction – Mayor and role of Elected Representative – CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles – CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments)– Village level: Role of Elected and Appointed officials –Importance of grass root democracy.

UNIT V **ELECTION COMMISSION** 5

Election Commission: Election Commission: Role and Functioning – Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning – Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: L : 25

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REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Bare Act	The Constitution of India	Government Publication	1950
2.	Dr. S. N. Busi, Dr. B. R. Ambedkar	Framing of Indian Constitution	1st Edition	2015
3.	M. P. Jain	Indian Constitution Law	Lexis Nexis, 7th Edition	2014
4.	D.D. Basu	Introduction to the Constitution of India	Lexis Nexis	2015

19MCD09	PEDAGOGY STUDIES	L T P C
		2 0 0 0

COURSE OBJECTIVES
1. Review existing evidence on the review topic to inform programme design
2. Policy making undertaken by the DfID, other agencies and researchers.

COURSE OUTCOMES

19MCD09.CO1	Understand the pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
19MCD09.CO2	Understand the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners.
19MCD09.CO3	Learn about teacher education (curriculum and practicum) and the school curriculum
19MCD09.CO4	Guidance materials best support effective pedagogy
19MCD09.CO5	Identify critical evidence gaps to guide the development

UNIT I **INTRODUCTION AND METHODOLOGY** 5

Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT II **THEMATIC OVERVIEW** 5

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT III **PEDAGOGICAL PRACTICES** 5

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers" attitudes and beliefs and Pedagogic strategies.

UNIT IV **PROFESSIONAL DEVELOPMENT** 5

Alignment with classroom practices and follow- up support, Peer support. Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes

UNIT V **RESEARCH GAPS AND FUTURE DIRECTIONS** 5

Research design, Contexts, Pedagogy, Teacher education Curriculum and assessment Dissemination and research impact.

TOTAL : L : 25

REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ackers J, Hardman F	Classroom interaction in Kenyan primary schools, Compare	-	2016
2.	Agrawal M	Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies	-	2004
3.	Akyeampong K	Teacher training in Ghana - does it count? Multi-site teacher education research project(MUSTER)	International Journal Educational Development	2013
4.	Chavan M	Read India: A mass scale, rapid, learning to read campaign.	Oxford and Boston: Blackwell	2003

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19MCD10	STRESS MANAGEMENT BY YOGA	L T P C
		2 0 0 0

COURSE OBJECTIVES
1. To achieve overall health of body and mind
2. To overcome stress

COURSE OUTCOMES
19MCD10.CO1   Develop healthy mind in a healthy body thus improving social health also
19MCD10.CO2   Improve efficiency

UNIT I   5

Definition of Eight parts of yoga.(Ashtanga)

UNIT II   **THEMATIC OVERVIEW**   10

Yam and Niyam. Do's and Don't's in life-Ahinsa, satya, astheya, bramhacharya and aparigraha - Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT III   **PEDAGOGICAL PRACTICES**   10

Asan and Pranayam-Various yoga poses and their benefits for mind & body -Regularization of breathing techniques and its effects-Types of pranayam

UNIT IV   **PROFESSIONAL DEVELOPMENT**   5

Alignment with classroom practices and follow- up support, Peer support. Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes

UNIT V   **RESEARCH GAPS AND FUTURE DIRECTIONS**   5

Research design, Contexts, Pedagogy, Teacher education Curriculum and assessment Dissemination and research impact.

TOTAL : L : 25

REFERENCE BOOKS

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Janardan Swami Yogabhyasi Manda, Nagpur	Yogic Asanas for Group Tarining-Part-I	-	-
2.	Swami Vivekananda, Advaita Ashrama	Raja yoga or conquering the Internal Nature	Publication department, Kolkatta	-

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