VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai

Approved by AICTE, New Delhi, Accredited by NAAC, NBA Tier –I

Elayampalayam, Tiruchengode – 637 205, Namakkal District, Tamilnadu.

CURRICULUM & SYLLABI

FOR

M.E. COMPUTER SCIENCE AND ENGINEERING

REGULATION 2023

(After 16thBoS)

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN

M.E. COMPUTER SCIENCE AND ENGINEERING

PROGRAMME EDUCTIONAL OBJECTIVES (PEOs):

The objectives of the Post Graduate programme in Computer Science and Engineering (ME-CSE) are to produce engineers who:

1. Become successful computer science professionals in academic, research and industry fronts.
2. Apply computer science knowledge in solving problems involving lifelong and continuous learning through research activities.
3. Practice professional and ethical code of conduct in work place.

PROGRAMME OUTCOMES (POs):

Graduates of Computer Science and Engineering can able to:

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, 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 modelling 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 (PSOs)

Graduates of Computer Science and Engineering can able to

PSO1: Develop computational solution to complex real world problems with modern programming tools

PSO2: Demonstrate basic knowledge of computer applications and apply standard practices in developing feasible solutions for IT enabled services

Mapping of Programme Educational Objectives with Programme Outcomes

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
1	√	√	√		√	√		√	√		√	
2		√		√			√	√	√	√		√
3	√	√	√		√	√	√		√	√	√	

Course with Programme Outcomes

SEM	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
SEM1	Mathematical Foundations of Computer Science	√	√	√		√						√	√
	Advanced Algorithms	√	√	√	√	√		√		√	√	√	
	Machine Learning Techniques	√	√	√		√	√		√	√		√	
	Research Methodology and IPR		√	√	√	√	√	√			√	√	√
	Professional Elective-I												
	Audit Course -I												
	Algorithms and Analysis Laboratory	√	√	√	√	√	√	√	√	√	√	√	
	Machine Learning Laboratory	√	√	√	√	√	√	√	√	√	√	√	
SEM 2	Data Analytics	√	√	√		√		√			√	√	
	Parallel Computing	√	√	√	√	√	√		√	√		√	
	Advanced Networks	√	√			√		√	√			√	
	Professional Elective-II												
	Professional Elective-III												
	Audit Course-II												
	Advanced Networks Laboratory	√	√	√	√	√	√					√	
	Data Analytics Laboratory		√	√	√	√	√		√	√	√	√	
SEM 3	Professional Elective-IV												
	Professional Elective-V												
	Open Elective-I												
	Project Phase-I	√	√	√	√	√	√	√	√	√	√	√	√
SEM 4	Project Phase-II	√	√	√	√	√	√	√	√	√	√	√	√

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	**M.E.**	Programme Code	201	Regulation	**2023**				
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**				

CURRICULUM

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
P23MA101	Mathematical Foundations of Computer Science*	ESC	3	0	0	3	40	60	100
P23CS101	Advanced Algorithms	PCC	3	0	0	3	40	60	100
P23CS102	Machine Learning Techniques	PCC	3	0	0	3	40	60	100
P23CS103	Research Methodology and IPR*	PCC	3	0	0	3	40	60	100
	Professional Elective-I	PEC	3	0	0	3	40	60	100
	Audit Course-I	AC	2	0	0	0	100	-	100
PRACTICAL									
P23CS104	Algorithms and Analysis Laboratory	PCC	0	0	4	2	60	40	100
P23CS105	Machine Learning Laboratory*	PCC	0	0	4	2	60	40	100
					Total	**19**	**420**	**380**	**800**

*Common to M.E. - CSE & M.Tech. - IT

PCC – Professional Core Course, PEC – Professional Elective Course, AC- Audit Course, ESE – Engineering Science Course, CA - Continuous Assessment, ESE - End Semester Examination,

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**M.E.**	Programme Code	201	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
P23CS206	Data Analytics	PCC	3	0	0	3	40	60	100
P23IT207	Parallel Computing*****	PCC	3	0	0	3	40	60	100
P23CS207	Advanced Networks	PCC	3	0	0	3	40	60	100
	Professional Elective - II	PEC	3	0	0	3	40	60	100
	Professional Elective - III	PEC	3	0	0	3	40	60	100
	Audit Course - II	AC	2	0	0	0	100	-	100
PRACTICAL									
P23CS208	Advanced Networks Laboratory	PCC	0	0	4	2	60	40	100
P23CS209	Data Analytics Laboratory	PCC	0	0	4	2	60	40	100
					Total	**19**	**420**	**380**	**800**

PCC – Professional Core Course, PEC – Professional Elective Course, AC-Audit Course, CA - Continuous Assessment, ESE - End Semester Examination

*Common to M.E. - CSE & M.Tech. - IT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**M.E**	Programme Code	201	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
	Professional Elective -IV	PEC	3	0	0	3	40	60	100
	Professional Elective -V	PEC	3	0	0	3	40	60	100
	Open Elective - I	OEC	3	0	0	3	40	60	100
PRACTICAL									
P23CS310	Project Phase - I	EEC	0	0	16	8	60	40	100
					Total	**17**	**180**	**220**	**400**

PEC – Professional Elective Course, OEC- Open Elective Course,

EEC – Employability Enhancement Course, CA - Continuous Assessment,

ESE - End Semester Examination

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Programme	**M.E**	Programme Code	201	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**IV**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
Practical Course									
P23CS411	Project Phase-II	EEC	0	0	32	16	60	40	100
					Total	**16**	**60**	**40**	**100**

Total Credits: 71

Credit distribution

S.No	Category	CREDIT PER SEMESTER				TOTAL CREDITS
		1	2	3	4	
1.	**ESC**	3	-	-	-	**3**
2.	**PCC**	13	13	-	-	**26**
3.	**PEC**	3	6	6	-	**15**
4.	**EEC**	-	-	8	16	**24**
5.	**OEC**	-	-	3	-	**3**
6.	**AC**	-	-	-	-	**-**
TOTAL		**19**	**19**	**17**	**16**	**71**

Professional Electives

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
P23CSE01	Advanced Software Testing*	PEC	3	0	0	3	40	60	100
P23CSE02	Advanced Computer Architecture	PEC	3	0	0	3	40	60	100
P23CSE03	Advanced Database Technology	PEC	3	0	0	3	40	60	100
P23CSE04	Internet of Things	PEC	3	0	0	3	40	60	100
P23CSE05	Advanced Software Engineering	PEC	3	0	0	3	40	60	100
P23CSE06	Big Data Frameworks and Technologies	PEC	3	0	0	3	40	60	100
P23CSE07	Text and Speech Analytics	PEC	3	0	0	3	40	60	100
P23CSE08	Cloud Computing Techniques	PEC	3	0	0	3	40	60	100
P23CSE09	Cloud Security and Analytics	PEC	3	0	0	3	40	60	100
P23ITE09	Computer Vision*	PEC	3	0	0	3	40	60	100
P23CSE10	Cryptocurrency and Blockchain Technologies	PEC	3	0	0	3	40	60	100
P23CSE11	Cyber Security and Cyber Laws	PEC	3	0	0	3	40	60	100
P23CSE12	Software Project Management	PEC	3	0	0	3	40	60	100
P23CSE13	Virtualization Techniques and Applications*	PEC	3	0	0	3	40	60	100
P23CSE14	Soft Computing Techniques	PEC	3	0	0	3	40	60	100
P23CSE15	Digital Image Processing	PEC	3	0	0	3	40	60	100
P23CSE16	Deep Learning Techniques*	PEC	3	0	0	3	40	60	100
P23CSE17	Ethical Hacking and Digital Forensics	PEC	3	0	0	3	40	60	100
P23ITE06	GPU Computing*	PEC	3	0	0	3	40	60	100
P23CSE18	Human and Computer Interaction	PEC	3	0	0	3	40	60	100
P23ITE03	Social Network Analysis*	PEC	3	0	0	3	40	60	100
P23ITE18	Information Retrieval*	PEC	3	0	0	3	40	60	100
P23CSE19	Information Security*	PEC	3	0	0	3	40	60	100
P23CSE20	Information Security and Risk Management	PEC	3	0	0	3	40	60	100
P23CSE21	Information Storage Management	PEC	3	0	0	3	40	60	100
P23CSE22	Intelligent Information Retrieval	PEC	3	0	0	3	40	60	100
P23CSE23	Intelligent Systems	PEC	3	0	0	3	40	60	100
P23CSE24	Mining Massive Datasets*	PEC	3	0	0	3	40	60	100
P23CSE25	Multimedia Systems	PEC	3	0	0	3	40	60	100
P23CSE26	Realtime Operating Systems	PEC	3	0	0	3	40	60	100
P23CSE27	Security Principles and Practices	PEC	3	0	0	3	40	60	100

*Common to M.E. - CSE & M.Tech. - IT

CSE OPEN ELECTIVE OFFERED TO OTHER DEPARTMENT

Course Code	Course name	Category	L	T	P	C	CA	ESE	Total
P23CSOE1	Business Analytics	OEC	3	0	0	3	40	60	100
P23CSOE2	Machine Learning Techniques	OEC	3	0	0	3	40	60	100
P23CSOE3	Web Engineering	OEC	3	0	0	3	40	60	100
P23CSOE4	Cost Management of Engineering Projects	OEC	3	0	0	3	40	60	100
P23CSOE5	Internet of Things	OEC	3	0	0	3	40	60	100
P23CSOE6	Data Science and Analytics	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE – PSE

Course Code	Course name	Category	L	T	P	C	CA	ESE	Total
P23PSOE1	Industrial Safety	OEC	3	0	0	3	40	60	100
P23PSOE2	Energy Storage Technologies	OEC	3	0	0	3	40	60	100
P23PSOE3	Energy Management and Auditing	OEC	3	0	0	3	40	60	100
P23PSOE4	Electrical circuit design for Hazardous in Industries	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE - VLSI

Course Code	Course name	Category	L	T	P	C	CA	ESE	Total
P23VDOE1	Micro sensors and MEMS	OEC	3	0	0	3	40	60	100
P23VDOE2	Basics of VLSI	OEC	3	0	0	3	40	60	100
P23VDOE3	Communication Busses and Interfaces	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE - IT

Course Code	Course name	Category	L	T	P	C	CA	ESE	Total
P23ITOE1	Cloud Computing Principles	OEC	3	0	0	3	40	60	100
P23ITOE2	Research Publication Ethics	OEC	3	0	0	3	40	60	100
P23ITOE3	Game Development	OEC	3	0	0	3	40	60	100
P23ITOE4	IoT for Smart Systems	OEC	3	0	0	3	40	60	100
P23ITOE5	Robotics	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE - BT

Course Code	Course name	Category	L	T	P	C	CA	ESE	Total
P23BTOE1	Bioethics and Biosafety	OEC	3	0	0	3	40	60	100
P23BTOE2	Renewable Energy	OEC	3	0	0	3	40	60	100
P23BTOE3	Waste Management	OEC	3	0	0	3	40	60	100

AUDIT COURSES

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
P23AC001	Research Process and Methodologies	AC	2	0	0	0	100	-	100
P23AC002	Pedagogy Studies	AC	2	0	0	0	100	-	100
P23AC003	Disaster Management	AC	2	0	0	0	100	-	100
P23AC004	Value Education	AC	2	0	0	0	100	-	100
P23AC005	Constitution of India	AC	2	0	0	0	100	-	100
P23AC006	English for Research Paper Writing	AC	2	0	0	0	100	-	100
P23AC007	Personality Development through Life	AC	2	0	0	0	100	-	100
P23AC008	Universal Human Values	AC	2	0	0	0	100	-	100
P23AC009	Online Course	AC	2	0	0	0	100	-	100

Semester - I

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E/M.TECH**	Programme Code			Regulation		**2023**	
Department	**CSE/IT**				Semester		**I**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23MA101	**Mathematical Foundations of Computer Science**	**3**	**0**	**0**	**3**	**40**	**60**	**100**

Course Objective

The main objective of the course is to

- Understand the elementary aspects of probability and appropriate probability distribution.
- Analyze and interpret statistical data using two dimensional random variables.
- Identify and demonstrate suitable sampling and data collection process.
- Understand fundamentals of Graph theory.
- Analyze strategies in decision making.

Course Outcome	At the end of the course, the student should be able to	Knowledge Level
	CO1: Inculcate the habit of statistical thinking.	K3
	CO2: Enable to identify various probability distribution.	K4
	CO3: Apply appropriate modern technology to explore probability/statistical concepts	K3
	CO4: Apply suitable graph model and algorithm for solving applications.	K4
	CO5: To evaluate determining different strategies to get optimum solution.	K5

Pre-requisites

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	3	2	1		1								2	1	
CO 2	3	2		1	1								2	1	
CO 3	3	2	1	1									2	1	
CO 4	3	2	1		1								2	1	
CO 5	3	2	1		1								2	1	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	RANDOM VARIABLES	Periods	9
Random Variables-Probability Function-Moments-Moment Generation Function and their Properties-Binomial-Poisson-Geometric, Uniform, Exponential and Normal Distributions.			
Unit - II	**TWO DIMENSIONAL RANDOM VARIBLE**	Periods	**9**
Joint Distributions-Marginal and Conditional distributions-Functions of two dimensional random variables-Regression curve-Correlation.			
Unit – III	**ESTIMATION THEORY**	Periods	**9**
Sampling distributions, point estimation, unbiasedness, consistency, maximum likelihood estimation, Confidence intervals for parameter in one sample from normal population.			
Unit - IV	**GRAPH THEORY**	Periods	**9**
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.			
Unit – V	**GAME THEORY**	Periods	**9**
Game Theory-Two person Zero sum games-Saddle point, Dominance Rule, Convex Linear Combination (Averages), methods of matrices, graphical method.			
		Total Periods	**45**

Text Books	
1.	Montgomery, D.C. and Runger, C.G., Applied Statistics and Probability for Engineers, 7th Edition, Wiley Students Edition, Wiley, 2020.
2.	Ravichandran, J., Probability and statistics for Engineers, 1st Edition, Wiley India Ltd, 2012.
References	
1.	Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Statistics, 12th Edition, Sultan an Sons, 2020.
2.	Devore, J.L., Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage Learning, 2014.
3.	Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Probability and Statistics for Engineers 9th Edition, Pearson Education, 2016.
4.	Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", Prentice-Hall of India Pvt.Ltd, 2003.
5.	Bondy, J. A. and Murty, U.S.R., "Graph Theory with Applications", North Holland Publication, 2008.
6.	Hamdy A.Taha, Operations Research an Introduction, 10th Edition, Pearson Publications, 2019
E-Resources	
1.	https://www.youtube.com
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**Computer Science and Engineering**			Semester	**I**		
Course code	Course name	Periods per week		Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS101	**Advanced Algorithms**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Learn and use hierarchal data structures and its operations • Learn the usage of graphs and its applications • Design data structures and algorithms that is appropriate for problems	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Design and analyze algorithms using divide and conquer and characterizing running time	K3
	CO2: Perform probabilistic analysis and amortised analysis of algorithms.	K2
	CO3: Solvenetworking problems using minimum spanning trees, shortest path algorithm, and Maximum flow in graphs	K2
	CO4: Solve problems using parallel algorithms and linear programming	K4
	CO5: Apply String matching algorithms, Computational geometry algorithms to Solve the problem.	K5
Pre-requisites	Data Structures	

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak													**CO/PSO Mapping**	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	3		3	2	2							3	2
CO 2	2	3		3	2	2							2	1
CO 3	2	3		3		3							3	2
CO 4	2	3		2		2							1	1
CO 5	2	3		2		2							2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION**	Periods	**9**

Role of Algorithms in Computing–Analyzing algorithms–Designing algorithms– O- notation, Ω-notation, and Θ(Theta)-notation. Asymptotic notation: formal definitions – Standard notations and common functions –Divide and Conquer–Probabilistic analysis –Randomized algorithms.

Unit–II	DESIGN AND ANALYSIS TECHNIQUES	Periods	9
Dynamic programming : Rod cutting, Matrix-chain multiplication, Elements of dynamic programming, Optimal binary search trees–**Greedy Algorithms**: An activity-selection problem, Elements of the greedy strategy, Huffman codes–Amortized Analysis.			
Unit – III	**GRAPH ALGORITHMS**	Periods	**9**
Elementary Graph Algorithms–Minimum Spanning trees: the algorithms of Kruskal and Prim–Single source shortest paths:–All pairs shortest paths: Floyd-Warshall algorithm, Johnson‘s algorithm for sparse graphs–Maximum Flow.			
Unit– IV	**ADVANCED ALGORITHMS I**	Periods	**9**
Parallel Algorithms: The basics of fork-join parallelism, Parallel matrix multiplication – Matrix operations: Solving systems of linear equations, Inverting matrices, Symmetric positive definite matrices and least-squares approximation– Linear programming– Polynomials and FFT.			
Unit-V	**ADVANCED ALGORITHMS II**	Periods	**9**
String matching: Naïve string- matching algorithm, Rabin-Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm – Machine-Learning Algorithms - NP-Completeness–Approximation algorithms.			
		Total Periods	**45**

References

1.	Thomas H. Cormen, Charles E. Leiseron, Ronald L.Rivest, Clifford Stein, ―Introduction to Algorithms‖, 4th Edition, PHI learning Pvt. Ltd., 2022.
2.	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, ―Fundamentals of Computer Algorithms‖, Galgotia Publications Pvt. Ltd., 2008.

E-Resources

1.	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2.	https://www.docsity.com/en/study-notes/computer-science/advanced-algorithms/
3.	https://www.tutorialspoint.com/parallel_algorithm/graph_algorithm.html

VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN
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Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**Computer Science and Engineering**			Semester	**I**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS102	**Machine Learning Techniques**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Know the characteristics of machine learning that make it useful to real-world problems and the basic underlying concepts
- Know Characteristics of supervised machine learning algorithms
- To learn unsupervised algorithms for clustering, Instance-based learning and Principal Component Analysis
- The inference and learning algorithms for the hidden Markov model and Bayesian networks and few machine learning tools
- Various advanced machine learning algorithms in a range of real-world applications.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Understand the basic concepts, fundamental issues and challenges of machine learning algorithms and the paradigms of supervised learning.	K2
CO2: Understand the basic concepts of un-supervised machine learning.	K2
CO3: Design and implement basic machine learning algorithms using tools.	K3
CO4: Understand the basic concepts and architecture of reinforcement learning algorithms	K2
CO5: Design and implement various advanced machine learning algorithms in a range of real world applications.	K3

Pre-requisites: Artificial Intelligence

CO /PO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	2	1		1	2			3	2
CO 2	1	3	3	3	2	2	1		1	2			2	2
CO 3	3	3	2	1	1	3	-		1	2			3	2
CO 4	2	2	3	2	1	2	-		1	2			2	2
CO 5	3	3	2	2	1	2	-		1	2			2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1. Course -end survey

Content of the syllabus			
Unit– I	**INTRODUCTION**	Periods	**9**
Introduction- Well-Posed learning problems, Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning : Classification and Regression Trees, Support vector machines - Model Selection and feature selection – Decision trees- Ensemble methods: Bagging - Boosting - Real-world applications.			
Unit-II	**UNSUPERVISED LEARNING**	Periods	**9**
Unsupervised learning : Clustering, Instance-based learning- K-nearest Neighbor, Locally weighted regression, Radial Basis Function - EM- Mixtures of Gaussians - The Curse of Dimensionality - Dimensionality Reduction - Factor analysis -Principal Component Analysis - Probabilistic PCA-Independent components analysis.			
Unit – III	**PROBABILISTIC GRAPHICAL MODELS**	Periods	**9**
Graphical Models -Undirected graphical models - Markov Random Fields - Directed Graphical Models - Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models – Machine learning tools – R, Scikit Learn, Octave, BigML, WEKA.			
Unit– IV	**REINFORCEMENT LEARNING**	Periods	**9**
Reinforcement Learning – Introduction -Elements of Reinforcement Learning – Learning Task – Q-learning – k-armed Bandit Elements – Model-Based learning – Value Iteration – Policy iteration – Temporal Difference Learning-Exploration Strategies–non-deterministic rewards and actions.			
Unit– V	**ADVANCED MACHINE LEARNING**	Periods	**9**
Introduction to learning theory - Modeling structured outputs: multi-label classification, introduction to Conditional Random Fields (CRFs)- Spectral clustering- Semi-supervised learning – Recommendation systems - Active Learning - Learning from streaming data, online learning - Deep learning.			
		Total Periods	**45**

References	
1.	TomMitchell,―MachineLearning‖,McGraw-Hill,2017
2.	Christopher Bishop, ―Pattern Recognition and Machine Learning‖, Springer, 2006
3.	Kevin P. Murphy, ―Machine Learning: A Probabilistic Perspective‖, MIT Press, 2012
4.	Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Second Edition ,Springer, 2011
5.	Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014
E-Resources	
1.	https://en.wikipedia.org/wiki/Unsupervised_learning
2.	https://blog.statsbot.co/probabilistic-graphical-models-tutorial-and-solutions-e4f1d72af189
3.	https://www.geeksforgeeks.org/what-is-reinforcement-learning/
4.	https://ml2.inf.ethz.ch/courses/aml/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E. & M.Tech.**	Programme code			Regulation	**2023**		
Department	**CSE & IT**				Semester	**I**		
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS103	**Research Methodology and IPR**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the importance of Research • Acquire knowledge in Data Collection • Acquire knowledge in Analysis of Data • Effectively write reports • Gain knowledge about IPR	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: identify the research problem and its types	K2
	CO2: design experiments for different research concepts	K2
	CO3: analyze data collection methods and choose appropriate method for the research problem	K3
	CO4:explore parametric tests of hypotheses and write research proposals and reports	K3
	CO5: apply IPR to the research work	K2
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-		3	2
CO 2	3	3	3	3	-	-	-	-	1	2	-		2	2
CO 3	3	3	2	3	-	-	-	-	1	2	-		3	2
CO 4	3	3	3	2	-	-	-	-	1	2	-		1	1
CO 5	3	3	2	2	-	-	-	-	1	2	-		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**INTRODUCTION TO RESEARCH**	Periods	**9**

Introduction: Meaning of research -Objectives of Research - Types of Research -Research Approaches- Significance of Research - Research Methods versus Methodology -Research and Scientific Method- Research Process-Criteria of Good Research -Problems Encountered by Researchers in India. **Defining the Research Problem**: Research Problem - Selecting the Problem - Necessity of Defining the Problem- Technique Involved in Defining a Problem- An Illustration.

Unit – II	RESEARCH DESIGN AND MEASUREMENT & SCALING	Periods	9
Research Design: Meaning of Research Design-Need for Research Design- Features of a Good Design- Important Concepts Relating to Research Design-Different Research Designs-Basic Principles of Experimental Designs- Important Experimental Designs. **Measurement and Scaling**: Quantitative and Qualitative Data - Classifications of Measurement Scales- Goodness of Measurement Scales- Sources of Error in Measurement- Techniques of Developing Measurement Tools- Scaling- Scale Classification Bases- Scaling Techniques- Multidimensional Scaling- Deciding the Scale.			
Unit – III	**DATA COLLECTION AND DATA PREPARATION**	Periods	**9**
Data Collection: Introduction– Experiments and Surveys - Collection of Primary Data- Collection of Secondary Data- Selection of Appropriate Method for Data Collection. **Data Preparation:** Data Preparation Process - Some Problems in Preparation Process - Missing Values and Outliers - Types of Analysis- Statistics in Research.			
Unit – IV	**TESTING AND REPORT WRITING**	Periods	**9**
Testing of Hypothesis: Hypothesis introduction - Basic Concepts Concerning Testing of Hypothesis - Testing the Hypothesis - Test Statistic and Critical Region- Critical Value and Decision Rule- Procedure for Hypothesis Testing - Hypothesis Testing for Mean, Proportion, Variance, Difference of Two Mean, Difference of Two Proportions, Two Variances - P-Value Approach- Power of the Test- Limitations of the Tests of Hypotheses. **Chi-Square Tests.** **Report Writing:** Meaning of Interpretation- Technique of Interpretation-Precaution in Interpretation- Significance of Report Writing-Different Steps in Writing Report-Layout of the Research Report-Types of Reports-Oral Presentation-Mechanics of Writing a Research Report-Precautions for Writing Research Reports			
Unit – V	**INTELLECTUAL PROPERTY RIGHTS (IPR)**	Periods	**9**
Nature of Intellectual Property: Patents, Designs, Trade and Copyright-IPR History-Patent Law—Trade Secret Law -Geographical Indications.			
		Total Periods	**45**

References

1.	C. R. Kothari, "Research Methodology – Methods and Techniques", 4th Edition, New Age International Publishers, 2020 (Reprint)
2.	Bordens, K. S. and Abbott, B. B., "Research Design and Methods – A Process Approach", 8th Edition, McGraw-Hill, 2011
3.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
4.	Davis, M., Davis K., and Dunagan M., "Scientific Papers and Presentations", 3rd Edition, Elsevier Inc.
5.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age". Aspen Law & Business; 6 edition July 2012

E-Resources

1.	https://www.questionpro.com/blog/research-design/
2.	https://research-methodology.net/research-methods/data-collection/
3.	https://www.wipo.int/edocs/pubdocs/en/intproperty/958/wipo_pub_958_3.pdf

VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**Computer Science and Engineering**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS104	**Algorithms and Analysis Laboratory**	0	0	4	2	60	40	100

Course Objective

The student should be made to,

- Design of algorithms using Divide and Conquer, Dynamic programming approach.
- Design of algorithms using Greedy and Back Tracking Techniques.
- Implement Graph algorithms and Matrix operations.
- Implement String matching algorithms
- Implement computational geometry and approximation algorithms.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Implement an algorithm for sorting of set elements.	K3
	CO2: apply divide and conquer, dynamic programming, greedy algorithms for given real world problem	K2
	CO3: Perform probabilistic analysis and amortized analysis of algorithms.	K2
	CO4: apply minimum spanning trees, shortest path algorithm, and Maximum flow in graphs to solve problems in networking.	K3
	CO5: Apply String matching algorithms, Computational geometry algorithms to solve problem.	K3

Pre-requisites -

CO /PO Mapping
(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	2	3	3	2	-	-	-	1	2	1		2	2
CO 2	3	3	3	3	2	-	-	-	1	2	1		2	2
CO 3	3	2	2	2	1	-	-	-	1	2	1		3	1
CO 4	3	3	2	2	1	-	-	-	1	2	1		1	1
CO 5	3	3	2	2	1	-	-	-	1	2	1		2	2

Course Assessment Methods

Direct

1. Pre lab & Post lab test / Viva
2. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

SUGGESTEDLISTOFEXPERIMENTS	**CO's**

1. Implement an algorithm that combines k sorted lists in time O(n log k) where n is the total number of elements.	CO1
2. Implement an algorithm to solve Matrix Multiplication problem and maximum value contiguous subsequence using dynamic programming approach.	CO2
3. Implement an algorithm based on greedy approach to solve knapsack problem and Activity Selection Problem.	CO2
4. Implement Merge Sort algorithm using Divide and Conquer approach.	CO2
5. Implement stack operations and calculate the amortized cost.	CO3
6. Implement Graph Traversal algorithms.	CO3
7. Implement algorithms to construct Minimum Spanning Trees.	CO4
8. Implement shortest path and Maximum Flow algorithms.	CO4
9. Implement String Matching Algorithms.	CO5
10. Implement Computational Geometry algorithms.	CO5
Total Periods:45	

E-Resources	
1.	http://camelliait.ac.in/Lab%20Manual/ADA%20Lab%20Programs.pdf
2.	https://iare.ac.in/sites/default/files/lab1/II%20YEAR_DAA_LAB_MANUAL.pdf

	VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E.& M.Tech.**	Programme code			Regulation	**2023**		
Department	**CSE& IT**				Semester	**I**		
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS105	**Machine Learning Laboratory**	0	0	4	2	60	40	100

Course Objective	The student should be made to, • Provide students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised. • Learn main models and algorithms for regression, classification, clustering and Markov decision processes. • Know linear and logistic regression, regularization, MLE, probabilistic (Bayesian) inference, • Know SVMs and kernel methods, ANNs, clustering, and dimensionality reduction. • Know the Python programming language and assumes familiarity with linear algebra, probability theory, and programming in Python.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Develop an appreciation for what is involved in learning from data.	K3
	CO2: Understand a wide variety of learning algorithms.	K2
	CO3: Understand how to apply a variety of learning algorithms to data.	K2
	CO4: Understand about Bayesian classifier.	K2
	CO5: Understand how to perform evaluation of learning algorithms and model selection.	K2
Pre-requisites	-	

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak													**CO/PSO Mapping**	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	-	-	-	-	2	1		3	2
CO 2	3	3	3	3	2	-	-	-	-	2	1		1	1
CO 3	3	2	2	3	1	-	-	-	-	2	1		3	1
CO 4	2	1	3	2	1	-	-	-	-	2	1		1	1
CO 5	3	3	2	2	1	-	-	-	-	2	1		2	2

Course Assessment Methods

Direct

1. Pre lab & Post lab test / Viva
2. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS	**CO's**

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.	**CO1**
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.	**CO1**
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.	**CO2**
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.	**CO3**
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.	**CO4**
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.	**CO4**
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.	**CO4**
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.	**CO5**
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.	**CO5**
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.	**CO5**
	Total Periods:45

E-Resources

1.	http://cittumkur.org/ads/csml1819.pdf
2.	https://www.imperial.ac.uk/data-science/research/multidisciplinary-labs/machine-learning-lab/

Semester - II

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**Computer Science Engineering**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS206	**Data Analytics**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the classifications of data
- Learn Bayesian, Support Vector and Kernel Methods
- Study the streams of data.
- Know the concept of Clustering
- Understand the concept of Visualization and R

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Discuss various concepts of data analytics pipeline	K2
	CO2: Apply classification and regression techniques	K3
	CO3: Explain and apply mining techniques on streaming data	K3
	CO4: Compare different clustering and frequent pattern mining algorithms	K4
	CO5: Describe the concept of R programming and implement analytics on Big data using R.	K3

Pre-requisites

CO /PO Mapping
(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	2	3	3	2	2	-	1	1	-	1		3	2
CO 2	3	3	3	3	2	2	-	1	1	-	2		2	2
CO 3	3	3	2	3	1	2	-	1	1	-	1		3	1
CO 4	3	3	3	1	1	2	-	1	1	-	1		2	2
CO 5	3	3	2	2	1	2	-	1	1	-	2		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**Introduction to Data Analytics**	Periods	**9**

Sources and nature of data, classification of data(structured, semi-structured, unstructured), characteristics of data, introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics**.** **Data Analytics Lifecycle:** Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization.

Unit–II	Data Analysis	Periods	9
Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, neural networks: learning and generalization, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search Methods.			
Unit – III	**Mining Data Streams**	Periods	**9**
Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP) applications, Case studies – real time sentiment analysis, stock market predictions.			
Unit– IV	**Frequent Itemsets and Clustering**	Periods	**9**
Mining frequent itemsets, market based modelling, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE and ProCLUS, frequent pattern based clustering methods, clustering in non-euclidean space, clustering for streams and parallelism.			
Unit-V	**Frameworks, Visualization & Introduction to R**	Periods	**9**
MapReduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems, Visualization: visual data analysis techniques, interaction techniques, systems and applications. **Introduction to R** - R graphical user interfaces, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, visualization before analysis, analytics for unstructured data.			
		Total Periods	**45**

References

1.	Bharti Motwani, Data Analytics With R, Wiley (2019), ISBN: 9788126576463
2.	Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2nd edition 2006
3.	Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2nd Edition, 2014
4.	John Garrett,Data Analytics for IT Networks : Developing Innovative Use Cases, Pearson Education, 1st Edition, 2019.

E-Resources

1.	https://careerfoundry.com/en/blog/data-analytics/what-is-data-analytics/
2.	https://www.edureka.co/blog/what-is-data-analytics/
3.	https://bookdown.org/mikemahoney218/LectureBook/introduction-to-r-and-data-visualization.html
4.	https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/
5.	https://hevodata.com/learn/data-streams-in-data-mining/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E. / M.Tech.**	Programme Code			Regulation	**2023**		
Department	**CSE & IT**				Semester	**II**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23IT207	**Parallel Computing**	3	0	0	3	40	60	100

Course Objective	**The Main Objective of the course is to,** • Study the scalability and clustering issues and the technology necessary for them. • Understand the technologies enabling parallel computing. • Study the different types of interconnection networks. • Study the different parallel programming models.	
Course Outcome	**At the end of the course, the student should be able to,**	**Knowledge level**
	CO1: Understand about parallel programming, process, threads and issues.	K2
	CO2: Analyze the performance and benchmarks of parallel computing.	K3
	CO3: Understand the technologies enabling parallel computing.	K2
	CO4: Illustrate different types of interconnection networks.	K2
	CO5: Analyze various parallel programming platforms.	K3
Pre requisites	-	

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	2	2											2	2
CO 2	3	2	1	1									2	1
CO 3	2	2											1	1
CO 4	2	2											2	2
CO 5	3	2	1	1									1	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**Introduction to Parallel Programming**	Periods	**9**

Evolution of Computer Architecture –System Architectures - Dimensions of Scalability – Parallel Computer Models: Semantic Attributes- Performance Attributes – Basic Concepts of Clustering – Scalable Design Principles Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues.

Unit - II	Performance Metrics and Benchmarks of Parallelism	Periods	9
Performance of Parallel Computing- Parallelism Overhead – Process Management- Grouping Operations – Process Inquiry Operations – Interaction Overhead – Synchronization – Communication – Aggregation – Broadcast, Scatter, gather, Total Exchange – Performance Metrics – Scalability and Speed up Analysis.			
Unit – III	**Enabling Technologies**	Periods	**9**
Microprocessor Architecture Families – Memory Hierarchy – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.			
Unit – IV	**System Interconnections**	Periods	**9**
Basics of Interconnection Networks – Network Component, characteristics, Properties - Network Topologies – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.			
Unit – V	**Parallel Programming Platforms**	Periods	**9**
Implicit Parallelism: Trends in Microprocessor Architectures - Limitations of Memory System Performance Dichotomy of Parallel Computing Platforms - Physical Organization of Parallel Platforms - Communication Costs in Parallel Machines - Routing Mechanisms for Interconnection Networks.			
		Total Periods	**45**

Text Books:	
1.	Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003.
2.	A Grama, A Gupta, G Karypis, and V Kumar, Introduction to Parallel Computing. 2nd Ed., Addison-Wesley, 2003.
REFERENCE BOOKS	
1.	David E. Culler & Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/Software Approach", Morgan Kaufman Publishers, 1999.
2.	Michael J. Quinn, "Parallel Programming in C with MPI & OpenMP", Tata McGraw-Hill, New Delhi, 2003.
E-Resources	
1.	https://www.slideshare.net/AkhilaPrabhakaran/introduction-to-parallel-computing-86473048
2.	https://www.geeksforgeeks.org/introduction-to-parallel-computing/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS207	**Advanced Networks**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand technological networks • Understand fundamentals of network theory • Understand computer algorithms for Networks • Understand models of network information • Understand processes on networks	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain the technological networks such as Internet, Distribution, Social and Biological networks	K2
	CO2: Represent the networks using appropriate data structure	K2
	CO3: Write algorithms for degree, degree distribution and graph partitioning	K2
	CO4: Identify suitable model for network information	K2
	CO5: Write algorithms for percolation and network resilience	K3
Pre-requisites	Computer Networks	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**		
COs	Programme Outcomes (POs)											PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PSO1**	**PSO2**	
CO 1	3	3	3	3	2	2	-	-	1	2	1	3	2	
CO 2	3	3	3	3	2	1	-	-	1	2	1	2	1	
CO 3	3	2	2	3	1	2	-	-	1	2	1	3	2	
CO 4	2	1	3	2	1	1	-	-	1	2	1	1	1	
CO 5	3	3	2	3	1	2	-	-	1	2	1	2	2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**THE EMPIRICAL STUDY OF NETWORKS**	Periods	**9**

Introduction - Technological Networks: The Internet, The telephone Network, Power Grids, Transportation Networks, Delivery and distribution networks – Social Networks – Networks of Information – Biological Networks- Mathematics of Networks – Networks and their representation – Measures and metrics.

Unit – II	FUNDAMENTALS OF NETWORK THEORY	Periods	9
The large scale structure of the networks: Components, shortest path and small world effect, degree distribution, Power laws and scale free networks, distributions of other centrality measures, Clustering coefficients, Assortative mixing.			
Unit – III	**COMPUTER ALGORITHMS**	Periods	**9**
Basic concepts of algorithms - Running time and computational complexity, Storing network data, adjacency matrix and list, trees, heaps – Fundamental network algorithms – Matrix algorithms and graph partitioning.			
Unit – IV	**NETWORK MODELS**	Periods	**9**
Random graphs – Random graphs with general degree distributions – Models of network formation – Other network models – small world model, exponent random graphs.			
Unit - V	**PROCESSES ON NETWORKS**	Periods	**9**
Ne Percolation and network resilience –Percolation, Uniform random removal of vertices, non-uniform removal of vertices, percolation in real world networks, computer algorithms for percolation – Epidemics on networks – dynamical systems on networks – network search.			
		Total Periods	**45**

References

1.	Mark Newman, “Networks”, Second Edition, Oxford University Press, 2018.
2.	David Easey, John Kleinberg, “Networks, Crowds and markets: Reasoning about a highly connected world”, Cambridge University Press, 2010.
3.	UlrikBandes, Thomas Erlebach, “Network Analysis: Methodological foundations”, Springer, 2004

E-Resources

1.	https://www.tutorialspoint.com/network_theory/network_theory_quick_guide.htm
2.	https://en.wikipedia.org/wiki/Advanced_Network_and_Services
3.	https://en.wikipedia.org/wiki/Network_model

	VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**			
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CS208	**Advanced Networks Laboratory**	0	0	4	2	60	40	100

Course Objective	The student should be made to, • Optimize statistical analysis • Apply the data preprocessing on raw data • Imparting the architectural concepts of numerical data prediction • Executing the mining algorithms using R, Python etc., • Evaluate the KNN algorithm.	
Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Simulate and analyze simple DHCP for wireless network	K3
	CO2: Configure CISCO router using basic commands	K3
	CO3: Analyze the performance of different routing algorithms	K4
	CO4: Implement FTP Server and NAS using Linux server	K3
	CO5: Simulate and configure Mail server	K3
Pre-requisites	-	

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak												**CO/PSO Mapping**	
COs	Programme Outcomes(POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	2	3	3	3	-	-	-	-	1	2	-		3	2
CO 2	3	3	3	3	-	-	-	-	1	2	-		1	1
CO 3	3	2	2	3	-	-	-	-	1	2	-		3	2
CO 4	3	3	3	2	-	-	-	-	1	2	-		1	1
CO 5	3	2	2	2	-	-	-	-	1	2	-		2	2

Course Assessment Methods

Direct

1. Pre lab & Post lab test / Viva
2. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS	**CO's**

1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands.	**CO2**
2. Configuration of IP addressing for a given scenario for a given set of topologies.	**CO2**
3. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically 28 Signature of serve Windows and Linux OS Binaries based on client MAC address	**CO1**
4. Configure, implement and debug the following: Use open source tools for debugging and diagnostics a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using net stat)	**CO3**
5. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wire shark characterize traffic when the DNS server is up and when it is down.	**CO1**
6. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterize file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.	**CO4**
7. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.	**CO5**
8. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a Linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS).	**CO4**
	Total Periods:45

E-Resources

1.	http://www.rpsinstitutions.org/downloads/lab%20manual/cnlab.pdf
2.	https://www.coursehero.com/file/31213437/11-to-15pdf/

	VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**Computer Science and Engineering**			Semester	**II**		
Course code	Course name	Periods per week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
P23CS209	**Data Analytics Laboratory**	0	0	4	2	60	40	100

Course Objective	**The student should be made to,** • Optimize statistical analysis • Apply the data preprocessing on raw data • Imparting the architectural concepts of numerical data prediction • Executing the mining algorithms using R, Python etc., • Evaluate the KNN algorithm.	
Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Implement numerical and statistical analysis on various data sources	K3
	CO2: Apply data preprocessing and dimensionality reduction methods on raw data	K3
	CO3: Implement linear regression technique on numeric data for prediction	K3
	CO4: Execute clustering and association rule mining algorithms on different datasets	K3
	CO5: Implement and evaluate the performance of KNN algorithm on different datasets	K4
Pre-requisites	-	

CO /PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1 -Weak												**CO/PSO Mapping**	
COs	Programme Outcomes(POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	-	-	-	-	2	1		3	2
CO 2	3	3	3	3	2	-	-	-	-	2	1		1	1
CO 3	3	2	2	3	1	-	-	-	-	2	1		3	1
CO 4	2	1	3	2	1	-	-	-	-	2	1		1	1
CO 5	3	3	2	2	1	-	-	-	-	2	1		2	2

Course Assessment Methods

Direct

1. Pre lab & Post lab test / Viva
2. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS	**CO's**

1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND) using in R	CO1
2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames in R.	CO1
3. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept in R.	CO2
4. To perform statistical operations (Mean, Median, Mode and Standard deviation) using R	CO3
5. To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization	CO4
6. To perform dimensionality reduction operation using PCA for Houses Data Set	CO4
7. To perform Simple Linear Regression with R	CO4
8. To perform K-Means clustering operation and visualize for iris data set	CO5
9. Write R script to diagnose any disease using KNN classification and plot the results.	CO5
10. To perform market basket analysis using Association Rules (Apriori).	CO5
Total Periods:45	

E-Resources

1.	https://drive.google.com/file/d/1eylBQQKeZXxedP2gndT-pkbnAxGbITJM/view
2.	https://www.nitt.edu/home/academics/departments/ca/programmes/M.Tech.%20DA%20Syllabus1.pdf

Professional Electives

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E. /M.Tech.**	Programme code			Regulation		**2023**	
Department	**CSE & IT**				Semester			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE01	**Advanced Software Testing**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Provide an understanding of concepts and techniques for testing software • Provide an understanding of classification and levels of testing software • Prepare test plan based on the requirement document, design test plans and document test plans • Design and validate test cases suitable for a software development in various domains • Use of automation testing tools	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Identify the basics of software testing for software development in any domain.	K1
	CO2: Develop Test cases for a given Software/System Specification	K2
	CO3: Design, develop, implement, validate and document test plans at various levels.	K2
	CO4: Validate Test Cases with the Requirement Specification and components	K3
	CO5: Use various automation tools to implement test cases.	K4
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	2	3	3	2	1	-	-	1	2	1	-	3	3
CO 2	3	3	3	3	2	2	-	-	1	2	1	-	2	2
CO 3	3	2	2	3	1	2	-	-	1	2	1	-	3	2
CO 4	3	3	3	2	1	2	-	-	1	2	1	-	2	1
CO 5	3	3	2	2	1	2	-	-	1	2	1	-	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**FUNDAMENTALS OF TESTING**	Periods	**9**

Objectives of Testing - Basics Definitions - Testing Principles-Illustrations - Fundamental Test Process, The tester‘s role in a software development organization - Test planning - Establishing Test Policy – Structured approach to testing Test Factors - Eleven Step software testing process - Origin of Defects - Defect Repository and Test Design - Developer/Tester support of developing a defect repository - Defect Examples, Case Studies - Identify the defect - Defect Analysis and Prevention Strategies - Developing adhoc test cases for a case study

Unit - II	WHITE BOX TESTING AND BLACK BOX TESTING	Periods	9
White Box Strategies - Peer Reviews - Inspections - Walkthrough - Comparative Analysis - Static Analysis Tools - Paths Code Complexity - Evaluating test adequacy criteria - Black Box Testing Strategies - Requirements Based Testing - Random Testing - Boundary - Value Analysis - Equivalence Class Partitioning - Case Studies for White Box testing and Black Box Testing.			
Unit – III	**LEVEL OF TESTING**	Periods	**9**
The need for levels of testing - Unit Testing: Planning - Test Harness - Running the tests Recording Results - Integration Testing: Goals, Design and Plan - System Testing goals - Types of System Testing: Functional Testing - Performance Testing - Stress Testing - Configuration Testing - Security Testing - Recovery Testing - Reliability Testing - Usability Testing - Regression Testing - Alpha, Beta and Acceptance Testing - Testing Documentation plan - Reporting and Measurement of Success.			
Unit – IV	**TEST MANAGEMENT**	Periods	**9**
Choice of Standards - Infrastructure Management - Test People Management - Test Plan Components Attachments - Locating Test Items - Managing Issues - Addressing Perception - Documentation uses& types - Test Analysis report Documentation - Analyze reports and Problem tracking - Controlling and Monitoring Test Progress, Test Metrics and measurements: Role - need and types - Project Metrics with Practice - Progress Metrics with Practice - Productivity Metrics with Practice.			
Unit – V	**TEST TOOLS AND AUTOMATION**	Periods	**9**
Integration and Information Interchange between Tools – Test Automation Project – Automation Architectures – Creating Keyword Driven Tables – Fault Seeding and Fault Injection Tools – Testing and Monitoring Tools – Tools for Web Testing – Model Based Testing Tools – Support Component Testing and Build Process.			
		Total Periods	**45**

References

1.	Software Testing: A Craftsman's Approach, Fourth Edition Paul C. Jorgensen 2018
2.	Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices‖", Pearson Education, 2006
3.	Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
4.	Ilene Burnstein, "Practical Software Testing‖", Springer International Edition, 2003.
5.	Rocky Nook, "Advanced Software Testing", Vol. 3, 2nd Edition, O'Reilly, 2015.

E-Resources

1.	https://www.softwaretestinghelp.com/web-application-testing/
2.	https://en.wikipedia.org/wiki/Defect_tracking
3.	http://www.testmanagement.com/

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Coursecode	Coursename	Periodsper week			Credit	MaximumMarks		
		L	T	P	C	CA	ESE	Total
P23CSE02	**Advanced Computer Architecture**	3	0	0	3	40	60	100

Course Objective

Thestudentshouldbe made to,

- Be familiar with the concept of Architecture of Computers
- Understand Internal operations of Computers
- Grasp the principles the Pipelining Concepts
- Enable students to understand Multiprocessors and Thread Level Parallelism
- Gain knowledge on Memory Hierarchy

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand about computer performance	K2
	CO2: Know instruction set architecture design and implementation	K2
	CO3: Understand about processor implementation alternatives (single- cycle, multiple-cycle, and pipelined implementations)	K2
	CO4: Implement multiprocessors and thread level parallelism	K3
	CO5: Design memory hierarchy	K4

Pre-requisites **Computer Organization**

CO /POMapping
(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	2	-	1	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	-	1	2	1		2	2
CO 3	3	3	3	3	1	3	-	-	1	2	1		3	2
CO 4	3	3	3	3	1	2	1	-	1	2	1		2	1
CO 5	3	3	3	3	1	2	-	-	1	2	1		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semesterexaminations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**FUNDAMENTALS OF COMPUTER DESIGN**	Periods	**9**

Introduction-Measuring, reporting and summarizing performance-Quantitative principles of computer design Instruction Set Principles-Introduction-Classifying ISA-Types and size of operands-Pipelining-IntroductionHazards-Implementation-Multicycle operations.

Unit–II	INSTRUCTION LEVEL PARALLELISM	Periods	9
Instruction Level Parallelism-Concepts, Challenges-Basic Compiler Techniques for exposing ILP-Reducing branch cost with prediction-Overcoming data hazards with dynamic scheduling-Examples and algorithms Hardware based speculation.			
Unit – III	**INSTRUCTION LEVEL PARALLELISM WITH HARDWARE AND SOFTWARE APPROACHES**	Periods	**9**
Exploiting ILP with multiple Issues and static scheduling, dynamic scheduling-Advanced technique for instruction delivery and speculation-Limitations of ILP-Hardware Vs Software Speculation-Multithreading using ILP-Exploit thread level parallelism.			
Unit– IV	**MULTIPROCESSORS AND THREAD LEVEL PARALLELISM**	Periods	**9**
Introduction-Symmetric Shared Memory- Architecture, Performance-Distributed Shared memory-Directory based coherence-Synchronization-Basic-Models of memory consistency-Sun T1 Multiprocessor.			
Unit-V	**MEMORY HIERARCHY AND STORAGE DEVICES**	Periods	**9**
Introduction-Optimization of cache performance-Memory technology and optimizations-Protection-Virtual Memory and Machine-Storage Systems-Introduction-Advanced topics in disk storage-I/O performance, reliability, measures and benchmarks.			
		Total Periods	**45**

References

1.	John L. Hennessey and David A. Patterson, “Computer Architecture – A quantitative approach”, 6th edition, Morgan Kaufmann / Elsevier, 2019.
2.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, Tenth Edition, Pearson Education, 2016.
3.	David E. Culler, Jaswinder Pal Singh, “Parallel Computing Architecture: A hardware/ software approach, Morgan Kaufmann / Elsevier, 2003.

E-Resources

1.	https://en.wikipedia.org/wiki/Instruction-level_parallelism
2.	https://www.docsity.com/en/multiprocessors-thread-level-parallelism-advanced-computer-architecture-lecture-slides/281249/
3.	http://www.csit-sun.pub.ro/courses/cn2/Carte_H&P/H%20and%20P/chapter_6.pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E.**	Programme code	**201**		Regulation			**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE03	**Advanced Database Technology**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the basic concepts of database like parallel and distributed database. • Learn the basics of object-oriented database. • Learn and design the semantic based databases. • Be exposed to intelligent databases. • Gain knowledge about data using XML database.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Select the appropriate high-performance database like parallel and distributed database	K3
	CO2: model and represent the real-world data using object-oriented database	K3
	CO3: design a semantic based database to meaningful data access	K3
	CO4: embed the rule set in the database to implement intelligent databases	K3
	CO5: represent the data using XML database for better interoperability	K3
Pre-requisites	Database Management Systems	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
COs		Programme Outcomes (POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3		3									3	2
CO 2	3	2		3									3	2
CO 3	3	2		3									3	2
CO 4	3	1		3									3	2
CO 5	3	1		2									3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**PARALLEL AND DISTRIBUTED DATABASES**	Periods	**9**

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

Unit – II	OBJECT ORIENTED DATABASES	Periods	9
Object Oriented Databases - Introduction - Weakness of RDBMS - Object Oriented Concepts - Storing Objects in Relational Databases - Next Generation - Database Systems - Object Oriented Data models - OODBMS Perspectives - Persistence - Issues in OODBMS - Object Oriented Database Management System Manifesto - Advantages and Disadvantages of OODBMS - Object Oriented Database Design - OODBMS Standards and Systems - Object Management Group - Object Database Standard ODMG - Object Relational DBMS – Postgres - Comparison of ORDBMS and OODBMS.			
Unit – III	**INTELLIGENT DATABASES**	Periods	**9**
Active Databases: Syntax and Semantics (Starburst, Oracle, DB2) – Taxonomy – Applications - Design Principles for Active Rules - Temporal Databases: Overview of Temporal Databases - TSQL2 - Deductive Databases: Logic of Query Languages - Datalog - Recursive Rules - Syntax and Semantics of Datalog Languages - Implementation of Rules and Recursion - Recursive Queries in SQL - Spatial Databases - Spatial Data Types - Spatial Relationships - Spatial Data Structures - Spatial Access Methods - Spatial DB Implementation.			
Unit – IV	**ADVANCED DATA MODELS**	Periods	**9**
Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management -Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols - Multimedia Databases - Information Retrieval - Data Warehousing - Data Mining - Text Mining.			
Unit – V	**EMERGING TECHNOLOGIES**	Periods	**9**
XML Databases: XML Data Model - DTD - XML Schema - XML Querying - Web Databases - Geographic Information Systems - Biological Data Management - Cloud Based Databases: Data Storage Systems on the Cloud - Cloud Storage Architectures - Cloud Data Models - Query Languages - Introduction to Big Data - Storage - Analysis			
		Total Periods	**45**

References

1.	Henry F. Korth, Abraham Silberschatz S., Sudharshan, "Database System Concepts", 5th Edition, McGraw Hill, 2011
2.	Elmasri R., Navathe S.B., "Fundamentals of Database Systems", 5th Edition, Pearson Education/Addison Wesley, 2010
3.	Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", 3rd Edition, Pearson Education, 2007

E-Resources

1.	https://www.geeksforgeeks.org/design-of-parallel-databases-dbms/
2.	https://www.quackit.com/database/tutorial/
3.	https://catdir.loc.gov/catdir/toc/ecip059/2005006392.html

	VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E.**	Programme code	**101**	Regulation	**2023**			
Department	**Computer Science and Engineering**			Semester				
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE04	**Internet of Things**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Learn about introduction to internet technology and need for IoT.
- Learn about the basics of IOT protocols.
- Apply the concept of Internet of Things in the real world scenario.
- Focuses on interoperability in IoT along with various IoT Platforms for application development and Build a small low cost embedded system
- Know the applications of IoT

Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Grasp the basic concepts, physical and logical design of IoT systems	K2
	CO2: Analyze the IoT reference models, domain models, and information models.	K3
	CO3: Assess the standardization efforts and specific protocols used in IoT	K3
	CO4: Design a portable IoT using Arduino and Raspberry Pi.	K3
	CO5: Analyze applications of IoT in real time scenario.	K4

Pre-requisites

CO /PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO / PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	2	-	-	-	2	1	3	3	2
CO 2	2	3	3	3	2	2	-	-	1	2	1	3	1	2
CO 3	3	3	2	3	1	3	-	-	-	2	1	3	3	3
CO 4	3	3	3	2	1	2	-	-	1	2	1	3	1	1
CO 5	3	3	2	2	1	2	-	-	1	2	1	3	2	2

Course Assessment Methods Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION TO IoT**	Periods	**9**

Introduction to Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M-IoT platform Design Methodology-An Emerging industrial structure for IoT-Trends in Information and Communication Technologies.

Unit–II	IoT ARCHITECTURE	Periods	9
M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture			
Unit – III	**IoT PROTOCOLS**	Periods	**9**
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security.			
Unit– IV	**INTEROPERABILITY IN IoT**	Periods	**9**
Arduino: Introduction to Arduino Programming - Integration of Sensors and Actuators with Arduino - Introduction to Python programming. **Raspberry Pi:** Introduction to Raspberry Pi - Implementation of IoT with Raspberry Pi. Build use cases using Raspberry Pi			
Unit-V	**IoT APPLICATIONS**	Periods	**9**
Real world design constraints - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT. **Case studies:** IoT for smart cities, health care, agriculture, smart meters, Web of things, Cellular IoT, Industrial IoT, Industry 4.0			
		TotalPeriods	**45**

References

1.	Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2015.
2.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things‖, Springer, 2011.
3.	Honbo Zhou, ―The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012.
4.	Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Aves and. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5.	Olivier Hersent, David Boswarthick, Omar Elloumi, ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012.
6.	Daniel Minoli - Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M- Wiley 2013 Communications

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1.	https://medium.com/datadriveninvestor/4-stages-of-iot-architecture-explained-in-simple-wordsb2ea8b4f777f
2.	https://www.researchgate.net/publication/330513589_Internet_of_Things_IOT_Using_Raspberry_Pi
3.	https://www.analyticsvidhya.com/blog/2016/08/10-youtube-videos-explaining-the-real-worldapplications-of-internet-of-things-iot/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation		**2023**	
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester			
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE05	**Advanced Software Engineering**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • understand the rationale for Software Engineering Lifecycle Models • Gain knowledge about the need for software Requirement • Need why the architectural design of software is important; • Learn different stages of testing during development of a software system • Familiar with the rationale for Agile Methodology	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the advantages of various Software Development Lifecycle Models	K2
	CO2: Gain knowledge software Requirement	K2
	CO3 : Know various approaches of architectural design in software	K3
	CO3: Perform formal testing based on specifications and knowledge of SCM	K2
	CO4: Familiar with the rationale for Agile Methodology	K2
Pre-requisites	Software Engineering	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	2	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	2	1	2	1		2	2
CO 3	3	3	2	3	1	3	-	3	1	2	1		3	2
CO 4	3	3	3	2	1	2	-	2	1	2	1		1	1
CO 5	3	3	2	2	1	2	-	2	2	2	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	INTRODUCTION	Periods	9
Software engineering concepts – Development activities – Software lifecycle models - Classical waterfall - Iterative waterfall – Prototyping – Evolutionary - Spiral – Software project management – Project planning – Estimation – Scheduling – Risk management			
Unit - II	**SOFTWARE REQUIREMENT SPECIFICATION**	Periods	**9**
Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram.			
Unit - III	**SOFTWARE DESIGN**	Periods	**9**
Design Concepts – Design Model – Software Architecture – Architectural Styles – Architectural Design – Component-Level Design – User Experience Design – Design for Mobility – Pattern- Based Design..			
Unit - IV	**SOFTWARE TESTING AND SOFTWARE CONFIGURATION MANAGEMENT**	Periods	**9**
Software Testing Strategy – Unit Testing – Integration Testing – Validation Testing – System Testing – Debugging – White-Box Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing – Software Configuration Management (SCM) – SCM Repository – SCM Process – Configuration Management for Web and Mobile Apps.			
Unit - V	**AGILE METHODOLOGY & PROCESSES**	Periods	**9**
Agile software development – Traditional model vs. Agile model -classification of agile methods – Agile manifesto and principles – Agile project management – Agile team interactions – Ethics in agile teams -. Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, and Extreme Programming			
		Total Periods	**45**

References

1.	Software Engineering: A Practitioner's Approach, 9th Edition. Roger Pressman and Bruce Maxim, McGraw-Hill 2019.
2.	Software Engineering, 10th Edition, Ian Somerville, Pearson Education Asia 2016
3.	Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd edition, Pearso Education, 2004.
4.	Len Bass, Ingo Weber and Liming Zhu, ―DevOps: A Software Architect‘s Perspective‖, Pearson Education, 2016
5.	Dingsoyr, Torgeir, Dyba, Tore, Moe, Nils Brede (Eds.), ―Agile Software Development, Current Research and Future Directions‖, Springer-Verlag Berlin Heidelberg, 2010

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2.	https://www.geeksforgeeks.org/software-engineering-architectural-design/
3.	https://en.wikipedia.org/wiki/DevOps

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

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Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**		Semester		

Course Code	**Course Name**	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE06	**Big Data Frameworks and Technologies**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Analyze the need of Big Data, challenges and different analytical architectures
- Installation and understanding of Hadoop Architecture and its ecosystems
- Accessing, storing and manipulating the huge data from different resources.
- Demonstrate the working environment of Pig and Hive for processing the structured and unstructured data.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Describe the characteristics of big data and use it for identifying the types of digital data	K3
	CO2: Implement Map Reduce programs in Hadoop framework	K3
	CO3: Understand and work on Hadoop Ecosystem.	K3
	CO4: Determine the need for stream processing and use of Spark	K3
	CO5: Demonstrate spark programming with different programming languages.	K4

Pre-requisites: Database Management Systems

CO / PO Mapping
(3/2/1indicates strength of correlation)3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO1**	**PSO2**
CO 1	2		2										3	2
CO 2	3		2		3								3	2
CO 3	3		1		3								3	2
CO 4	2		2		2								3	1
CO 5	1		3										3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit –I	INTRODUCTION TO BIG DATA	Periods	9
Data Storage and Analysis - Characteristics of Big Data – Big Data Analytics - Typical Analytical Architecture – Requirement for new analytical architecture – Challenges in Big Data Analytics – Need of big data framework			
Unit–II	**HADOOP FRAMEWORK**	Periods	**9**
Hadoop – Requirement of Hadoop Framework - Design principle of Hadoop –Comparison with other system - Hadoop Components – Hadoop 1 vs Hadoop 2 – Hadoop Daemon's – HDFS Commands – Map Reduce Programming: I/O formats, Map side join, Reduce Side Join, Secondary sorting, Pipelining MapReduce jobs			
Unit – III	**HADOOP ECOSYSTEM**	Periods	**9**
Introduction to Hadoop ecosystem technologies: Serialization: AVRO, Co-ordination: Zookeeper, Databases: HBase, Hive, Scripting language: Pig, Streaming: Flink, Storm			
Unit– IV	**SPARK FRAMEWORK**	Periods	**9**
Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features.			
Unit-V	**DATA ANALYSIS WITH SPARK SHELL AND SPARK STREAMING**	Periods	**9**
Writing Spark Application - Spark Programming in Scala, Python, R, Java - Application Execution. Overview – Errors and Recovery – Streaming Source – Streaming live data with spark			
		Total Periods	**45**

References

1.	Mike Frampton, "Mastering Apache Spark", Packt Publishing, 2015.
2.	TomWhite,"Hadoop:TheDefinitiveGuide",O'Reilly,4th Edition, 2015

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1.	https://techreviewer.co/blog/the-most-popular-big-data-frameworks
2.	https://www.interviewbit.com/blog/apache-spark-architecture
3.	https://www.geeksforgeeks.org/hadoop-ecosystem/

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE07	**Text and Speech Analytics**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the mathematical foundations needed for speech processing.
- Understand the basic concepts and algorithms of speech processing and synthesis.
- Familiarize the students with the various speech signal representation, coding and recognition techniques.
- Appreciate the use of speech processing in current technologies and to expose the students to real world applications of speech processing.

Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1:Identify the appropriate approach of speech synthesis depending on the language to be processed	K2
	CO2: Determine the various encoding techniques for representing speech.	K3
	CO3:Identify the various temporal, spectral and cepstral features required for identifying speech units–phone me, syllable and word	K3
	CO4:Determine and apply Mel- frequency cepstral coefficients for processing all types of signals	K3
	CO5:Justify the use of formant and concatenative approaches to speech synthesis	K3

Pre-Requisites -

CO /PO Mapping
(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	2	2	2	2		2		3	2	2		3	2
CO 2	3	3	3				2		2	2	1		2	3
CO 3	3	3	3				3		2	3			3	2
CO 4	3	2	3	2	2	2			2	3	2		2	3
CO 5	2	3	3			2							2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	TEXTANALYSIS	Periods	9
Lexicon – Document Structure Detection – Text Normalization – Linguistic Analysis–Homograph Disambiguation –Morphological Analysis–Letter-to-sound Conversion–Prosody– Generation schematic – Speaking Style–Symbolic Prosody–Duration Assignment–Pitch Generation.			
Unit–II	**TEXT TO SPEECH SYNTHESIS**	Periods	**9**
Attributes – Formant Speech Synthesis – Concatenative Speech Synthesis –Prosodic Modification of Speech–Source- filter Models for Prosody Modification – Feature space for speaker recognition-similarity measures-Evaluation of TTS Systems, Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness-role of prosody			
Unit – III	**FUNDAMENTALS OF SPEECH PROCESSING**	Periods	**9**
Introduction–Spoken Language Structure–Phonetics and Phonology–Syllables and Words – Syntax and Semantics – Probability, Statistics and Information Theory – Probability Theory – Estimation Theory – Significance Testing–Information Theory.			
Unit– IV	**SPEECH SIGNAL REPRESENTATIONS AND CODING**	Periods	**9**
Overview of Digital Signal Processing – Speech Signal Representations–Short time Fourier Analysis–Acoustic Model of Speech Production–Linear Predictive Coding– Cepstral Processing – Formant Frequencies–The Role of Pitch–Speech Coding–LPC Coder.			
Unit-V	**SPEECH RECOGNITION**	Periods	**9**
Hidden Markov Models – Definition–Continuous and Discontinuous HMMs–Practical Issues – Limitations. Acoustic Modeling – Variability in the Speech Signal – Extracting Features – Phonetic Modeling – Adaptive Techniques –Confidence Measures–Other Techniques.			
		Total Periods	**45**

References

1.	Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Prentice Hall Signal Processing Series, 1993.
2.	Joseph Mariani, “Language and Speech Processing”, Wiley, 2009.
3.	Sadaoki Furui, “Digital Speech Processing: Synthesis, and Recognition”, Second Edition, (Signal Processing and Communications), Marcel Dekker, 2000.
4.	Thomas F.Quatieri, “Discrete-Time Speech Signal Processing”, PearsonEducation,2002
5.	Xuedong Huang, Alex Acero, Hsiao-Wuen Hon, “Spoken Language Processing – A guide to Theory, Algorithm and System Development”, Prentice Hall PTR, 2001.

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2.	https://www.sciencedirect.com/topics/neuroscience/speech-processing
3.	https://nptel.ac.in/courses/117105145/
4.	https://www.cse.iitb.ac.in/~pjyothi/cs753/index.html
5.	https://www.phon.ucl.ac.uk/resource/educational.php
6.	https://link.springer.com/chapter/10.1007/978-3-540-49127-9_1

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

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Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE08	**Cloud Computing Techniques**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the concept of cloud and utility computing.
- Understand the various issues in cloud computing.
- Familiarize with the state of the art in cloud.
- Appreciate the emergence of cloud as the next generation computing paradigm.
- Describe the cloud security

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Articulate the main concepts, key technologies	K3
	CO2: Describe the Virtualization concepts in cloud	K3
	CO3: Identify the architecture, infrastructure	K3
	CO4: Familiarize the Parallel and Distributed Programming Paradigms	K3
	CO5: Address the core issues of cloud computing such as security and interoperability	K3

Pre-requisites: Distributed computing

CO /POMapping
(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO 1**	**PSO2**
CO 1	2	2	3		2			2			1		2	3
CO 2	3	3	3		2			2			3		2	3
CO 3	2	3	3		3			2			3		1	3
CO 4	3	3	3		2			2			3		2	3
CO 5	3	3	3		2			3			3		2	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION**	Periods	**9**

Evolution of Cloud Computing –System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture -IaaS – On-demand Provisioning – Elasticity in Cloud – E.g. of IaaS Providers - PaaS – E.g. of PaaS Providers - SaaS – E.g. of SaaS Providers – Public, Private and Hybrid Clouds.

Unit–II	VIRTUALIZATION	Periods	9
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Desktop Virtualization – Server Virtualization			
Unit – III	**CLOUD INFRASTRUCTURE**	Periods	**9**
Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.			
Unit– IV	**PROGRAMMING MODEL**	Periods	**9**
Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack.			
Unit-V	**SECURITY IN THE CLOUD**	Periods	**9**
Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security.			
		Total Periods	**45**

References

1.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2.	John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
4	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2009.
5	James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
6	Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer, 2010

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2.	https://en.wikipedia.org/wiki/Cloud_computing_security
3.	https://www.tutorialspoint.com/cloud_computing/cloud_computing_infrastructure.htm

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Coursename	Periodsper week			Credit	MaximumMarks		
		L	T	P	C	CA	ESE	Total
P23CSE09	**Cloud Security and Analytics**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Compare modern security concepts as they are applied to cloud computing • Evaluate the security issues related to multi-tenancy • Understand how cloud computing changes the traditional enterprise security	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Assess the security of virtual systems	K3
	CO2: Explain the Virtualization-Based Security Enhancement	K3
	CO3: Analyze Legal and Compliance Issues	K3
	CO4: Discuss the IoT and Cloud analytics	K4
	CO5: Illustrate how to perform security analytics in cloud platform.	K5
Pre-requisites	Cloud Computing	

CO /POMapping
(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	3	3		3			2			3		2	2
CO 2	2	2	3		3			2			3		2	2
CO 3	2	2	3		3			2			3		2	2
CO 4	2	2	3		3			2			3		2	2
CO 5	2	2	3		3			2			3		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**Multi-Tenancy Issues**	Periods	**9**

Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues- e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery; Virtualization System Vulnerabilities- Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

Unit–II	Security Enhancement	Periods	9
Technologies For Virtualization-Based Security Enhancement: IBM security virtual server protection, virtualization-based sandboxing; Storage SecurityHIDPS, log management, Data Loss Prevention. Location of the Perimeter**.Virtualization System-Specific Attacks:**Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyper jacking.			
Unit – III	**Legal and Compliance Issues**	Periods	**9**
Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer.			
Unit– IV	**IoT and CLOUD analytics**	Periods	**9**
IoT Cloud Platforms –Microsoft Azure IoT-Amazon Web Services IoT-IBM WATSON IoT-Google's cloud IoT. IoT analytics for the cloud- Designing data processing for analytics- Designing visual analysis for IoT data. Techniques to understand data quality, Basic time series analysis, Statistical analysis.			
Unit-V	**Security Analytics**	Periods	**9**
Techniques in Analytics - Challenges in Intrusion Detection System and Incident Identification DDoS attacks Analytics - Analysis of Log file - Simulation and Security Process. Access Analytics - Security Analysis with Text Mining Security Intelligence and Breaches			
		Total Periods	**45**

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1.	Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance" O'Reilly Media; 1 edition [ISBN: 0596802765], 2009.
2.	ArshdeepBahga and Vijay Madisetti, "Internet of Things – A Hands on Approach", Universities Press, 2015.
3	Ianlim, E.Coleen Coolidge, Paul Hourani, Securing Cloud and Mobility: A Practitioners Guide, Auerbach Publications, Feb 2013. Pethuru Raj, Cloud Enterprise Architecture, CRC Press, 2013
4	Ronald L. Krutz, Russell Dean Vines, "Cloud Security" [ISBN: 0470589876], 2010.
5	Kevin, Townsend, Carles, Cufí, Akiba and Robert Davidson, "Getting Started with Bluetooth Low Energy" O'Reilly.
6	Curtis Franklin, Jr. ,Brian J. S. Chee, "Securing the Cloud: Security Strategies for the Ubiquitous Data Center", CRC Press, 2019.

E-Resources

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2.	https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/whitepaper/techpaper/vmw-white-paper-secrty-vsphr-hyprvsr-uslet-101.pdf
3.	Survey of intrusion detection systems: techniques, datasets and challenges | Cybersecurity | Full Text (springeropen.com)

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Programme	**M.E. / M.Tech.**	Programme code		Regulation	**2023**				
Department	**CSE & IT**		Semester						
Course Code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
P23ITE09	**Computer Vision**	3	0	0	3	40	60	100	

Course Objective	The Main Objective of the course is to • To review image processing techniques for computer vision. • To understand shape and region analysis. • To understand Hough Transform and its applications to detect lines, circles, ellipses. • To understand three-dimensional image analysis techniques. • To understand motion analysis.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Implement fundamental image processing techniques required for computer vision	K2
	CO2: Perform shape analysis and Implement boundary tracking techniques	K2
	CO3: Apply Hough Transform for line, circle, and ellipse detections.	K3
	CO4: Apply 3D vision techniques.	K3
	CO5: Develop applications using computer vision techniques.	K3
Pre-requisites	Programming Knowledge	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	3										2	2
CO 2	2	2	2										2	2
CO 3	3	2	2										2	2
CO 4	3	2	2										2	2
CO 5	3	2	2										2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

UNIT I	**IMAGE PROCESSING FOUNDATIONS**	Periods	**9**

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

Unit – II	SHAPES AND REGIONS	Periods	9
Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – boundary tracking procedures – shape models and shape recognition– handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments			
Unit – III	**HOUGH TRANSFORM**	Periods	**9**
Line detection – Hough Transform (HT) for line detection – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform			
Unit – IV	**3D VISION AND MOTION**	Periods	**9**
Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – translational alignment – parametric motion – spline-based motion – optical flow.			
Unit – V	**APPLICATIONS**	Periods	**9**
Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.			
Total Periods			**45**

Text Books:

1.	"Computer Vision: Algorithms and Applications", Richard Szeliski, Second Edition, 2021
2.	D. L. Baggio et al., Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.

References:

1	E. R. Davies, Computer & Machine Vision‖, Fourth Edition, Academic Press,2012.
2	Jan Erik Solem, Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.

E-Resources:

1.	https://www.slideshare.net/mohamedrajah/computer-vision-11687562
2.	https://slideplayer.com/slide/6218949/

	VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTERSCIENCEANDENGINEERING**			Semester			

CourseCode	Coursename	Periodsper week			Credit	MaximumMarks		
		L	T	P	C	CA	ESE	Total
P23CSE10	**Cryptocurrency and Blockchain Technologies**	3	0	0	3	40	60	100

Course Objective

The studentshouldbemade to,

- Understandtheconceptsof Crypto currency and block chain
- UnderstandDigital signature and crypto scams
- Study and understand Bitcoin transaction working and Bitcoin ecosystem
- Learn and understand Ethereum and blocks in block chain.
- Understand concept of Hyperledger architecture and Hyperledger Fabric Blockchain network

Course Outcome	Attheendofthecourse,thestudentshouldbeableto,	**KL**
	CO1: Discover the secure and efficient transactions with crypto-currencies.	K4
	CO2: Experiment with cryptocurrency trading and crypto exchanges.	K3
	CO3: Examine bitcoin transaction and application of bitcoin ecosystem	K4
	CO4: Develop private blockchain environment and develop a smart contract on Ethereum.	K3
	CO5: Construct the hyperledger architecture and the consensus mechanism applied in the hyperledger.	K3

Pre-requisites Cryptography and Network security

CO/PO Mapping
(3/2/ 1 indicates strength of correlation) 3-Strong, 2–Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	2	2	2	-	-	-	-	3	-	-	3	2
CO 2	3	2	2	2	2	-	-	-	-	2	-	-	3	2
CO 3	3	2	3	3	2	-	-	-	-	3	-	-	3	2
CO 4	3	3	3	2	2	-	-	-	-	2	-	-	2	1
CO 5	3	3	3	2	1	-	-	-	-	2	-	-	3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I,II& III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1.Course-end survey

Content of the syllabus

Unit– I	CRYPTOCURRENCY AND BLOCKCHAIN-INTRODUCTION	Periods	9
Cryptography and Cryptocurrency- Anonymity and Pseudonymity in Cryptocurrencies Digital Signatures- Cryptocurrency Hash Codes. Distributed networks Blockchain- An Introduction Distinction between databases and Blockchain- Distributed ledgerBlockchain ecosystem-Blockchain structure- Blockchain technology- Working - Permission and permission-less Blockchain			
Unit-II	**CRYPTO CURRENCIES**	Periods	**9**
Crypto Currencies - Need for Crypto Currencies – Crypto Markets – Explore Crypto Currency Ecosystems - ICOs – Crypto Tokens - Atomic Swaps – Crypto Currency Exchanges – Centralised and Decentralized Crypto exchanges – Regulations on Crypto Currencies & exchanges – Downside of non-regulated currencies – crypto Scams – Exchange hacks			
Unit – III	**BITCOIN**	Periods	**9**
Bitcoin – history- Bitcoin- usage, storage, selling, transactions, working- Invalid TransactionsParameters that invalidate the transactions- Scripting language in Bitcoin- Applications of Bitcoin script- Nodes and network of Bitcoin- Bitcoin ecosystem			
Unit–IV	**ETHEREUM**	Periods	**9**
The Ethereum ecosystem, DApps and DAOs - Ethereum working- Solidity- Contract classes, functions, and conditionals- Inheritance & abstract contracts- Libraries- Types & optimization of Ether- Global variables- Debugging- Future of Ethereum- Smart Contracts on Ethereum- different stages of a contract deployment- Viewing Information about blocks in Blockchain- Developing smart contract on private Blockchain- Deploying contract from web and console			
Unit–V	**HYPERLEDGER**	Periods	**9**
Hyperledger Architecture- Consensus- Consensus & its interaction with architectural layersApplication programming interface- Application model -Hyperledger frameworks- Hyperledger Fabric -Various ways to create Hyperledger Fabric Blockchain network- Creating andDeploying a business network on Hyperledger Composer Playground- Testing the business network definition- Transferring the commodity between the participants.			
		Total Periods	**45**

References

1.	Mastering Bitcoin: Unlocking Digital Crypto currencies, by Andreas M Antonopoulos 2018
2.	Henning Diedrich, Ethereum: Block chains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations-2016

E-Resources

1.	https://www.coursera.org/learn/ibm-blockchain-essentials-for-developers
2.	https://museblockchain.com/
3.	https://www.provenance.org/
4.	https://www.coursera.org/learn/blockchain-basics https://steemit.com/
5.	https://101blockchains.comhttps://followmyvote.com/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTERSCIENCEANDENGINEERING**		Semester		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE11	**Cyber Security and Cyber Laws**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Learn cybercrime and cyber law.
- Understand the cyber attacks and tools for mitigating them.
- Understand information gathering.
- Learn how to detect a cyber attack.
- Learn how to prevent a cyber attack.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain the basics of cyber security, cyber crime and cyber law	K2
	CO2: Classify various types of attacks and learn the tools to launch the attacks	K2
	CO3: Apply various tools to perform information gathering	K3
	CO4: Understand intrusion techniques to detect intrusion	K3
	CO5: Remember intrusion prevention techniques to prevent intrusion	K3

Pre-requisites

CO /PO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	1	1	1	1	-	1	-	-	-	-	-		2	2
CO 2	1	3	1	3	2	-	-	-	-	-	-		2	2
CO 3	2	1	1	1	-	-	-	-	-	-	1		2	2
CO 4	3	3	2	2	2	-	-	-	-	-	-		2	2
CO 5	3	2	1	1	1	-	-	1	-	-	1		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION & CYBER LAW**	Periods	**9**

Cyber Security ,Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; History of Internet and World Wide Web – Need for cyber law – Cyber-crime on the rise – Important terms related to cyber law – Cyber law in India – Need for cyber law in India – History of cyber law in India – Information Technology Act, 2000 – Overview of other laws amended by the National Policy on Information Technology 2012 – IT Act 2000.

Unit–II	ATTACKS AND COUNTER MEASURES	Periods	9
OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks – Security Breach – Types of Malicious Attacks – Malicious Software – Common Attack Vectors – Social engineering Attack – Wireless Network Attack – Web Application Attack – Attack Tools – Countermeasures.			
Unit – III	**RECONNAISSANCE**	Periods	**9**
Harvester – Whois – Netcraft – Host – Extracting Information from DNS – Extracting Information from E-mail Servers – Social Engineering Reconnaissance; Scanning – Port Scanning – Network Scanning and Vulnerability Scanning – Scanning Methodology – Ping Sweer Techniques – Nmap Command Switches — Banner Grabbing and OS Finger printing Techniques.			
Unit– IV	**INTRUSION DETECTION**	Periods	**9**
Host -Based Intrusion Detection – Network -Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honeypots – Example System Snort.			
Unit-V	**INTRUSION PREVENTION**	Periods	**9**
Firewalls and Intrusion Prevention Systems: Need for Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Basing – Firewall Location and Configurations – Intrusion Prevention Systems – Example Unified Threat Management Products.			
		Total Periods	**45**

References

1.	Anand Shinde, “Introduction to Cyber Security Guide to the World of Cyber Security”, Notion Press, 2021
2.	Nina Godbole, Sunit Belapure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley Publishers, 2011
3.	David Kim, Michael G. Solomon, “Fundamentals of Information Systems Security”, Jones & Bartlett Learning Publishers, 2013
4.	Patrick Engebretson, “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy”, Elsevier, 2011
5.	William Stallings, Lawrie Brown, “Computer Security Principles and Practice”, Third Edition, Pearson Education, 2018

E-Resources

1.	https://owasp.org/www-project-top-ten/(Introduction to Cyber Security)
2.	https://nptel.ac.in/courses/106/105/1060606210/ (Intrusion Prevention
3.	https://www.researchgate.net/publication/27465550_Developments_in_the_global_law_enforcement_of_cyber-crime

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE12	**Software Project Management**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand overall SDLC and adopt suitable processes
- Elicite, analyze, prioritize, and manage both functional and quality requirements
- Estimate efforts required, plan, and track the plans
- Understand and apply configuration and quality management techniques
- Evaluate, manage, and design processes

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Adopt a suitable process for software development	K2
	CO2: Elicit functional and quality requirements	K3
	CO3: Analyze, prioritize, and manage requirements	K3
	CO4: Estimate the efforts required for software development	K2
	CO5: Adopt best practices for process improvement	K2

Pre-requisites

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO 1	3	2	3	3						2	1	2	2
CO 2	3	3	3	3						2	1	2	2
CO 3	3	2	2	3						2	2	2	3
CO 4	3	3	3	3						2	1	2	1
CO 5	3	3	2	2						2	1	2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**DEVELOPMENT LIFE CYCLE PROCESSES**	Periods	**9**

Overview of software development life cycle – introduction to processes – Personal Software Process (PSP) –Team software process (TSP) – Unified processes – Rapid Application development-agile processes – Extreme Programming– SCRUM-Managing interactive processes-choosing the right process

Unit – II	REQUIREMENTS MANAGEMENT	Periods	9
Functional requirements and quality attributes – elicitation techniques – Quality Attribute Workshops (QAW) – analysis, prioritization, and trade-off – Architecture Centric Development Method (ACDM) – requirements documentation and specification – change management – traceability of requirements.			
Unit – III	**ESTIMATION, PLANNING, AND TRACKING**	Periods	**9**
Identifying and prioritizing risks – risk mitigation plans – estimation techniques – use case points – function points – COCOMO II – top-down estimation – bottom-up estimation – work breakdown structure – macro and micro plans – planning poker – wideband delphi – documenting the plan – tracking the plan – earned value method (EVM).			
Unit – IV	**CONFIGURATION AND QUALITY MANAGEMENT**	Periods	**9**
identifying artifacts to be configured – naming conventions and version control – configuration control – quality assurance techniques – peer reviews – Fegan inspection – unit, integration, system, and acceptance testing – testdata and test cases – bug tracking –causal analysis			
Unit - V	**SOFTWARE PROCESS DEFINITION AND MANAGEMENT**	Periods	**9**
Process elements – process architecture – relationship between elements – process modeling – process definition techniques – ETVX (entry-task-validation-exit) – process base lining – process assessment and improvement –CMMI – Six Sigma.			
		Total Periods	**45**

References

1.	Pankaj Jalote, "Software Project Management in Practice", Pearson, 2002.
2.	Robert K. Wysocki "Effective Software Project Management" – Wiley Publication, 2011.
3.	Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
4.	Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013

E-Resources

1.	https://swayam.gov.in/nd1_noc19_cs70/preview
2.	https://resources.sei.cmu.edu/asset_files/CurriculumModule/1989_007_001_15704.pdf
3.	http://www.mbaexamnotes.com/software-project-management.html

	VIVEKANANDHACOLLEGEOFENGINEERINGFORWOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E. / M.Tech.**	Programme code		Regulation	**2023**			
Department	**CSE & IT**			Semester				
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE13	**Virtualization Techniques and Applications**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the concept of Virtualization • Understand the concept of Virtual Machines • Understand the concept of server virtualization • Learn network and storage virtualization • Know the real time examples for virtualization	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Deploy legacy OS on virtual machines.	K3
	CO2: Analyze the intricacies of server, storage and network virtualizations	K4
	CO3: Design and develop applications on virtual machine platforms	K3
	CO4: Design and develop applications on storage virtualization	K3
	CO5: Analyze the importance of virtualization	K4
Pre-requisites	-	

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	2	-	-	1	2	1		3	2
CO 2	3	2	3	3	2	2	-	-	1	2	1		2	1
CO 3	3	3	2	3	1	3	-	-	2	2	1		3	2
CO 4	3	3	3	2	1	2	-	-	1	2	1		1	1
CO 5	3	3	2	2	1	2	-	-	1	2	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1.Course-end survey

Content of the syllabus

Unit– I	**OVERVIEW OF VIRTUALIZATION**	Periods	**9**

System architectures-Virtual Machine basics- Process vs System Virtual Machines-Taxonomy. Emulation: Basic Interpretation-Threaded Interpretation–Pre-coded and Direct Threaded Interpretation-Binary Translation. System Virtual Machines-Key concepts-Resource utilization basics.

Unit-II	**PROCESS VIRTUAL MACHINES**	Periods	**9**

Implementation–Compatibility–Levels–Framework–State Mapping–Register–Memory Address Space – Memory Architecture Emulation–Memory Protection–Instruction Emulation–Performance Tradeoff- Staged Emulation–Exception Emulation – Exception Detection–Interrupt Handling–Operating Systems Emulation– Same OS Emulation–Different OS Emulation– System Environment.

Unit – III	HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION	Periods	9
HLL virtual machines: Pascal P-Code–Object Oriented HLLVMs-Java VM architecture-Java Native Interface-Common Language Infrastructure. Server virtualization: Partitioning techniques-virtual hardware uses of virtual servers-server virtualization platforms.			
Unit –IV	**NETWORK AND STORAGE VIRTUALIZATION**	Periods	**9**
Design of Scalable Enterprise Networks – Layer2 Virtualization – VLAN - VFI - Layer 3 Virtualization – VRF - Virtual Firewall Contexts - Network Device Virtualization - Data- Path Virtualization - RoutingProtocols.HardwareDevices–SANbackupandrecoverytechniques–RAID–ClassicalStorageModel– SNIA Shared Storage Model–Virtual Storage: File System Level and Block Level.			
Unit–V	**APPLYING VIRTUALIZATION**	Periods	**9**
Practical Virtualization Solutions: Comparison of Virtualization Technologies: Guest OS/Host OS– Hypervisor – Emulation – Kernel Level – Shared Kernel, Enterprise Solutions: VMWare Server – VMWare ESXi–Citrix Xen Server–Microsoft Virtual PC–Microsoft Hyper-V–Virtual Box, Server Virtualization: Configuring Servers with Virtualization–Adjusting and Tuning Virtual servers–VMBackup–VMMigration.			
		Total Periods	**45**

References

1.	James E.Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann,2005.
2.	David Marshall, Wade A.Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications,2006.
3.	Kumar Reddy ,Victor Moreno, “Network virtualization”, Cisco Press,July,2006.
4.	Chris Wolf, ErickM. Halter, “Virtualization: From the Desktop to the Enterprise”, A Press 2005.
5.	Kenneth Hess, Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall,2010.

E-Resources

1.	https://www.tutorialspoint.com/virtualization2.0/virtualization2.0_overview.htm
2.	https://en.wikipedia.org/wiki/Storage_virtualization
3.	https://www.sam-solutions.com/blog/virtualization-techniques-in-cloud-computing/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205						
Programme	**M.E.**	Programme code	**201**		Regulation		**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester		
Course Code	Course name	Periods per week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
P23CSE14	**Soft Computing Techniques**	3	0	0	3	40	60	100

Course Objective	**The student should be made to,** • Understand the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience • Gain knowledge on neural networks with examples • Gain knowledge on the mathematical background for carrying out the optimization associated with neural network learning • Gain knowledge on genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations • Introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing	
Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Analyze a given computational task to recognize the appropriateness through fuzzy sets	K3
	CO2: Design a fuzzy based soft computing system to address the computational task	K3
	CO3:Analyze a given computational task to solve it through neural network	K3
	CO4: Apply Genetic Algorithm operations for solving a computational task	K3
	CO5: Design and implement a soft computing system to achieve a computational solution	K3
Pre-requisites	Nil	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3												2	2
CO 2	3		3										2	2
CO 3	3	3	2										2	2
CO 4	3	2	2			2							2	2
CO 5	3	2	2	3			2					2	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION TO SOFT COMPUTING	Periods	9
Evolution from Conventional AI to Computational intelligence - Evolutionary Search Strategies Fuzzy Sets - Fuzzy Membership Functions - Operations, Relations - Fuzzy Extension Principle Basics of Fuzzy Logic - Problem solving using Fuzzy Rules - Fuzzy Reasoning - Mamdani's Representation.			
Unit – II	**FUZZY INFERENCE SYSTEMS**	Periods	**9**
Fuzzification - Application of Fuzzy Operators on Antecedent part of Rules - Evaluation of Fuzzy Rules- Defuzzification - Problems associated to Fuzzy controller - Cruise Controller and Air Conditioner Controller - Convergence of efficiency parameter - Boltzmann's Machine Learning Algorithm - Back Propagation Algorithm.			
Unit – III	**NEURAL NETWORKS**	Periods	**9**
Neural Networks in Computer Science - Biological model - McCulloch-Pitts Model - The Perceptron Model - Widrow-Hoff's Delta Rule - XOR Problem - Curse of Dimensionality - Dimensionality Reduction- Activation Functions - Learning by Neural Nets.			
Unit – IV	**ADVANCED SEARCH STRATEGIES**	Periods	**9**
Natural Evolution – Chromosomes - Systematic approach of Elitism (Selection- Crossover- Mutation) - Development of Genetic Algorithm - Fitness Function – Population - GA operators – Parameters – Convergence – Pattern Classifiers - Layered Feed Forward Neural Networks - Solution for XOR Problem - Hebb's Rule - Competitive Learning Methods (Kohonen's Self Organizing Maps and Learning Vector Quantization) - Pattern Associators (Hopfield nets) - Back Propagation Networks - Generalized Delta Rule			
Unit – V	**HYBRID SYSTEMS**	Periods	**9**
Neuro-Fuzzy Modelling – Control - Feedback control - Neuro fuzzy control - Neuro-fuzzy Reinforcement Learning - Gradient Free Optimization (GA operators) - Gain Scheduling - Case study: Color Recipe Prediction			
		Total Periods	**45**

References

1.	Sandhya Bansal & Rajiv Goel "Fundamentals of Soft Computing", 1st Edition, Notion Press Publication, 2020
2.	Saroj koushik& Sunita Tiwari "Soft Computing, Fundamentals, Techniques and Applications" 1st Edition, McGraw Hill Publication, 2018
3.	Samir Roy and Udit Chakraborthy, "Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms" Pearson Education, 2013.
4.	J.S.R. Jang, C.T.sun and E. Mizutani, "Neuro-fuzzy and Soft Computing: A computational Approach to Learning and Machine Intelligence, Pearson Education, 2004.
5.	D.E.GoldBerg, "Genetic Algorithms in Search, Optimization, and Machine Learning", Pearson Education, 2013.
6.	S.N.Sivanandam, S.N.Deepa, "Priciples of Soft Computing", 2nd Edition, John-Wiley India, 2011.

E-Resources

1.	https://www.geeksforgeeks.org/fuzzy-logic-introduction/
2.	https://www.iitk.ac.in/eeold/archive/courses/2013/intel-info/d1pdf3.pdf
3.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5597564/
4.	https://prutor.ai/introduction-to-ann-artificial-neural-networks-set-3-hybrid-systems/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	201	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE15	**Digital Image Processing**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the fundamentals of digital image processing,
- Appreciate the different aspects of various image transforms,
- Understand the concept of image restoration techniques
- Understand the , image compression
- Understand about segmentation used in digital image processing.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Describe the roles of image processing systems in a variety of application	**K2**
CO2: Write programs to read/write and manipulate images: enhancement, segmentation, and compression, spatial filtering	**K3**
CO3: Develop Fourier transform for image processing in frequency domain	**K2**
CO4: Evaluate the methodologies for image segmentation, restoration	**K4**
CO5: Compare morphological transformation algorithms	**K3**

Pre-requisites

CO / PO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

COs	Programme Outcomes(POs)												**CO/PSO Mapping PSOs**	
	PO 1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**P10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	2	2	3	3	3	3	2	1	-	-	1	1	2	2
CO 2	3	3	3	3	2	1	-	1	-	2	2	1	2	1
CO 3	3	2	1	-	-	-	-	-	-	-		1	3	2
CO 4	3	3	2	3	2	1	-	-	1	-	2	1	1	1
CO 5	2	3	3	2	1	1	-	-	-	-	1	1	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION**	Periods	9

Digital Image Fundamentals: Brightness - Adaptation and Discrimination - Light and Electromagnetic Spectrum - Image Sampling and Quantization - Some Basic Relationships between Pixels Types of images.

Unit–II	IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN	Periods	9
Some Basic Intensity Transformation Functions - Histogram Equalization - Spatial Correlation and Convolution - Smoothening Spatial Filters: Low pass filters - Order Statistics filter - Sharpening Spatial Filters: Laplacian filter.			
Unit – III	**IMAGE ENHANCEMENT IN FREQUENCY DOMAIN**	Periods	9
The Discrete Fourier Transformation (DFT)- Frequency Domain Filtering - Ideal and Butterworth Low pass and High pass filters - DCT Transform (1D, 2D).			
Unit– IV	**IMAGE RESTORATION**	Periods	9
Image Degradation/Restoration Process - Noise models - Noise Restoration Filters Image Compression: Fundamentals of Image Compression - Huffman Coding - Run Length Coding - JPEG.			
Unit-V	**MORPHOLOGICAL IMAGE PROCESSING & IMAGE SEGMENTATION**	Periods	9
Morphological Image Processing : Erosion – Dilation – Opening – Closing - Hit-or-Miss Transformation - Basic Morphological Algorithms. **Image Segmentation:** Point - Line and Edge Detection, - Thresholding - Region Based Segmentation.			
		Total Periods	45

References

1.	Rafael c. Gonzalez, Richard eugene woods (2018)" Digital image processing", Pearson education, ISBN 0133356728, 9780133356724.
2.	Scott E Umbaugh (2023), "Digital Image Enhancement, Restoration and Compression", CRC Press, ISBN 9781032071305 (hbk),978103217102 (pbk).
3.	Milan Sonka, "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition.
4.	S. Sridhar , Digital Image Processing, Oxford University Press, 2nd Ed, 2016
5.	James R. Parker, "Algorithms for Image Processing and Computer Vision", 2016
6.	Milan Sonka, "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition.

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1.	http://www.cs.umsl.edu/~sanjiv/classes/cs5420/lectures/spatial.pdf
2.	https://uomustansiriyah.edu.iq/media/lectures/6/6_2020_03_22!11_23_17_AM.pdf
3.	https://medium.com/computational-photography/intensity-transformation-and-spatial-filtering-a186f9b19af0
4.	https://aits-tpt.edu.in/wp-content/uploads/2023/09/DIP-min.pdf
5.	https://www.mygreatlearning.com/blog/digital-image-processing-explained/
6.	https://pkklib.iitk.ac.in/index.php/resources/e-books/e-text-books/33741:digital-image-processing-2e
7.	https://www.brainkart.com/article/Image-Classification_4485/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637205								
Programme	**M.E. M.Tech.**	Programme code		Regulation	**2023**				
Department	**CSE & IT**			Semester					
Course Code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
P23CSE16	**Deep Learning Techniques**	3	0	0	3	40	60	100	

Course Objective	**The student should be made to,** • Understand the concepts of Neural Networks and Deep Learning • Understand Deep Neural network and layered learning approach • Study and understand CNN and RNN for deep learning • Learn and understand Autoencoders and its applications • Understand concept of transfer learning and its applications with keras	
Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: interpret the components of a neural networks and activation function	K2
	CO2: identify the optimization techniques for training deep learning models	K2
	CO3: Implement single and multilayer Perceptron using feed-forward neural networks and backpropagation.	K3
	CO4: Implement CNNs and RNNs for various data processing and sequential data tasks.	K3
	CO5: explore the principles, methods, and applications of autoencoders, RBMs, DBNs, and related learning algorithms	K2
Pre-requisites	-	

CO/PO Mapping (3/2/ 1 indicates strength of correlation)3-Strong, 2–Medium,1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	2	2	2	1	-	-	1	3	1		3	2
CO 2	3	2	3	2	2	2	-	-	1	2	1		3	2
CO 3	3	2	3	3	1	2	-	-	1	3	1		3	2
CO 4	3	3	3	2	1	2	-	-	-	2	1		2	1
CO 5	3	3	3	2	1	2	-	-	-	2	1		3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I,II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1.Course-end survey

Content of the syllabus

Unit– I	INTRODUCTION TO DEEP LEARNING	Periods	9
History of Deep Learning –Machine learning vs Deep learning - Deep Learning Models -Artificial Neural Networks: The Neuron-Expressing Linear Perceptrons as Neurons- Linear Neurons and their limitations – Sigmoid – Tanh – and ReLU Neurons -Softmax Output Layers Applications of Deep Learning.			
Unit-II	**OPTIMIZATION AND MACHINE LEARNING**	Periods	**9**
Unconstrained Optimization–Neighborhoods–Supervised Learning–Regression Models–Learning rate–Test for Multicollinearity–Unsupervised Learning–Expectation Maximization Algorithm–Decision Tree Learning – Gradient Boosting –Random Forest –Bayesian Learning.			
Unit – III	**SINGLE AND MULTI LAYER PERCEPTRON MODELS**	Periods	**9**
Single Layer Perceptron Model–Training–Widrow Hoff Algorithm– Limitations – Statistics– Multilayer Perceptron Model– Feed-Forward Neural Networks -Converging upon a Global Optimum–Back propagation Algorithm for MLP Models– Limitation and consideration for MLP Models–Use of hidden layer and neurons.			
Unit–IV	**CNNs AND RNNs**	Periods	**9**
Convolutional Neural Networks: Structure & Properties–Components–Tuning parameters–CNN Architectures – Regularization – Recurrent Neural Networks: Fully Recurrent Networks – Training RNN with BPPT–Elman Neural Networks– History Compressor–Long Short Term Memory–Training LSTM–Structural Damping within RNNs.			
Unit–V	**DEEP LEARNING MODELS**	Periods	**9**
Autoencoders – Restricted Boltzmann Machine – Contrastive Divergence Learning –Momentum within RBMs – Weight Decay – Sparsity – Deep Belief Networks – Fast Learning Algorithm – Analysis of Variance – Fisher Principles–Feature/Variable Selection Techniques–Handling Categorical Data–Local Search Methods– Reactive Search Optimization.			
		Total Periods	**45**

References

1.	Taweh Beysolow II, “Introduction to Deep Learning using R”, Apress, Springer, 2017.
2.	IanGood fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
3.	Jason Brownlee, “Deep Learning with Python”,ebook,2016
4.	Nikhil Buduma, “Fundamentals of Deep Learning”,OReilly,2017
5.	Kevin P.Murphy, “Machine Learning: A Probabilistic Perspective”,MITPress,2012

E-Resources

1.	http://neuralnetworksanddeeplearning.com/chap1.html
2.	https://towardsdatascience.com/introducing-deep-learning-and-neural-networks-deep-learning-for-rookies-1-bd68f9cf5883
3.	https://www.sciencedirect.com/science/article/abs/pii/S0893608014002135

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**		Semester		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE17	**Ethical Hacking and Digital Forensics**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Learn various hacking techniques and attacks.
- Understand the benefits of strategic planning process.
- Evaluate where information networks are most vulnerable.
- Perform penetration tests into secure networks for evaluation purposes.
- Enable students to understand issues associated with the nature of forensics.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Organize a computer and network against a variety of attacks	**K3**
CO2: Enumerate the Computer network services and determine the possible security attacks in Windows machine	**K3**
CO3: Identify and assess the vulnerabilities in hardware and wireless environment	**K2**
CO4: Understand the responsibilities and liabilities of a computer forensic investigator	**K2**
CO5: Understand forensics to recent technologies such as smart phones, email, cloud and social media.	**K2**

Pre-requisites -

CO /PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	2	3	3	2	1	-	-	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	-	1	2	1		2	2
CO 3	3	2	2	3	1	2	-	-	1	2	1		3	2
CO 4	3	3	3	2	1	2	-	-	1	2	1		1	1
CO 5	3	3	2	2	1	2	-	-	1	2	1		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	INTRODUCTION TO HACKING	Periods	9
Ethical Hacking Overview - Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing – Numbering Systems. - Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks – Addressing Physical Security			
Unit–II	**FOOT PRINTING, SCANNING & ENUMERATION**	**Periods**	**9**
Internet Foot printing- Scanning – Determining if the system is alive – Determining which services are running or Listening – Detecting the operating system – Processing and storing scan data.- Enumeration - basic banner grabbing- Enumerating Common Network services and its countermeasures. Hacking Windows – Unauthenticated attacks – authenticated attacks – windows security features.			
Unit – III	**APPLICATION HACKING & COUNTERMEASURES**	**Periods**	**9**
Web and Database Hacking – Web Server Hacking - Web application Hacking - Common web application Vulnerabilities – Database Hacking. Mobile Hacking – Hacking android – iOS.			
Unit– IV	**UNDERSTANDING DIGITAL FORENSICS AND LEGAL ASPECTS**	**Periods**	**9**
Understanding computer forensics - Preparing for computer investigation – Maintaining professional conduct – understanding computer investigations – Taking a systematic approach – Corporate Hi-Tech investigations – Conducting an investigation.			
Unit-V	**EMAIL AND SOCIAL MEDIA FORENSICS**	**Periods**	**9**
Investigating E-mail crimes and Violations – Applying Digital Forensics Methods to Social Media Communications - Social Media Forensics on Mobile Devices - Forensics Tools -Mobile phone basics – Acquisition procedures for mobile - Android Device –Android Malware – SIM Forensic Analysis			
		Total Periods	**45**

References

1.	Michael T. Simpson, Kent Backman, and James E. Corley, “Hands-on Ethical Hacking and Network Defense, Course Technology”, Delmar Cengage Learning, 2013.
2.	Stuart McClure, Joel Scambray, Goerge Kurtz, “Hacking Exposed 7: Network Security Secrets and Solutions”, 7th Edition,Tata McGraw Hill Publishers, 2016
3.	Kevin Beaver, “Ethical Hacking for Dummies”, 6th Edition, Wiley, 2018.
4.	B. Nelson, A. Phillips, F. Enfinger, and C. Steuart, Guide to Computer Forensics and Investigations, 2019, 6th ed. CENGAGE, INDIA (ISBN: 9789353506261)
5.	André Årnes, Digital Forensics, 2018, 1st ed., Wiley, USA(ISBN No.: 9781119262411)
6.	Nihad A Hassan, Digital Forensics Basics: A Practical Guide to Using Windows OS, 2019, 1st ed, A Press, USA (ISBN: 9781484238387)

E-Resources

1.	https://onlinecourses.swayam2.ac.in/cec21_ge10/preview (Digital Forensics)
2.	https://null-byte.wonderhowto.com/how-to/hacking-windows-10-break-into-somebodyscomputer-without-password-setting-up-payload-0183584/
3.	https://www.acfe.com/uploadedFiles/Shared_Content/Products/SelfStudy_CPE/Fundamentals%20of%20Computer%20and%20Internet%20Fraud%202017_Extract.pdf

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205

Programme	**M.E./ M.Tech.**	Programme Code		Regulation	**2023**
Department	**CSE & IT**			Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23ITE06	**GPU Computing**	3	0	0	3	40	60	100

Course Objective	**The Main Objective of the course is to,** • Study architecture and capabilities of modern GPUs • Learn programming techniques for the GPU such as CUDA programming model. • Develop solutions for problems in various fields.

Course Outcome	**At the end of the course, the student should be able to,**	**Knowledge level**
	CO1: Understand GPU computing architecture.	K1
	CO2: Develop programs using CUDA programming	K3
	CO3: Understand the CUDA memories.	K2
	CO4: Implement algorithms efficiently for common application kernels.	K4
	CO5: Develop solutions to solve computationally intensive problems in various fields	K4

Pre-requisites	-

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	**Programme Outcomes (POs)**												**CO/PSO Mapping** **PSOs**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO1	3	3	2		2								2	2
CO2	2	1	2		1								3	2
CO3	3	2	2		1								2	1
CO4	2	3	3		2								2	2
CO5	2	2	2		1								3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	HISTORY OF GPU COMPUTING	Periods	11
Evolution of Graphics Pipelines, The Era of Fixed-Function Graphics Pipelines, Evolution of Programmable Real-Time Graphics, Unified Graphics and Computing Processors, GPGPU, Scalable GPUs, Recent Developments, Future Trends.			
Unit – II	**INTRODUCTION TO DATA PARALLELISM AND CUDA C**	Periods	**9**
Data Parallelism, CUDA Program Structure, A Vector Addition Kernel, Device Global Memory and Data Transfer, Kernel Functions and Threading. Data-Parallel Execution Model: CUDA Thread Organization, Mapping Threads to Multidimensional Data, Matrix-Matrix Multiplication—A More Complex Kernel, Synchronization and Transparent Scalability, Assigning Resources to Blocks, Thread Scheduling and Latency Tolerance.			
Unit – III	**CUDA MEMORIES**	Periods	**11**
Importance of Memory Access Efficiency, CUDA Device Memory Types, A Tiled Matrix – À Matrix Multiplication Kernel, Memory as a Limiting Factor to Parallelism.			
Unit - IV	**STREAMS**	Periods	**9**
Support: Debugging GPU Programs. Profiling, Profile tools, Performance aspects Streams: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based-Synchronization - Overlapping data transfer and kernel execution, pitfalls.			
Unit – V	**OPENCL & CASE STUDIES**	Periods	**5**
An Introduction to OpenCL: Data Parallelism Model, Device Architecture, Kernel Functions, Device Management and Kernel Launch, Electrostatic Potential Map in OpenCL. Case Studies: Image Processing, Graph algorithms, Simulations, Deep Learning			
		Total Periods	**45**

Text Books:	
1.	Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-mei Hwu; Morgan Kaufman; 2010 (ISBN: 978-0123814722)
2.	CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN: 978-0124159334)
REFERENCE BOOKS	
1.	Nicholas Wilt, CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison – Wesley, 2013
2.	Edward Kandrot, CUDA by Example: An Introduction to General Purpose GPU Programming, Addison – Wesley, 2010.
E-Resources	
1.	https://www.intechopen.com/chapters/54968

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE18	**Human and Computer Interaction**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Design, implement and evaluate effective and usable graphical computer interfaces.
- Describe and apply core theories, models and methodologies from the field of HCI.
- Describe and discuss current research in the field of HCI.
- Implement simple graphical user interfaces using the Java Swing toolkit.
- Describe special considerations in designing user interfaces for older adults.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain the capabilities of both humans and computers from the view point of human information processing.	K2
	CO2: Describe typical human-computer interactions (HCI) models and styles, as well as various historic HCI paradigms.	K2
	CO3: Apply an interactive design process and universal design principles to designing HCI systems.	K4
	CO4: Describe and use HCI design principles, standards and guidelines.	K4
	CO5: Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.	K2

Pre-requisites -

CO /PO Mapping
(3/2/1indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	2	-	-	-	-	-	2	1		3	2
CO 2	3	3	3	3	-	-	-	-	-	2	1		2	2
CO 3	3	3	2	3	-	-	-	-	-	2	1		3	2
CO 4	3	3	3	2	-	-	-	-	-	2	1		1	1
CO 5	3	3	2	2	-	-	-	-	-	2	1		2	2

Course Assessment

Methods Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semesterexaminations

Indirect

1.Course -end survey

Content of the syllabus			
Unit -I	**INTRODUCTION**	Periods	**9**
Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – memory – processing and networks; Interaction: Model – frameworks – Ergonomics – styles – elements – interactivity – Paradigms.			
Unit–II	**INTERACTIVE DESIGN BASICS**	Periods	**9**
Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.			
Unit – III	**COGNITIVE MODELS**	Periods	**9**
Cognitive models – Socio – organizational issues and stake holder requirements – Communication and collaboration models – Hypertext, Multimedia and WWW.			
Unit– IV	**MOBILE ECOSYSTEM**	Periods	**9**
Mobile Ecosystem: Platforms, Application frameworks – Types of Mobile Applications: Widgets, Applications, Games – Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.			
Unit-V	**DESIGNING WEB INTERFACES**	Periods	**9**
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow .Case Studies			
		Total Periods	**45**

References

1.	Bhattacharya A. Et.Al, “Human Computer Interaction”, McGraw Hill India, 2019.
2.	Yvonne Rogers, Helen Sharp, Jennifer Preece, “Interaction Design”, Wiley, Sixth Edition,6 March 2023.
3.	Jerome R. Busemeyer, Adele Diederich, “Cognitive Modeling”, SAGE Publications, 2010.
4.	Porter Mills, “Designing Web Interfaces”,CreateSpace Independent Publishing Platform, 2017.

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1.	https://www.educative.io/blog/intro-human-computer-interaction
2.	https://www.tutorialspoint.com/human_computer_interface/interactive_system_design.htm
3.	https://www.slideshare.net/alanjohndix/hci-3e-ch-12-cognitive-models
4.	https://www.slideshare.net/arulkumarcbe/mobile-hci
5.	https://www.geeksforgeeks.org/software-engineering-user-interface-design/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. / M.Tech.**	Programme Code		Regulation	**2023**
Department	**CSE & IT**		Semester		

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23ITE03	**Social Network Analysis**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the component of Social Networks distribution.
- Learn graph theory for Social Network Analysis
- Compare the different analysis and search techniques in Social Networks
- Understand human behavior in social web and related communities.
- Know the applications in behavior of social networks.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1:Apply the concepts of graph theory for analysis of social networks distribution	K2
	CO2: Utilize game theory for decision making in the context of social networking	K2
	CO3: Compare and contrast different link analysis and web search techniques	K2
	CO4:Analyze network behavior based on population model	K3
	CO5:Investigate the aggregate behavior of the social networks based on structural model	K2

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO1	PSO 2
CO 1	2	2	1										2	2
CO 2	3	2	1	1		1							3	3
CO 3	2	2	3										3	3
CO 4	2	2	3										2	2
CO 5	3	2	2	1		2						2	2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment / Quiz / Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	**GRAPH THEORY AND SOCIAL NETWORKS**	Periods	**9**

Graphs: Basic Definitions- Paths and Connectivity- Distance and Breadth First Search-Network Dataset: An overview. Strong and Weak Ties: Triadic Closure- The Strength of Weak Ties- Tie Strength and Network Structure in Large Scale Data- Tie Strength, Social Media, - Closure, Structural Holes- Social Influence- Affiliation. Positive and Negative Relationships: Structural Balance- Characterizing the Structure of Balanced Networks – Application of Structural Balance – A Weaker Form of Structural Balance

Unit - II	**GAME THEORY AND INTERACTION IN NETWORKS**	Periods	**9**

Games: What is Game- Reasoning about Behavior in Game- Best Responses and Dominant Strategies- Nash Equilibrium- Multiple Equilibria- Coordination Games, -Examples and Empirical Analysis- Pareto Optimality and Social Optimality. Modeling Network Traffic using Game Theory: Traffic at Equilibrium- Braess's Paradox.- Matching Markets: Bipartite Graphs and Perfect Matchings Valuations and Optimal Assignments.			
Unit – III	**INFORMATION NETWORKS AND THE WORLD WIDE WEB**	Periods	**9**
The Structure of the Web: The World Wide Web- Information Networks, Hypertext, and Associative Memory- The Web as a Directed Graph- The Bow-Tie Structure of the Web. Link Analysis and Web Search: Searching the Web: The problem of Ranking- Link Analysis using Hubs and Authorities- Page Rank- Applying Link Analysis in Modern Web Search.			
Unit - IV	**NETWORK DYNAMICS - POPULATION MODELS**	Periods	**9**
Bayes Rule: A model of Decision Making- Making under Uncertainty- Baye's Rule in the Herding Experiment- A Simple, General Cascade Model- Sequential Decision Making and Cascades. Network Effects: The Economy Without Network Effects- The Economy with Network Effects- Stability, Instability and Tipping Points- A Dynamic View of the Market- Industries with Network Goods- Mixing Individual Effects with Population-Level Effects. The Effect of Search Tools and Recommendation Systems			
Unit – V	**NETWORK DYNAMICS – STRUCTURAL MODELS**	Periods	**9**
Cascading Behavior in Networks: Diffusion in Network-Modeling diffusion through a Network- Cascades and Clusters Diffusion, Thresholds, and the Role of Weak Ties- Extensions of the Basic Cascade Model- Knowledge, Thresholds and Collective Action. Epidemics: Diseases and the Networks that transmit them-Branching Processes- The SIR Epidemic Model- The SIS Epidemic Model- Synchronization- Transient Contacts and the Danger of Concurrency.			
		Total Periods	**45**

REFERENCE BOOKS

1.	David Easley, Jon Klienberg, "Networks, Crowds, and Markets: Reasoning about a Highly Connected World", 1 st edition, Cambridge University Press, 2010.
2.	Stanley Wasserman, Katherine Faust, "Social Networks Analysis: Methods and Applications", Cambridge University Press, 2010.
3.	Charles Kadushin, "Understanding Social Networks: Theories, Concepts, and Findings", 1 st edition, Oxford University Press, 2012.

E-Resources

1	https://hal.usc.edu/chugg/docs/social_networks/EE599_Chugg_Graphs_SocNets_part1.pdf
2	Social Network Analysis and Mining | Home (springer.com)
3	Social network analysis: An approach and technique for the study of information exchange - Science Direct

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E. / M.Tech.**	Programme Code		Regulation	**2023**		
Department	**CSE & IT**			Semester	-		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
P23ITE18	**Information Retrieval**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to, • Demonstrate genesis and diversity of information retrieval situations for text and hyper media. • Describe hands-on experience store, and retrieve information from www using semantic approaches. • Demonstrate the usage of different data/file structures in building computational search engines. • Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia. • Analyze ranked retrieval of a very large number of documents with hyperlinks between them.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Describe the objectives of information retrieval systems.	K1
	CO2: Describe models like vector-space, probabilistic and language models to identify the similarity of query and document.	K2
	CO3: Implement clustering algorithms like hierarchical agglomerative clustering and k-means algorithm.	K3
	CO4: Understand relevance feedback in vector space model and probabilistic model.	K2
	CO5: Illustrate how N-grams are used for detection and correction of spelling errors.	K3
Pre-requisites	-	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	1	1									2	2
CO 2	2	3	1	1									2	1
CO 3	3	2	1										1	1
CO 4	2	1											2	2
CO 5	3	2	3	1									1	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	Introduction	Periods	9
Introduction to Information Retrieval Systems: Definition and Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities			
Unit - II	**Retrieval Utilities**	Periods	**9**
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, NGram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.			
Unit – III	**Semantic Networks**	Periods	**9**
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.			
Unit - IV	**Query Processing**	Periods	**9**
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies			
Unit – V	**Applications**	Periods	**9**
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.			
		Total Periods	**45**

Text Books cum Reference Books

1.	David A. Grossman, Ophir Frieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition(Distributed by Universal Press), 2004.
2.	Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004.
3.	Christopher D Manning, Prabhakar Raghavan, Hinrich Schutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009.

E-Resources

1	https://books.google.co.in/books?id=hs0RBwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
2	https://theswissbay.ch/pdf/Gentoomen%20Library/Information%20Retrieval/Information%20Storage%20And%20Retrieval%20SystemsTheory%20And%20Impl%202e_Kowalski%20GJ%20%282002%29.pdf

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E. / M.Tech.**	Programme code		Regulation	**2023**
Department	**CSE & IT**			Semester	

Course Code	**Course Name**	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE19	**Information Security**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- To provide an understanding of principal concepts, major issues, technologies, and basic approaches in information security.
- Master the key concepts of information security and how they "work."
- Develop a "security mindset:" learn how to critically analyze situations of computer and network usage from a security perspective, identifying the salient issues, viewpoints, and trade-offs.
- To provide the ability to examine and analyze real-life security cases.

Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Evaluate vulnerability of an information system and establish a plan for risk management.	K2
	CO2: Demonstrate basic principles of Web application security	K4
	CO3: Evaluate the authentication and encryption needs of an information system.	K2
	CO4: Demonstrate how to secure a network.	K3
	CO5: Evaluate a company's security policies and procedures	K4

Pre-requisites	-

CO /PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	
CO 1	3	3	2	2	2	2	-	-	-	2	-		3	2	
CO 2	3	3	2	2	2	2	-	-	-	2	-		3	2	
CO 3	3	3	2	2	2	2	-	-	-	2	-		3	2	
CO 4	3	3	2	2	2	2	-	-	-	2	-		3	2	
CO 5	3	3	2	2	2	2	-	-	-	2	-		3	2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION TO SOFTWARE SECURITY**	Periods	**9**

Introduction: Security mindset, Computer Security Concepts (CIA), Threats, Attacks, and Assets. Vulnerabilities and protections, malware, program analysis

Unit–II	**PRACTICAL CRYPTOGRAPHY**	Periods	**9**
Encryption, authentication, hashing, symmetric and asymmetric cryptography, Digital Signatures and Certificates			
Unit – III	**NETWORK SECURITY**	Periods	**9**
Network security issues, Sniffing, IP spoofing, Common threats, E-Mail security, IPSec, SSL, PGP, Intruders, Virus, Worms, Firewalls-need and features of firewall, Types of firewall, Intruder Detection Systems.			
Unit– IV	**CYBER SECURITY**	Periods	**9**
Cyber Crime and security, Security tools, Introduction to Digital Forensic, OS fingerprinting, TCP/IP stack masking, Social Engineering			
Unit-V	**APPLICATIONS AND SPECIAL TOPICS**	Periods	**9**
Web application Security, Privacy and Anonymity, public policy			
		Total Periods	**45**

References	
1.	Computer Security: Principles and Practice, William Stallings; Lawrie Brown
2.	Cryptography and Network Security: Principles and Practice, 7th Edition, by William Stallings published by Pearson Education 2017.

E-Resources	
1.	https://www.cryptomathic.com/
2.	https://www.tutorialspoint.com/
3.	onlinecourses.nptel.ac.in

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course Code	**Course Name**	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE20	**Information Security And Risk Management**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Provide the basic concepts of information security and its life cycle.
- Analyze about legal, ethical and professional issues in information security.
- Use the physical, personal and operational security concepts.
- Develop various security tools and its technologies.
- Implement various risk identification, assessment and management techniques.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Summarize the principal concepts, major issues, technologies and basic approaches in information security.	K2
CO2: Analyze the threats, attacks and understand legal professional and ethical issues.	K3
CO3: Select the appropriate security technology for risk control.	K3
CO4: Choose the appropriate operational security technologies to prevent security breach.	K3
CO5: Examine the process of identifying, assessing and treating risks.	K2

Pre-requisites: Basic concepts of computer networks and software engineering

CO /PO Mapping
(3/2/1indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	2	3		2	2	1				3		2	2
CO 2	2	2	3		2	2	1				3		3	2
CO 3	2	2	2		3	2	2				3		2	3
CO 4	2	2	3		3	2	2				3		3	2
CO 5	2	2	3		2	2	1				3		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	BASICS OF INFORMATION SECURITY	Periods	9
History, Definition – Information Security, Critical Characteristics of Information – CNSS Security Model – Components of an Information Systems – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC-Security Professional and the Organization – Communities of Interest			
Unit–II	**SECURITY INVESTIGATION**	Periods	**9**
Need for Security – Business Needs – Threats – Attacks – Legal, Ethical and Professional Issues – Planning for Security - Information Security Planning and Governance – Information Security Policy, Standards and Practices.			
Unit – III	**SECURITY TECHNOLOGIES**	Periods	**9**
Introduction - Access Control – Firewalls – Protecting Remote Connections – Intrusion Detection and Prevention Systems – Honeypots, Honeynets and Padded Cell Systems – Scanning and Analysis Tools.			
Unit– IV	**PHYSICAL, PERSONNEL AND OPERATIONAL SECURITY**	Periods	**9**
Physical Access Controls – Fire Security and Safety – Failure of Supporting Utilities and Structural Collapse, Interception of Data – Securing Mobile and Portable Systems – Security and personnel – Information Security Maintenance – Real time case studies.			
Unit-V	**RISK MANAGEMENT**	Periods	**9**
Introduction - An overview of Risk Management – Risk Identification – Risk Assessment – Risk Control strategies – Selecting a Risk Control Strategy – Quantitative versus Qualitative Risk Management.			
		Total Periods	**45**

References

1.	Michael E Whitman and Herbert J Mattord, Principles of Information Security, Cengage Learning India, Sixth Edition, 2018.
2.	Micki Krause, Harold F. Tipton, Handbook of Information Security Management, CRC Press, Florida, Second Edition, 2004.

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1.	https://www.nisc.go.jp/security-site/campaign/files/aj-sec/handbook-all_eng.pdf
2.	https://www.oreilly.com/library/view/information-security-the/9780071784351/
3.	https://www.quora.com/What-are-the-best-books-on-information-security
4.	https://www.oreilly.com/library/view/corporate-risk-management/9781119995104/mern_9781119995104_oeb_ref_r1.html

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Programme	**M.E.**	Programme code	**201**		Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester				
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE21	**Information Storage Management**	3	0	0	3	40	60	100

Course Objective	**The student should be made to,** • Understand the storage architecture and available technologies • Learn to establish & manage datacenter. • Learn security aspects of storage& data center • Understand the importance of information • Learn how to provide security to information	
Course Outcome	**At the end of the course, the student should be able to,**	**KL**
	CO1: Select from various storage technologies to suit for required application	K2
	CO2: Apply security measures to safeguard storage& farm	K4
	CO3: Analyze QoS on Storage	K4
	CO4: Analyze information monitoring systems	K4
	CO5: Deal with security issues	K2
Pre-requisites	-	

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													**CO/PSO Mapping**		
COs	Programme Outcomes(POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	
CO 1	3	3	3	3	2	2	1	3	1	1	1		3	2	
CO 2	3	3	3	3	2	2	1	2	1	1	1		2	2	
CO 3	3	3	2	3	1	3	2	3	1	1	1		3	2	
CO 4	3	3	3	2	1	2	2	2	1	1	1		2	1	
CO 5	3	3	2	2	1	2	2	2	1	1	1		2	1	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	**STORAGE TECHNOLOGY**	Periods	**9**

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

Unit–II	STORAGE SYSTEMS ARCHITECTURE	Periods	9
Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its levels.			
Unit – III	**INFORMATION AVAILABILITY**	Periods	**9**
Planned/unplanned outages and the impact of downtime, Impact of downtime -Business continuity (BC) and disaster recovery (DR), RTO and RPO.			
Unit– IV	**MONITORING & MANAGING DATACENTERS**	Periods	**9**
Identify single points of failure in a storage infrastructure, architecture of backup/recovery, replication technologies, Remote replication technologies. Identify key areas to monitor in a data center, Industry standards data center monitoring and management.			
Unit-V	**SECURING STORAGE AND STORAGE VIRTUALIZATION**	Periods	**9**
Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.			
		Total Periods	**45**

References

1.	EMC Corporation, "Information Storage and Management: Storing, Managing, and Protecting Digital Information", Wiley, India, 2012
2.	Robert Spalding, ―Storage Networks: The Complete Reference―, Tata McGraw Hill, Osborne, 2017.
3.	Marc Farley, ―Building Storage Networks, Tata McGraw Hill ,Osborne, 2001.

E-Resources

1.	http://www.rgpvonline.com/guide/notes-ism-unit-2.pdf
2.	https://www.techopedia.com/definition/29875/data-center-monitoring
3.	https://searchstorage.techtarget.com/definition/storage-virtualization
4.	https://www.javatpoint.com/storage-virtualization

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE22	**Intelligent Information Retrieval**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Infer Boolean and vector space model, text index construction and scoring
- Develop intelligent systems by applying the methods such as Prediction, Forecasting, Classification, Clustering and Optimization
- Build working systems that assist users in finding useful information on the Web

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Describe the information retrieval system using model	K2
CO2: Construct the variety of information retrieval models and techniques	K3
CO3: Penetrate the retrieval models and analyse classification and clustering methods	K3
CO4: Interpret the internet connectivity and web	K2
CO5: Analyse the web applications and online information retrieval systems	K4

Pre-requisites

Information security, Natural language processing

CO /PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2		2	1									3	2
CO 2	3		2	2	3								3	2
CO 3	3	2	1	3	3								3	2
CO 4	2		2	2	2								3	1
CO 5	1	2	3	1									3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	FUNDAMENTALS OF IR SYSTEMS, MODELS AND INDEXING	Periods	9
Overview of IR Systems, Information retrieval using the Boolean model, The dictionary and postings lists, Tolerant retrieval, Automatic Indexing, Index construction and compression, Scoring, Vector space model and term weighting			
Unit–II	**DOCUMENT REPRESENTATION AND ANALYSIS**	Periods	**9**
Statistical Characteristics of Text, Regular Expressions, Text Normalization, Edit Distance, N- Gram Language Models, Naive Bayes and Sentiment Classification-Logistic Regression for Document Analysis, Data Structure and File Organization for IR, Evaluation in information retrieval-Relevance feedback			
Unit – III	**RETRIEVAL MODELS AND TEXT CLASSIFICATION**	Periods	**9**
Similarity Measures and Ranking, Boolean Matching, Vector Space Models, Probabilistic Models, XML Retrieval, Language models for information retrieval – Text classification – vector space classification – support vector machines and machine learning on documents			
Unit– IV	**WEB SEARCH ANALYSIS**	Periods	**9**
Web search basics. web characteristics-index size and estimation- near duplicates and shingling-web crawling-distributing indexes- connectivity servers-link analysis-web as a graph-Page Rank- Hubs and authoritative pages- summarization-question answering			
Unit-V	**WEB MINING AND ONLINE IR SYSTEMS**	Periods	**9**
Web mining and its applications-Mining Twitter, Facebook, Instagram, LinkedIn, Mailboxes and GitHub. Online IR systems- online public access catalogs-digital libraries-architectural issues-document models -representations and access protocols			
		Total Periods	**45**

References

1.	D. Jurafsky, and J. Martin, Speech and language processing : an introduction to natural language processing, computational linguistics, and speech recognition, Pearson Prentice Hall, Second Edition (2013)
2.	Ricardo Baezce Yates, Berthier Ribeiro-Neto, Modern Information Retrieval: The Concepts and Technology behind Search (2ndEd, 2010)

E-Resources

1.	https://web.stanford.edu/~jurafsky/slp3/ed3book.pdf
2.	https://ciir.cs.umass.edu/irbook/
3.	https://link.springer.com/book/10.1007/978-3-642-14929-0

VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode– 637205

Programme	**M.E.**	Programme code	**201**	Regulation	**2023**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE23	**INTELLIGENT SYSTEMS**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand Artificial Intelligence (AI)
- Learn to solve real world problems for which solutions are difficult
- Express traditional algorithmic approach
- Explore the essential theory behind methodologies for developing systems
- Learning from experience and following problem solving strategies found in nature

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Demonstrate knowledge of the fundamental principles of intelligent systems	K3
CO2: Analyze and compare the relative merits of a variety of AI problem solving techniques.	K3
CO3: Evaluate traditional algorithmic approach	K3
CO4: Demonstrate intelligent behavior including dealing with uncertainty	K4
CO5: Solve real world problems for which solutions are difficult	K4

Pre-requisites

CO /PO Mapping
(3/2/1indicates strength of correlation) 3-Strong, 2–Medium,1 -Weak

CO/PSO Mapping

COs	Programme Outcomes(POs)												PSOs			
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO2**		
CO 1	2	3	3		2			1			3	2	2	2		
CO 2	2	2	3		2			1			3	2	2	2		
CO 3	2	2	3		2			2			3	2	2	2		
CO 4	2	2	3		2			1			3	2	2	2		
CO 5	2	2	3		3			2			3	2	2	2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	INTRODUCTION	Periods	9
Biological foundations to intelligent systems I: Artificial neural networks, Back propagation networks, Radial basis function networks, and recurrent networks.			
Unit–II	**BIOLOGICAL FOUNDATIONS**	Periods	**9**
Biological foundations to intelligent systems II: Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks.			
Unit – III	**SEARCH METHODS**	Periods	**9**
Search Methods Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill climbing search. Optimization and search such as stochastic annealing and genetic algorithm.			
Unit– IV	**KNOWLEDGE REPRESENTATION METHODS**	Periods	**9**
Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.			
Unit-V	**LEARNING TECHNIQUES**	Periods	**9**
Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning.			
		Total Periods	**45**

References

1.	Luger G.F. and Stubblefield W.A. (2008). Artificial Intelligence: Structures and strategies for Complex Problem Solving. Addison Wesley, 6th edition.
2.	Russell S. and Norvig P. (2010). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd edition.
3	Artificial Intelligence (6^{th} Edition), Luger, Addison Wesley, 2009

E-Resources

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2.	https://microtek.ac.in/assets/courses/bca/InformedSearchinAI
3.	https://www.cs.uic.edu/~liub/teach/cs511-spring-06/cs511-uncertainty.doc

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Programme	**M.E. / M.Tech.**	Programme code		Regulation	**2023**
Department	**CSE & IT**			Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE24	**Mining Massive Datasets**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Managing immense amounts of data quickly using MapReduce.
- Examining data for similar items.
- Efficient mining of data streams.
- Analyzing large-scale data derived from social-networks.
- Online advertising and Recommender systems

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Use Map Reduce to handle large amount of data.	K2
	CO2: Analyze similarity problem as finding sets with large intersection and also to test the degree of similarity among data.	K4
	CO3: Summarize data streams, filter it and efficiently store it for future use.	K3
	CO4: Identify communities, similarity among nodes of a graph, measure the connectedness of community, and measure the neighborhood size of nodes in a graph.	K2
	CO5: Use algorithms to address issues like matching problems and ad words problem.	K2

Pre-requisites: Data Warehousing and Data Mining

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	-	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	-	1	2	1		2	2
CO 3	3	2	2	3	1	3	-	-	1	2	1		3	2
CO 4	3	3	3	2	1	2	-	-	1	2	2		1	2
CO 5	3	3	2	2	1	2	-	-	1	2	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit - I	**INTRODUCTION TO DATA WAREHOUSING**	Periods	**9**
Introduction to Data Mining - Statistical limits on data mining - Introduction to Distributed File Systems- MapReduce - Algorithms using MapReduce - Communication cost model - Complexity Theory for MapReduce.			
Unit - II	**SIMILARITY SEARCH**	Periods	**9**
Similarity Search - Applications of nearest - neighbour search - Shingling of Documents – Similarity - preserving summaries of sets - Locality - Sensitivity hashing for documents - Distance measures - Theory of locality-Sensitive functions - Applications - Methods for high degrees of similarity.			
Unit - III	**MINING DATA STREAMS AND LINK ANALYSIS**	Periods	**9**
Mining Data streams - Stream data model - Sampling data in a Stream - Filtering streams - Counting distinct elements in a stream- Estimating moments - Link analysis – Page rank - Efficient computation of Page rank - Topic-sensitive page rank - Link spam - Hubs and Authorities.			
Unit - IV	**MINING SOCIAL NETWORKS**	Periods	**9**
Social networks as graphs - Clustering of social-network graphs - Direct discovery of communities - Partitioning of graphs - Finding overlapping communities - Simrank – Counting triangles - Neighborhood properties of graphs.			
Unit - V	**ONLINE ADVERTISING AND RECOMMENDATION SYSTEMS**	Periods	**9**
Advertising on Web: Issues- Online Algorithms- Matching Problems - Adwords Problem - Implementation – Recommendation Systems: Model – Content based Recommendation- Collaborative Filtering-Dimensionality Reduction.			
		Total Periods	**45**

References

1.	Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of massive Datasets", Cambridge University Press, 2014.
2.	Jimmy Lin, Chris Dyer, “Data-Intensive Text Processing with Map Reduce”, Cambridge University Press, 2013.
3.	James Abello, Panos M. Pardalos, Mauricio G. C. Resende (editors), “Handbook of Massive Data Sets”, Kluwer Academic Publishers, 2002.
4.	Lei Tang, Huan Liu, “Community Detection and Mining in Social Media”, Morgan & Claypool Publishers, 2010.

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1.	https://en.wikipedia.org/wiki/Data_stream_mining
2.	https://www.digitalvidya.com/blog/introduction-to-data-warehousing/
3.	http://infolab.stanford.edu/~ullman/mmds/book.pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**Computer Science and Engineering**			Semester			

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE25	**Multimedia Systems**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Describe the ways in which multimedia information is captured, processed, and rendered. • Introduce multimedia quality of service (QoS) • Compare subjective and objective methods of assessing user satisfaction, • Discuss the ways in which multimedia data is transmitted across networks, • Discuss privacy and copyright issues in the context of multimedia.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Describe different realizations of multimedia tools and the way in which they are used.	K2
	CO2: Analyze the structure of the tools in the light of low-level constraints imposed by the adoption of various QoS schemes	K2
	CO3: Analyze the effects of scale and use on both presentation and lower-level requirements.	K4
	CO4: State the properties of different media streams;	K4
	CO5: Compare and contrast different network protocols and to describe mechanisms for providing QoS guarantees in the network.	K2
Pre-requisites	-	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	2	-	-	-	-	1	2	1		3	2
CO 2	3	3	3	2	-	-	-	-	1	2	1		2	2
CO 3	3	3	2	2	-	-		-	1	2	1		3	2
CO 4	3	3	3	2	-	-	-	-	1	2	1		1	1
CO 5	3	3	2	2	-	-	-	-	1	2	1		2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION	Periods	9
An overview of multimedia system – media streams- Fourier Transform- Audio Basics.			
Unit – II	**REPRESENTATION AND COMPRESSION TECHNIQUES**	Periods	**9**
Source representation and compression techniques text, speech and audio, still image and video – Graphics and animation.			
Unit - III	**MULTI-MODAL AND MULTIMEDIA COMMUNICATION**	Periods	**9**
Multi-modal communication –Multimedia communication, video conferencing, video-on-demand broadcasting issues, traffic shaping and networking support.			
Unit - IV	**IP-BASED TRANSPORT**	Periods	**9**
Networked multimedia applications- Streaming Media with TCP-Streaming Media with UDP Real-time Transport Protocol (RTP)-RTP header compression-Application-level adaptation-FEC and redundant coding.			
Unit - V	**SYNCHRONIZATION AND QoS**	Periods	**9**
Multimedia servers, databases and content management – Multimedia information system and applications.			
		Total Periods	**45**

References	
1.	Ralf Steinmetz and Klara Nahrstedt, Multimedia Systems, Springer,2013.
2.	J. D. Gibson, Multimedia Communications: Directions and Innovations, Springer, 2009.
3.	K. Sayood, Introduction to Data Compression, Morgan-Kaufmann, 2012.
4.	A. Puri and T. Chen, Multimedia Systems, Standards, and Networks, Marcel Dekker, 2000.
5.	Iain E.G. Richardson, H.264 and MPEG-4 Video Compression, John Wiley, 2013.

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1.	https://lecturenotes.in/subject/133/multimedia-systems-ms
2.	http://www.cse.unsw.edu.au/~cs9519/lecture_notes_06/L1_COMP9519_4in1.pdf
3.	https://www.cc.gatech.edu/fac/Ann.Chervenak/8113/8113.html

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester			
Course code	Course name	Periods per week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
P23CSE26	**REALTIME OPERATING SYSTEMS**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Read and understand sample open source programs and header files. • Understand the implementation of the Linux file system. • Study Linux memory management data structures and algorithms. • Acquire the knowledge in the implementation of interprocess communication. • Understand how program execution happens in Linux.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain the functionality of a large software system by reading its source.	K2
	CO2: Learn how the processes are implemented in linux	K3
	CO3: Revise any algorithm present in a system.	K4
	CO4: Design a new algorithm to replace an existing one.	K4
	CO5: Appropriately modify and use the data structures of the Linux kernel for a different software system.	K2
Pre-requisites	Operating Systems	

CO /PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1 -Weak													**CO/PSO Mapping**		
COs	Programme Outcomes(POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO1**	**PSO2**	
CO 1	3	3	3	1	2	2	1	1	2	1	2		3	2	
CO 2	2	2	3	3	2	2	1	2	1	2	1		2	2	
CO 3	3	3	2	3	1	3	1	3	2	1	1		3	2	
CO 4	2	2	3	2	2	2	1	1	1	2	2		2	1	
CO 5	3	3	2	2	1	1	1	2	1	1	1		2	1	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	INTRODUCTION	Periods	9
Basic Operating System Concepts - Overview of Unix File System - Files - Links - Types - Inodes -Access Rights - System Calls - Overview of Unix Kernels -Model - Implementation - Reentrant Kernels - Address Space - Synchronization - Interprocess Communication - Process Management - Memory Management - Device Drivers.			
Unit–II	**PROCESSES**	Periods	**9**
Processes, Lightweight Processes, and Threads - Process Descriptor - State - Identifying a Process - Relationships among processes - Organization - Resource Limits - Creating Processes - System Calls - Kernel Threads - Destroying Processes -Termination - Removal.			
Unit – III	**FILE SYSTEM**	Periods	**9**
The Virtual File System (VFS) - Role - File Model -System Calls - Data Structures - Super Block, Inode, File, dentry Objects - dentry Cache - Files Associated with a Process – File system Types - Special File systems – File system Type Registration – File system Handling - Namespaces - Mounting - Unmounting - Implementation of VFS System Calls.			
Unit– IV	**MEMORY MANAGEMENT**	Periods	**9**
Page frame management -page descriptors - non-uniform memory access - memory zones - reserved page frames - zoned page frame allocator - kernel mappings - buddy system algorithm - page frame cache - zone allocator.			
Unit-V	**PROCESS COMMUNICATION AND PROGRAM EXECUTION**	Periods	**9**
Process Communication - Pipes -Usage - Data Structures - Creating and Destroying a Pipe - Reading From and Writing into a Pipe. Program Execution - Executable Files - Process Credentials - Command-Line Arguments and Shell Environment - Libraries - Program Segments and Process Memory Regions - Execution tracing - Executable Formats - Execution Domains - The exec Functions.			
		Total Periods	**45**

References

1.	Harold Abelson, Gerald Jay Sussman and Julie Sussman, ―Structure and Interpretation of Computer Programs, Second Edition, Universities Press, 2013.
2.	Daniel P. Bovet and Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly Publications, 2005.
3.	Maurice J. Bach, ―The Design of the Unix Operating System‖ 1st Edition Pearson Education, 2003.

E-Resources

1.	https://en.wikipedia.org/wiki/Real-time_operating_system
2.	https://www.tutorialspoint.com/operating_system/os_processes.htm
3.	https://www.tutorialspoint.com/operating_system/os_file_system.htm
4.	https://www.geeksforgeeks.org/inter-process-communication-ipc/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester				
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSE27	**Security Principles and Practices**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the mathematical foundations of security principles • Appreciate the different aspects of encryption techniques • Understand the role played by authentication in security • Appreciate the current trends security practices • Understand the real time requirements of data security	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Use the mathematical foundations in security principles	K2
	CO2: Identify the features of encryption and authentication.	K2
	CO3: Use authentication techniques	K2
	CO4: Identify the importance of security practices	K2
	CO5: Analyze the need of information security	K4
Pre-requisites		

CO /PO Mapping
(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1 -Weak

COs	Programme Outcomes(POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	2	2			1	2			2	2
CO 2	3	3	2	3	2	1			1	2			2	1
CO 3	2	3	2	3	1	3			1	2			3	1
CO 4	3	2	3	2	1	2			1	2			1	1
CO 5	3	3	2	2	1	1			1	2			3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect

1.Course -end survey

Content of the syllabus

Unit -I	INTRODUCTION AND MATHEMATICAL FOUNDATION	Periods	9
An illustrative communication game – safeguard versus attack – Probability and Information Theory - Algebraic foundations – Number theory.			
Unit-II	**ENCRYPTION–SYMMETRIC TECHNIQUES**	Periods	**9**
Substitution Ciphers – Transposition Ciphers – Classical Ciphers – DES – AES – Confidentiality Modes of Operation – Key Channel Establishment for symmetric cryptosystems.			
Unit-III	**ENCRYPTION – ASYMMETRIC TECHNIQUES AND DATA TECHNIQUES**	Periods	**9**
Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Need for stronger Security Notions for Public key Cryptosystems – Combination of Asymmetric and Symmetric Cryptography – Key Channel Establishment for Public key Cryptosystems - Data Integrity techniques – Symmetric techniques - Asymmetric techniques			
Unit-IV	**AUTHENTICATION**	Periods	**9**
Authentication Protocols Principles – Authentication protocols for Internet Security – SSH Remote logic protocol – Kerberos Protocol – SSL & TLS – Authentication frame for public key Cryptography – Directory Based Authentication framework – Non - Directory Based Public-Key Authentication framework			
Unit-V	**SECURITYPRACTICES**	Periods	**9**
Protecting Programs and Data – Information and the Law – Rights of Employees and Employers – Software Failures – Computer Crime – Privacy – Ethical Issues in Computer Security			
		Total Periods	**45**

References:

1.	William Stallings, ―Crpyptography and Network security: Principles and Practices‖, Pearson/PHI, 7th Edition, 2017.
2.	Behrouz A. Forouzan, ―Cryptography and Network Security‖, 2nd Edition, Tata McGraw Hill Education, 2010.
3.	Wade Trappe, Lawrence C Washington, ―Introduction to Cryptography with coding theory‖, 2nd Edition, Pearson, 2007.
4.	DouglasR.Stinson,―CryptographyTheoryandPractice‖,3rdEdition,Chapman&Hall/CRC,2006.
5.	W. Mao, ―Modern Cryptography– Theory and Practice‖, Pearson Education, 2nd Edition, 2007.
6.	Charles P. Pfleeger, Shari Lawrence Pfleeger, ―Security in computing‖, 3rd Edition, Prentice Hall of India, 2006.
7.	Wenbo Mao, ―Modern Cryptography – Theory and Practice‖, Pearson Education, 2006.
8.	Charlie Kaufman, Radia Perlman and Mike Speciner, ―Network Security Private Communication in a Public World‖, PHI, Second Edition, 2012.

E-Resources

1.	https://www.tutorialspoint.com/mathematical-foundation-introduction
2.	https://www.cryptomathic.com/news-events/blog/symmetric-key-encryption-why-where-and-how-its-used-in-banking
3.	http://indexof.es/Hack/Information%20Security%20Principles%20and%20Practice%202nd%20Edition%20-%20Stamp.pdf

Open Electives

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	-			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSOE1	**Business Analytics**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the Analytics life cycle • Comprehend the process of acquiring business intelligence • Understand various types of analytics for business forecasting • Model the supply chain management for analytics • Apply analytics for different functions of a business	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Navigate through the analytics life cycle, including types of analytics, business problem definition, data collection, and data preparation	K2
	CO2: Grasp the principles of knowledge management and different types of business decisions	K2
	CO3: Interpret results/solutions and identify appropriate type of analytics for business forecasting	K3
	CO4: Apply analytics to human resources for planning, recruitment, training, and development.	K3
	CO5: Analyze customer behavior to enhance marketing effectiveness	K4
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	2	3	3					2	2	1		3	2
CO 2	3	3	3	3					2	2	1		2	2
CO 3	3	2	2	3					2	2	1		3	2
CO 4	3	3	3	2					2	2	1		1	1
CO 5	3	3	2	2					2	2	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO BUSINESS ANALYTICS**	Periods	**9**
Analytics and Data Science – Analytics Life Cycle – Types of Analytics – Business Problem Definition – Data Collection – Data Preparation – Hypothesis Generation – Modeling – Validation and Evaluation – Interpretation – Deployment and Iteration.			
Unit - II	**BUSINESS INTELLIGENCE**	Periods	**9**
Data Warehouses and Data Mart – Knowledge Management – Types of Decisions – Decision Making Process – Decision Support Systems – Business Intelligence – OLAP – Analytic functions.			
Unit – III	**BUSINESS FORECASTING**	Periods	**9**
Introduction to Business Forecasting and Predictive analytics – Logic and Data Driven Models – Data Mining and Predictive Analysis Modelling – Machine Learning for Predictive Analytics.			
Unit – IV	**HR & SUPPLY CHAIN ANALYTICS**	Periods	**9**
Human Resources - Planning and Recruitment - Training and Development - Supply chain network - Planning Demand, Inventory and Supply - Logistics - Analytics applications in HR & Supply Chain.			
Unit – V	**MARKETING & SALES ANALYTICS**	Periods	**9**
Marketing Strategy, Marketing Mix, Customer Behaviour - Selling Process - Sales Planning - Analytics applications in Marketing and Sales. Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.			
		Total Periods	**45**

References	
1.	Business Analysis by james cadle et al. 2016
2.	Project Management: The Managerial Process, 7th Edition, By Erik Larson and Clifford Gray, ISBN10: 1259666093, 2018.
3.	U Dinesh Kumar, “Business Analytics: The science of Data Driven Decision Making”, Wiley, 2017.
4.	R N Prasad, Seema Acharya, “Fundamentals of Business Analytics”, 2nd Edition, Wiley, 2016.

E-Resources	
1.	https://www.coursehero.com/file/12169371/MBA-I-BUSINESS-ANALYTICS-14MBA14-NOTES/
2.	https://michael.hahsler.net/SMU/EMIS3309/slides/Evans_Analytics2e_ppt_01.pdf
3.	https://www.youtube.com/watch?v=UqUA5QReVik

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**-**		

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSOE2	**Machine Learning Techniques**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Analyze the text data using Machine Learning • Analyze the audio data using Machine Learning • Analyze Time Series and Sequential Data using Machine Learning • Analyze Image content using Machine Learning • Visualize the data	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the basic preprocessing techniques and machine learning techniques.	K2
	CO2: Identifying patterns in text using topic modeling.	K2
	CO3: Building a speech recognizer.	K2
	CO4: Extracting statistics from time series data, Building Conditional Random Fields for Sequential text data.	K3
	CO5: Build an object recognizer.	K2
Pre-requisites	Python Programming	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	2	3	2	1	-	-	1	2	1		3	3
CO 2	3	3	2	2	2	2	-	-	1	2	1		2	2
CO 3	3	3	2	3	1	2	-	-	1	3	1		3	3
CO 4	3	3	3	2	1	1	-	-	1	2	1		2	1
CO 5	3	3	2	2	1	1	-	-	1	3	1		3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**9**

Definition – Types and applications of ML – AI vs ML - Essential Math for ML and AI – Supervised Learning – Linear methods for classification and Regression – Support Vector Machines – Basis Expansions – Model Selection procedures

Unit – II	UNSUPERVISED LEARNING & NEURAL NETWORK	Periods	9
Introduction to unsupervised Learning – Association Rules – Cluster Analysis – Reinforcement learning – Kmeans Clustering – Neural Network – Perception – Back propagation Algorithm – Training - Convolutional Neural Networks – Introduction to Real world ML - Choosing an Algorithm – Design and anlaysis of ML – Common software for ML			
Unit – III	**TEXT FEATURE ENGINEERING**	Periods	**9**
Cleaning text data - Preprocessing data using tokenization - Tagging and categorizing words - Sequential tagging, Backoff tagging - Creating features from text data-Stemming - Lemmatising - Bagging using random forests - Implementing bag of words - Testing prepared data - Analyze the results - Building a text classifier - Analyzing the sentiment of a sentence - Topic Modeling			
Unit – IV	**TIME SERIES AND SEQUENTIAL DATA**	Periods	**9**
Transforming data into the time series format - Pandas and Numpy to convert Time Series data - Plotting time series data - Slicing time series data - Plotting sliced time series data - Operating on time series data - Extracting statistics from time series data - Correlation coefficients - Building Hidden Markov Models for sequential data - Prepare the Time Series data - Train Gaussian HMM - Visualizing the model - Building Conditional Random Fields for sequential text data - CRF Model.			
Unit – V	**IMAGE CONTENT ANALYSIS**	Periods	**9**
Operating on images using OpenCV- Python - Learn to extract and load the image - Detecting edges - Sobel filter - Laplacian edge detector - Canny edge detector - Visualize gray scale image - Detecting corners - Detecting SIFT feature points - SIFT feature detection - Visualize the feature detected image - Building a Star feature detector - Visualize key points on the input image – Visual code book and vector quantization - Method to quantize the data points.			
		Total Periods	**45**

References

1.	Zach Mershke, Jonathan Fitzpatrick, “Machine Learning for Absolute Beginners”, 2019
2.	Prateek Joshi and co, “Python:Real World Machine Learning”,Packt Publishing, 2016
3.	2016Sebastian Raschka, “Python Machine Learning”,PacktPublishing,2013.
4.	Richert Coelho, “Building Machine Learning Systems with Python”,PacktPublishing,2016
5.	Michael Bowles, “Machine Learning in Python”,Wiley&Sons,2015

E-Resources

1.	https://github.com/Shivam967/Machine_Learning_Books/blob/master/2(a)Python-real-world-machine-learning-prateek-joshi(www.ebook-dl.com).pdf
2.	https://github.com/Shivam967/Machine_Learning_Books/blob/master/2.Building-machine-learning-systems.pdf
3.	https://github.com/Shivam967/Machine_Learning_Books/blob/master/3.Designing-Machine-Learning-Systems-with-Python-David-Julian(www.ebook-dl.com).pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	-		

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSOE3	**Web Engineering**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the characteristics of web applications • Learn to Model web applications • Be aware of Systematic methods • Be familiar with the testing techniques for web applications	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Apply the characteristics of web applications	K2
	CO2: Learn to model web applications.	K2
	CO3: Design web applications	K2
	CO4: Knowledge in testing techniques of web applications	K3
	CO5: Develop a real time web applications	K2
Pre-requisites	-	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	2	2	2	-	-	1	2	1		3	2
CO 2	3	3	3	2	2	1	-	-	1	2	1		2	2
CO 3	3	2	2	3	1	2	-	-	1	2	1		3	2
CO 4	3	2	3	2	2	1	-	-	1	2	1		2	1
CO 5	3	3	2	3	1	2	-	-	1	2	1		2	3

CO/PSO Mapping

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION TO WEB ENGINEERING**	Periods	**9**

Motivation - Categories of Web Applications - Characteristics of Web Applications. Requirements of Engineering in Web Applications - Web Engineering - Components of Web Engineering - Web Engineering Process - Communication - Planning.

Unit - II	ARCHITECTURES & MODELLING WEB APPLICATIONS	Periods	9
Introduction - Categorizing Architectures - Specifics of Web Application Architectures - Components of a Generic Web Application Architecture - Data- aspect Architectures - Centric Architectures - Architectures for Web Document Management - Architectures for Multimedia Data - Hypertext Modeling - Hypertext Structure Modeling Concepts - Access Modeling Concepts - Customization Modeling - Modelling Framework - Modeling languages - The Content Model - The Interaction Model - Configuration Model			
Unit – III	**DESIGN WEB APPLICATION**	Periods	**9**
Design for WebApps - Goals - Design Process - Interactive Design - Principles and Guidelines - Workflow - Preliminaries - Design Steps - Usability - Issues - Information Design - Information Architecture - structuring - Accessing Information - Navigation Design - Functional Design - Web App Functionality - Design Process - Functional Architecture - Detailed Functional Design.			
Unit – IV	**TESTING**	Periods	**9**
Introduction - Fundamentals - Test Specifics in Web Engineering - Test Approaches - Conventional Approaches - Agile Approaches - Testing concepts - Testing Process - Test Scheme - Test Methods and Techniques - Link Testing - Browser Testing - Usability Testing - Load - Stress - and Continuous Testing - Testing Security - Test - driven Development - Content Testing - User Interface testing - Usability Testing - Compatibility Testing - Component Level Testing - Navigation Testing - Configuration testing - Security and Performance Testing - Test Automation.			
Unit – V	**WEB PROJECT MANAGEMENT**	Periods	**9**
Introduction - challenges in launching the web Application - Promoting Web Application - Content Management - Usage Analysis - Web Project Management - Challenges in Web Project Management - Managing Web Team - Managing the Development Process of a Web Application - Risk - Developing a Schedule - Managing Quality - Managing Change - Tracking the Project. Introduction to node JS - web sockets.			
		Total Periods	**45**

References

1.	Chris Bates, “Web Programming: Building Internet Applications‖”, Third Edition, Wiley India Edition, 2007.
2.	GertiKappel, Birgit Proll, “Web Engineering”, John Wiley and Sons Ltd, 2006.
3.	Guy W. Lecky-Thompson, “Web Programming”, Cengage Learning, 2008.
4.	John Paul Mueller, “Web Development with Microsoft Visual Studio 2005”, Wiley Dream tech, 2006.

E - Resources

1.	https://www.tutorialspoint.com/web_development_tutorials.htm
2.	https://web-engineering.info/
3.	https://www.w3schools.com/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**-**		

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSOE4	**Cost Management of Engineering Projects**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the cost estimating methods • Understand skills and tools for development of project cost estimate • Develop a cost baseline for engineering project • Understand the cost baseline management and control	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the inception of project in organization strategies.	K2
	CO2: Learn to estimate the project.	K2
	CO3: Understand the process and techniques in monitoring process,	K2
	CO4: Design the procedure to formulate resolution for unexpected changes.	K2
	CO5: Understand estimation and cost management issues.	K2
Pre - requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3 - Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	3	1	-	-	1	2	1		3	2
CO 2	3	3	2	2	2	2	-	-	1	2	1		2	2
CO 3	3	3	2	3	2	2	-	-	1	3	1		3	2
CO 4	3	3	3	2	2	1	-	-	1	2	1		2	1
CO 5	3	3	2	2	2	1	-	-	1	3	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End - Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**9**

Project scope and objective – Organization Objectives – Project Selection – Deliverable Oriented Work Breakdown Structure – WBS Development steps - -Division bases – Comparison of Different Bases – Process Oriented Projects – Organizational Priorities – Semantics – Changing the paradigm – Case study.

Unit - II	RESOURCE BREAKDOWN STRUCTURE	Periods	9
Nomenclature, Dimensions and units – Resource breakdown structure – RBS development – Primary Division basis – Lower level Division Bases with a Concentration on Human resources – Estimating the costs – Case study.			
Unit – III	**ESTIMATING MODELS**	Periods	**9**
Accuracy – Parametric Estimating – Modular Estimating – Parametric Model – Analogous Estimating – Ratio Estimating – Three Quarters Rule – Square root rule – Two third rule – Range Estimating – Expert Judgement – Normalization.			
Unit – IV	**PROGRESS MONITORING & COST MANAGEMENT**	Periods	**9**
Developing a Monitoring Plan – Elements of Monitoring – Earned Value – Productivity – Cost Management – Causes of change – Feed Forward Technique – Impact of schedule on cost – Lifecycle costs – Impact of Project Risk			
Unit – V	**EXTERNAL PROJECTS**	Periods	**9**
Specifications – Contracts – Responses of Specifications – Bidding – Project Costs – Direct Costs – Indirect Costs – Overhear – Allowance – Contingency – Project Audit – Case study to estimate project cost.			
		Total Periods	**45**

References

1.	Rory Burke, “Project Management Planning And Control Techniques”, 4th Edition, Wiley, 2009.
2.	Parviz F Rad, “Project Estimating and Cost Management”, Management Concepts, 2002
3.	Meredith, Mante, Shafer, “Project Management, A Managerial Approach”, Wiley, 2017
4.	Nikolay Voutchkov, “Desalination Project Cost Estimating and Management”, CRC Press.

E - Resources

1.	https://www.researchgate.net/publication/283210199_Project_Cost_Management
2.	http://dl.icdst.org/pdfs/files1/ae669b3503986d2d2844843a81559aff.pdf
3.	https://www.technicalbookspdf.com/project-estimating-and-cost-management-by-parviz-f-rad/

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Programme	**M.E.**	Programme code	**201**	Regulation	**2023**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**-**			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23CSOE5	**Internet of Things**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the basic concepts of IoT and its possible application areas • Understand the various IoT architectures along with compute and management stack across layers • Understand the architecture dissected at physical, Communication and Access levels • Understand the various enabling technologies for IoT including Big data analytics, Machine learning, Cloud and Streaming analytics • Understand the underlying business model for IoT	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Appreciate the omnipotent presence of IoT in all fields across globe.	K2
	CO2: Compare and contrast various architectures and be able to justify the right choice for adoption.	K2
	CO3: Choose appropriate protocols for various levels/layers based on the requirement in hand.	K2
	CO4: Implement using the available resources and demonstrate quickly to deployment skills wherever applicable.	K3
	CO5: Apply the tools and techniques towards integration in relevant areas of IoT product development.	K2
Pre - requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3 - Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	3	2	-	-	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	-	1	2	1		2	2
CO 3	3	3	2	3	2	3	-	-	1	2	1		3	2
CO 4	3	3	3	2	1	2	-	-	1	2	1		2	3
CO 5	3	3	2	2	2	2	-	-	1	2	1		2	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End - Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION TO IOT	Periods	9
Architecture of Internet of Things: Physical - Things - Protocols - an Introduction - Logical - Functional Blocks - Logical - Communication Models - Logical - Communication API - IOT enabling technologies - Introduction to IoT Levels and Deployments - IoT Security and Privacy - IoT Data Analytics - Protocols - IoT Environmental challenges: Excess waste disposal - Legal Challenges - Framework - a youth perspective - Privacy Enhancing Technologies for IoT			
Unit - II	**NETWORK ARCHITECTURES**	Periods	**9**
Comparing IoT Architectures - The IoT World Forum (IoTWF) - Standardized Architecture - IT and OT Responsibilities in the IoT - Reference Model - a simplified IoT architecture - The core IoT functional stack - Layer 1: Things: Sensors Layer - Actuators Layer - Layer 2: Communications Network Layer: Access - Gateway - Network - Management - Layer 3: Applications and Analytics Layer: Analytics Versus Control Applications - Data Versus Network Analytics - Benefits - Smart Services - IoT Data Management And Compute Stack: The Hierarchy Of Edge - Fog - And Cloud - Fog Computing - Edge Computing			
Unit – III	**SMART OBJECTS**	Periods	**9**
Sensors - Actuators - and Smart Objects - Micro - Electro - Mechanical Systems (MEMS) - Smart Objects - Smart Objects: A Definition Trends in Smart Objects Sensor Network - Wireless Sensor Networks (WSNs) - Communication Protocols for Wireless Sensor Networks - Communication Criteria - Definitions - Introduction to IoT Access Technologies - IoT Application transport methods - The Toolkit Approach for End - user Participation in the Internet of Things - Existing Toolkits - I/O Boards - HW Based Systems - Introduction to Open source boards (Arduino - Raspberry Pi and other variants) - SW Based Solutions			
Unit – IV	**DATA ANALYTICS FOR IoT - OVERVIEW**	Periods	**9**
IoT Data Analytics Challenges - Overview to Relevance of ML and IoT - Overview to Relevance of Big data and IoT - Overview to ML and getting Intelligence from Big Data - Overview to Big data analytics tools and techniques for IoT - MPP - NoSQL - Hadoop and YARN - Hadoop Eco system - Apache Kafk - Spark - Storm - Flink - Lamba Architecture - Edge Streaming Analytics for IoT - Network Analytics			
Unit – V	**BUSINESS MODELS FOR IoT**	Periods	**9**
Business Models - Business Model Innovation - Value Creation in IoT - Laws of Information - Revenue Generation in the Internet of Things - Exemplary Business Model - Scenarios for the Internet of Things - Scenario 1: Product as a Service (PaaS) - Scenario 2: Information Service Providers - Scenario 3: End - user Involvement - Scenario 4: Right - time Business - Analysis and Decision making			
		Total Periods	**45**

References

1.	Arshdeep Bahga, Vijay Madisetti, “Internet of Things, A Hands - on Approach”, 1st Edition 2015, University Press, ISBN: 978 - 81 - 7371 - 954 - 7
2.	Rolf, H. Weber and Romana Weber, “Internet of Things: Legal Perspectives”, Springer, 2010
3.	Uckelmann, D., Harrison, M., &Michahelles, F. (Eds.), “Architecting the Internet of Things”, Springer, 2011
4.	Rob Barton, Gonzalo Salgueiro, David Hanes, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, Cisco Press, 2017.

E - Resources

1.	https://www.oreilly.com/library/view/iot - fundamentals - networking/9780134307091/
2.	https://forms1.ieee.org/IOT - eLearning- Program.html
3.	https://www.nist.gov/topics/internet - things - iot

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2023**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**-**		
Course code	Course name	Periods per week			Credit	Maximum Marks	
P23CSOE6	**Data Science and Analytics**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made to, • Provide you with the knowledge and expertise to become a proficient data scientist. • Demonstrate an understanding of statistics and machine learning concepts that are vital for data science; • Produce Python code to statistically analyse a dataset • Critically evaluate data visualisations based on their design and use for communicating stories from data;	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain how data is collected, managed and stored for data science	K2
	CO2: Explain how data is collected, managed and stored for data science	K2
	CO3: Understand real-world applications	K2
	CO4: Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists	K2
	CO5: Implement data collection and management scripts using MongoDB	K3
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	3	3	2	2	-	1	1	2	1		3	2
CO 2	3	3	3	3	2	2	-	-	1	2	1		2	2
CO 3	3	3	2	3	1	3	-	1	1	2	1		3	2
CO 4	3	3	3	1	1	2	2	-	1	2	1		2	1
CO 5	3	3	2	2	1	2	-	-	1	2	1		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	INTRODUCTION	Periods	9
Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.			
Unit - II	**DATA COLLECTION AND MANAGEMENT**	Periods	**9**
Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources			
Unit - III	**DATA ANALYSIS**	Periods	**9**
Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.			
Unit - IV	**DATA VISUALISATION**	Periods	**9**
Data visualization: Introduction, Types of data visualisation, Data for visualisation: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.			
Unit - V	**APPLICATIONS**	Periods	**9**
Applications of Data Science Technologies for visualisation, Bokeh (Python)- Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.			
		Total Periods	**45**

References

1.	Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly 2013.
2.	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.2012.
3.	Arshdeep Bahga, Vijay Madisetti, "Big Data Science and Analytics", 1st Edition, VPT, 2016
4.	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data

E-Resources

1.	https://link.springer.com/article/10.1023/A:1012489924661
2.	http://www.crectirupati.com/sites/default/files/lecture_notes/NNFL.pdf
3.	http://www.cs.ubc.ca/labs/beta/Courses/CPSC532D-02/tutorial-slides.pdf

Audit Courses

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E. /M.Tech.**	Programme Code			Regulation	**2023**		
Department					Semester	--		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC001	**Research Process and Methodologies**	2	0	0	0	100	-	100
Course Objective	The main objective of the course is • To understand the importance of Research • To acquire knowledge in Data Collection and Analysis • To effectively write reports							
Course Outcome	At the end of the course, the student should be able to						Knowledge Level	
	CO1: Understand research problem types and data collection methods.						K2	
	CO2: Understand research design methodologies						K2	
	CO3: Analyze research related information						K4	
	CO4: Follow research ethics						K2	
	CO5: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.						K2	
Pre-requisites	--							

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2										
CO 2	3	3	3	2					2					
CO 3	3	3	3	2					2					
CO 4	3	3	3	2					2					
CO 5	3	3	3	2										

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**INTRODUCTION TO RESEARCH**	Periods	**9**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research Meaning of Research - Types of Research - Research Process - Problem definition - Objectives of Research - Research design - Approaches to Research - Quantitative vs. Qualitative Approach - Research Methods versus Methodology - Research and Scientific Method - Research Process - Criteria of Good Research.

Unit – II	RESEARCH DESIGN	Periods	9
Meaning of Research Design - Need for Research Design - Features of a Good Design - Important Concepts Relating to Research Design - Different Research Designs - Basic Principles of Experimental Designs.			
Unit – III	**DATA COLLECTION**	Periods	**9**
Data Collection: Collection of Primary Data - Observation Method - Interview Method - Collection of Data through Questionnaires - Collection of Data through Schedules - Difference between Questionnaires and Schedules - Collection of Secondary Data - Processing Operations - Elements/Types of Analysis - Statistics in Research.			
Unit – IV	**DATA ANALYSIS AND INTERPRETATION**	Periods	**9**
Data analysis - Statistical techniques and choosing an appropriate statistical technique - Hypothesis, Hypothesis testing - Data processing software (e.g. SPSS etc.) - statistical inference - Interpretation of results.			
Unit - V	**REPORT WRITING**	Periods	**9**
Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism.			
		Total Periods	**45**

References

1.	C. R. Kothari, "Research Methodology – Methods and Techniques", 2nd Edition, New Age International Publishers
2.	Bordens, K. S. and Abbott, B. B., "Research Design and Methods – A Process Approach", 8th Edition, McGraw-Hill, 2011
3.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
4.	Davis, M., Davis K., and Dunagan M., "Scientific Papers and Presentations", 3rd Edition, Elsevier Inc.

E-Resources

1.	https://www.oreilly.com/library/view/research-methodology/9789353067090/
2.	https://bbamantra.com/research-methodology/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC002	**Pedagogy Studies**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- Understand the concept of programme design through evidences.
- Illustrate the practice of innovative teaching methodology.
- Analyze the method of teacher education.
- Enhance the infrastructure in the class room.
- Elaborate the directions of future research

Course Outcome	At the end of the course, the student should be able to	Knowledge Level
	CO1: Describe about the concept of programme design through evidences	K2
	CO2: Demonstrate the practice of innovative teaching methodology	K2
	CO3: Evaluate the method of teacher education	K4
	CO4: Examine the infrastructure in the class room	K3
	CO5: Define the directions of future research	K3

Pre-requisites

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2										
CO 2	3	3	3	2										
CO 3	3	3	3	2						2	2			
CO 4	3	3	2	2						2	2			
CO 5	3	3	2	2										

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**INTRODUCTION**	Periods	**9**

Introduction and Methodology: 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	Periods	9
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.			
Unit – III	**PEDAGOGICAL PRACTICES**	Periods	**9**
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**	Periods	**9**
Professional development: alignment with classroom practices and follow-up support -Peer 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**	Periods	**9**
Research gaps and future directions, Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.			
		Total Periods	**45**

References

1.	Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2.	Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3.	Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

E-Resources

1.	https://nptel.ac.in/courses/121/105/121105010/ CO-ORDINATED BY : IIT KHARAGPUR
2.	https://nptel.ac.in/courses/109/105/109105122/ CO-ORDINATED BY : IIT KHARAGPUR

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC003	**Disaster Management**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work.
- Categorize the Risk Assessment in national level and global level.

Course Outcome	At the end of the course, the student should be able to	Knowledge Level
	CO1: Understand the effects of disaster	K2
	CO2: Analyze differences between disasters and hazards	K2
	CO3: Disaster management techniques	K3
	CO4: Risk management techniques	K3
	CO5: Elaborate the Risk assessment in world level	K4

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1					2	2	2				2	1		
CO 2					2	2	2				2	1		
CO 3					2	2	2				2	1		
CO 4					2	2	2				2	1		
CO 5					2	2	2				2	1		

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus			
Unit - I	**INTRODUCTION**	Periods	**9**
Introduction 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**	Periods	**9**
Repercussions of Disasters and Hazards: 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**	Periods	**9**
Disaster Prone Areas in India 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 PREPAREDNESS**	Periods	**9**
Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.			
Unit – IV	**RISK ASSESSMENT**	Periods	**9**
Risk Assessment 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. Disaster Mitigation Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.			
		Total Periods	**45**

References

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.

E-Resources

1.	https://www.digimat.in/nptel/courses/video/124107010/L36.html
2.	https://media.ifrc.org/ifrc/what-we-do/disaster-and-crisis-management/disaster-preparedness/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC004	**Value Education**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- To introduce the value of education and self- development.
- To interpret good values in students.
- To elaborate the importance of character.
- To distinguish the relationship and their cooperation.
- To interpret the religions and equality.

Course Outcome

At the end of the course, the student should be able to	Knowledge Level
CO1: Understand education values	K2
CO2: Analyze importance of cultivation values	K2
CO3: Importance of personality development	K3
CO4: Character maintenance	K3
CO5: Examine the religions and honesty.	K4

Pre-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2										
CO 2	3	3	3	2										
CO 3	3	3	3	2										
CO 4	3	3	3	2										
CO 5	3	3	3	2										

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**INTRODUCTION**	Periods	**9**

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation, Standards and principles, Value judgments.

Unit – II	IMPORTANCE OF CULTIVATION OF VALUES	Periods	9
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 AND BEHAVIOR DEVELOPMENT**	Periods	**9**
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	**RELATIONSHIP MANAGEMENT**	Periods	**9**
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**	Periods	**9**
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 Periods	**45**

References

1.	Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi 2011.

E-Resources

1.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5132380/
2.	https://www.examrace.com/Study-Material/Education/Value-Education-YouTube-Lecture-Handouts.html

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Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC005	**Constitution of India**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- To understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To identify the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To illustrate the role of socialism in India after the commencement of the Bolshevik Revolution and its impact on the initial drafting of the Indian Constitution.
- To categorize the governance bodies in the organization.
- To interpret the various administration in states.

Course Outcome

At the end of the course, the student should be able to	Knowledge Level
CO1: Define the history of Indian Constitution	K2
CO2: Categorize the importance of constitutional rights and duties.	K3
CO3:Understand the functions of Local administration	K2
CO4:Demonstratethegovernance bodies in the organization.	K4
CO5:Prioritize the local and district administration in states.	K4

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	2	2										
CO 2	3	3	2	2										
CO 3	3	3	2	2										
CO 4	3	3	2	2										
CO 5	3	3	2	2										

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment and Seminar

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	INTRODUCTION	Periods	9
History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)			
Unit – II	**PHILOSOPHY OF THE INDIAN CONSTITUTION**	Periods	**9**
Philosophy of the Indian Constitution: Preamble, Salient Features			
Unit – III	**CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES**	Periods	**9**
Contours of Constitutional Rights& 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 – IV	**ORGANS OF GOVERNANCE**	Periods	**9**
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 - V	**LOCAL ADMINISTRATION**	Periods	**9**
Local Administration: District's 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			
		Total Periods	**45**

References

1.	The Constitution of India, 1950 (Bare Act), Government Publication.
2.	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3.	M. P. Jain, Indian Constitution Law, 7th Edition., Lexis Nexis, 2014.

E-Resources

1.	https://nptel.ac.in/courses/129/106/129106002/ CO-ORDINATED BY : IIT MADRAS
2.	https://niti.gov.in/niti-lecture

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Programme	**M.E / M.Tech.**	Programme Code					**2023**	
Department					Semester		--	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC006	**English for Research Paper Writing**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- Illustrate the improve your writing skills and level of readability
- Categorize to write in each section.
- Understand the skills needed when writing a Title
- Ensure the good quality of paper at very first-time submission.
- Elaborate the concept of writing skills for submission of paper.

Course Outcome

At the end of the course, the student should be able to	Knowledge Level
CO1: Understand forming and brake up sentences.	K2
CO2: Importance of finding plagiarism.	K4
CO3: Summarize the concept of literature reviews.	K2
CO4: Extend the focus on skill development activities.	K2
CO5: Develop the writing skills in the paper.	K3

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2										
CO 2	3	3	3	2										
CO 3	3	3	3	2										
CO 4	3	3	3	2										
CO 5	3	3	2	2										

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	PLANNING AND PREPARATION	Periods	9
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.			
Unit – II	**CLARIFICATIONS**	Periods	**9**
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.			
Unit – III	**LITERATURE REVIEW**	Periods	**9**
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.			
Unit – IV	**SKILL DEVELOPMENT - I**	Periods	**9**
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	**SKILL DEVELOPMENT - II**	Periods	**9**
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, useful phrases, how to ensure paper is as good as it could possibly be the first- time submission			
		Total Periods	**45**

References

1.	Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2.	Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3.	Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

E-Resources

1.	https://nptel.ac.in/courses/110/105/110105091/ CO-ORDINATED BY : IIT KHARAGPUR
2.	https://www.udemy.com/topic/research-paper-writing

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Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC007	**Personality Development through Life Enlightenment Skills**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- Learn to achieve the highest goal happily.
- Identify a person with stable mind, pleasing personality and determination.
- Determine wisdom in students.
- Interpret managing others effectively.
- Extend the increasing productivity.

Course Outcome

At the end of the course, the student should be able to	Knowledge Level
CO1: Identify goals	K2
CO2: Analyze Personality development	K2
CO3: Make use of appropriate life and career goals	K3
CO4: Developing relationships with others	K3
CO5: Understand the value of diversity	K2

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2					2					
CO 2	3	3	3	2					2					
CO 3	3	3	3	2					2	2				
CO 4	3	3	3	2						2				
CO 5	3	3	3	2										

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment and Seminar

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**NEETISATAKAM – I**	Periods	**9**

Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue)			
Unit – II	**NEETISATAKAM – II**	Periods	**9**
Neetisatakam-Holistic development of personality Verses- 52,53,59 (dont's) Verses- 71,73,75,78 (do's)			
Unit – III	**APPROACH TO DAY TO DAY WORK AND DUTIES**	Periods	**9**
Approach to day to day work and duties. Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.			
Unit – IV	**STATEMENTS OF BASIC KNOWLEDGE**	Periods	**9**
Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18			
Unit - V	**PERSONALITY OF ROLE MODEL**	Periods	**9**
Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63			
		Total Periods	**45**

References

1.	"Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2.	Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
3.	Rashtriya Sanskrit Sansthanam, New Delhi.

E-Resources

1.	https://library.um.edu.mo/ebooks/b17771201.pdf
2.	https://www.staticcontents.youth4work.com/university/Documents/Colleges/CollegeSummaryAttach/29f57018-6412-4dee-b24b-ac29e54a0f9e.pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E / M.Tech.**	Programme Code				**2023**	
Department					Semester	--	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC008	**UNIVERSAL HUMAN VALUES**	2	0	0	0	100	-	100

Course Objective	The student should be made to, • To assist students in understanding the differences between values and skills, and in understanding the need, basic guidelines, content and the process of value education. • To help students initiate a process of dialog within themselves to understand what they 'really want to be' in their lives and professions • To help students understand the meaning of happiness and prosperity for human beings. • To help students understand harmony at all the levels of human living and to lead an ethical life

Course Outcome	At the end of the course, the student should be able to	Knowledge Level
	CO1: Evaluate the significance of value inputs in formal education and start applying them in their life and profession	K4
	CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
	CO3: Analyze the value of harmonious relationship based on trust and respect in their life and profession	K2
	CO4: Examine the role of a human being in ensuring harmony in society and nature.	K3
	CO5: Understand the harmony at all the levels of human living and to lead an ethical life	K3

Pre-requisites	--

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	1	1		3	3	1	2	3	3	2	3	1		
CO 2	2	1	2	3	2	2	2	2	1	1	3	1	2	
CO 3	3	1	2	3	3	1	3	2	2	1	2	3		
CO4	1	2	3	1	3	2	2	2	3	1	2	1	2	
CO5	2	1	2	1	2	1	3	3	2	2	1			

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment and Seminar
Indirect
1. Course - end survey

Content of the syllabus			
Unit - I	**Introduction-Basic Human Aspiration**	Periods	**9**
The basic human aspirations and their fulfillment through Right understanding and Resolution, Right understanding and Resolution as the activities of the Self, Self being central to Human Existence; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution.			
Unit – II	**Right Understanding (Knowing)**	Periods	**9**
The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).			
Unit – III	**Understanding Human Being**	Periods	**9**
Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self			
Unit – IV	**Understanding Nature and Existence**	Periods	**9**
A comprehensive understanding (knowledge) about the existence, Nature being included; the need and process of inner evolution (through self-exploration, self awareness and self-evaluation), particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the self.			
Unit - V	**Understanding Human Conduct**	Periods	**9**
Understanding Human Conduct, different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with Allen compassing Resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from Self to Nature and entire Existence			
		Total Periods	**45**

Text Books	
1.	R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.
2.	Premvir Kapoor, Professional Ethics and Human Values, Khanna Book Publishing, New Delhi, 2022.
References	
1.	Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2.	E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain
E-Resources	
1.	https://nptel.ac.in/courses/109104068
2.	https://fdp-si.aicte-india.org/UHV-I

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Programme	**M.E / M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC009	**Online Course**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is

- Illustrate about various online certification courses.
- Understand the importance of online certification courses.
- Distinguish about job opportunities.
- Make use of this course can prepare the competitive examination.
- Classify the online tools for course.

Course Outcome

At the end of the course, the student should be able to	Knowledge Level
CO1: Evaluatethe programming skills.	K3
CO2: Identify online certifications.	K2
CO3: Appraise the value of the courses and job opportunities	K5
CO4: Categorize in Quantitative Reasoning and Technological Literacy.	K4
CO5: Develop the ICT tools for the specific course.	K4

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	2	2						2			1	2
CO 2	3	3	2	2						2			2	2
CO 3	3	3	2	2						2	2		2	2
CO 4	3	3	2	2						2	2		2	2
CO 5	3	3	2	2							2		2	2

Course Assessment Methods

Direct
1. Online Assignments and Assessments
Indirect
1. Course - end survey

LIST OF COURSES

Online Courses such as :

1. NPTEL Courses
2. SWAYAM Courses
3. IIT-B Spoken Tutorials
4. UDEMY Courses
5. CCNA Courses
6. MOOC Courses
7. Microsoft Virtual Academy Certification courses etc.,

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Programme	**M.E./M.Tech.**	Programme Code		Regulation	**2023**
Department				Semester	--

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P23AC010	**Technical Report Writing**	2	0	0	0	100	-	100

Course Objective

The main objective of the course is to:

- Demonstrate rhetorical knowledge to create effective technical writing documents for end users.
- Apply and adapt flexible writing process strategies to produce clear, high-quality deliverables in a multitude of technical writing genres.
- Use professional technical writing conventions of clean and clear design, style, and layout of written materials.
- Gather and apply researched information that is appropriate to your field, as demonstrated by reading and analyzing documents, and citing sources correctly.
- Write clearly, correctly, and concisely.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Apply knowledge of sentence grammar to produce effective, correct, and rhetorically appropriate sentence constructions	K2
CO2: Apply and adapt flexible writing process strategies to produce clear, high-quality deliverables in a multitude of technical writing genres	K2
CO3: Use professional technical writing conventions of clean and clear design, style, and layout of written materials.	K2
CO4: Demonstrate by reading and analyzing documents, and citing sources correctly	K2
CO5: Write a short technical description of an everyday object with a detailed breakdown of its key components.	K3

Pre-requisites --

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	2	3	3	3	2	-	1	1	2	-	2	2	3	2
CO 2	2	1	-	2	2	-	2	2	1	2	1	2	1	2
CO 3	3	-	-	3	1	-	1	2	1	2	2	2	1	3
CO 4	1	-	2	3	2	-	2	1	3	3	3	2	2	3
CO 5	2	1	3	2	2	-	2	1	1	2	2	2	3	3

Course Assessment Methods

Direct
1. Seminar & Presentation
Indirect
2. Course - end survey

METHOD OF EVALUATION:

1. During the technical report session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes.
2. In a session of three periods per week, each student is expected to present the seminar. Each student isexpected to present at least twice during the semester and the student is evaluated based on that.
3. At the end of the semester, she can submit a report on her topic of seminar and marks are given based on the report.
4. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.