VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai

Approved by AICTE – Accredited by NBA New Delhi)

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

CURRICULUM

FOR

M.E. COMPUTER SCIENCE AND ENGINEERING

REGULATION 2019

(After 11th BoS)

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Signature of BoS Chairman, CSE

VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN

M.E. COMPUTER SCIENCE AND ENGINEERING

REGULATION – 2019

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):

Students of M.E. Computer Science and Engineering Programme at the time of graduation will be able to:

1. Exhibit higher order knowledge formation with wider and global perspective on Computer Science and Engineering.
2. Apply critical thinking to analyze, improve, create, evaluate and improve information for the conduct of research in Computer Science and Engineering.
3. Create and conceptualize optimal solutions for Computer Engineering and IT Problems by lateral thinking with awareness of public health safety, culture, society and environmental factors.
4. Perform exhaustive survey to familiarize with problems and rightly mix research methodologies and tools to design and conduct experiments for the development of scientific/technological knowledge.
5. Select, create if needed, and apply with the knowledge of limitations, the state of the art techniques and IT tools for complex engineering problems.
6. Recognize and use opportunities to contribute positively for collaborative-multi disciplinary scientific research to achieve common goals.
7. Practice engineering and management principles including economical and financial factors.
8. Communicate effectively and confidently.
9. Engage in lifelong learning to improve knowledge and competence.
10. Practice code of ethics in professional accomplishments and research for sustainable societal development.
11. Learn by observation and examination of the outcomes achieved, including mistakes, without external feedback.

Signature of BoS Chairman, CSE

Mapping of Programme Educational Objectives with Programme Outcomes:

Programme Educational Objectives	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	√	√	√		√	√		√	√		√
2		√		√			√	√	√	√	
3	√	√	√		√	√	√		√	√	√

Course with Programme Outcomes

SEM	Subject Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
SEM1	Applied Probability & Statistics*	√	√	√		√						√
	Advanced Algorithms*	√	√	√	√	√		√		√	√	√
	Machine Learning Techniques*	√	√	√		√	√		√	√		√
	Security Principles and Practices	√	√		√	√	√	√			√	√
	Professional Elective-I											
	Audit Course -I											
	Algorithms and Analysis Laboratory*	√	√	√	√	√	√	√	√	√	√	√
	Machine Learning Laboratory*	√	√	√	√	√	√	√	√	√	√	√
SEM 2	Advanced Networks	√	√			√		√	√			√
	Internet of Things	√	√	√	√	√	√		√	√		√
	Data Analytics	√	√	√		√		√			√	√
	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	√	√	√	√	√	√	√	√	√	√	√

*Common to M.E –CSE & M.Tech-IT

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) **Elayampalayam, Tiruchengode – 637 205**				
Programme	**M.E.**	Programme Code	201	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
P19MA101	Applied Probability & Statistics*	HS	3	0	0	3	40	60	100
P19CS101	Advanced Algorithms*	PCC	3	0	0	3	40	60	100
P19CS102	Machine Learning Techniques*	PCC	3	0	0	3	40	60	100
P19CS103	Security Principles and Practices	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									
P19CS104	Algorithms and Analysis Laboratory*	PCC	0	0	4	2	60	40	100
P19CS105	Machine Learning Laboratory*	PCC	0	0	4	2	60	40	100
					Total	**19**	**460**	**340**	**800**

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

PCC – Professional Core Course, PEC – Professional Elective Course, AC- Audit Course,
CA - Continuous Assessment, ESE - End Semester Examination,
HS - Humanities and Social Sciences
KL - Knowledge Level

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**M.E**	Programme Code	201	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
P19CS206	Advanced Networks	PCC	3	0	0	3	40	60	100
P19CS207	Internet of Things	PCC	3	0	0	3	40	60	100
P19CS208	Data Analytics	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									
P19CS209	Advanced Networks Laboratory	PCC	0	0	4	2	60	40	100
P19CS210	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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	**M.E**	Programme Code	201	Regulation	**2019**				
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**				

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 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									
P19CS311	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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**M.E**	Programme Code	201	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**IV**

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
Practical Course									
P19CS412	Project Phase-II	EEC	0	0	32	16	60	40	100
					Total	**16**	**60**	**40**	**100**

EEC – Employability Enhancement Course

Cumulative Course Credit : 71

Signature of BoS Chairman, CSE

PROFESSIONAL ELECTIVES

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
P19CSE01	Soft Computing	PEC	3	0	0	3	40	60	100
P19CSE02	Advanced Database Technology	PEC	3	0	0	3	40	60	100
P19CSE03	Introduction to Intelligent Systems	PEC	3	0	0	3	40	60	100
P19CSE04	Advanced Computer Architecture	PEC	3	0	0	3	40	60	100
P19CSE05	Mining Massive Datasets	PEC	3	0	0	3	40	60	100
P19CSE06	Real time Operating Systems	PEC	3	0	0	3	40	60	100
P19CSE07	Social Network Analysis	PEC	3	0	0	3	40	60	100
P19CSE08	Embedded Software Development	PEC	3	0	0	3	40	60	100
P19CSE09	Cloud Computing Technologies	PEC	3	0	0	3	40	60	100
P19CSE10	Virtualization Techniques and Applications	PEC	3	0	0	3	40	60	100
P19CSE11	Digital Image Processing	PEC	3	0	0	3	40	60	100
P19CSE12	Information Storage Management	PEC	3	0	0	3	40	60	100
P19CSE13	Computer Vision	PEC	3	0	0	3	40	60	100
P19CSE14	Advanced Software Engineering	PEC	3	0	0	3	40	60	100
P19CSE15	Ethical Hacking and Digital Forensics	PEC	3	0	0	3	40	60	100
P19CSE16	Human and Computer Interaction	PEC	3	0	0	3	40	60	100
P19CSE17	GPU Computing	PEC	3	0	0	3	40	60	100
P19CSE18	Multimedia Systems	PEC	3	0	0	3	40	60	100
P19CSE19	Information Retrieval	PEC	3	0	0	3	40	60	100
P19CSE20	Software Project Management	PEC	3	0	0	3	40	60	100
P19CSE21	Deep Learning Techniques	PEC	3	0	0	3	40	60	100
P19CSE22	Information Security	PEC	3	0	0	3	40	60	100
P19CSE23	Cyber Security and Cyber Laws	PEC	3	0	0	3	40	60	100
P19CSE24	Business Analytics	PEC	3	0	0	3	40	60	100
P19CSE25	Advanced Software Testing	PEC	3	0	0	3	40	60	100

Signature of BoS Chairman, CSE

OPEN ELECTIVE-I

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
P19CSOE1	Business Analytics	OEC	3	0	0	3	40	60	100
P19CSOE2	Machine Learning Techniques	OEC	3	0	0	3	40	60	100
P19CSOE3	Web Engineering	OEC	3	0	0	3	40	60	100
P19CSOE4	Cost Management of Engineering Projects	OEC	3	0	0	3	40	60	100
P19CSOE5	Internet of Things	OEC	3	0	0	3	40	60	100
P19CSOE6	Data Science and Analytics	OEC	3	0	0	3	40	60	100

AUDIT COURSES

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
P19CSAC1	Research Methodology and IPR*	AC	2	0	0	0	100	-	100
P19CSAC2	English for Research Paper Writing	AC	2	0	0	0	100	-	100
P19CSAC3	Disaster Management	AC	2	0	0	0	100	-	100
P19CSAC4	Value Education	AC	2	0	0	0	100	-	100
P19CSAC5	Constitution of India	AC	2	0	0	0	100	-	100
P19CSAC6	Pedagogy Studies	AC	2	0	0	0	100	-	100
P19CSAC7	Personality Development through Life Enlightenment Skills	AC	2	0	0	0	100	-	100
P19CSAC8	Online Course	AC	2	0	0	0	100	-	100
P19CSAC9	Technical Report Writing	AC	2	0	0	0	100	-	100

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

LIST OF OPEN ELECTIVES

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
P19ITOE1	Internet of Things	OEC	3	0	0	3	40	60	100
P19ITOE2	Cloud computing	OEC	3	0	0	3	40	60	100
P19ITOE3	Machine Learning Techniques	OEC	3	0	0	3	40	60	100
P19ITOE4	Mobile App Development	OEC	3	0	0	3	40	60	100
P19ITOE5	BlockChain Technology	OEC	3	0	0	3	40	60	100

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19MA101	**Applied Probability & Statistics**	3	0	0	3	40	60	100

Course Objective

The student should be made to,
- Understand the elementary aspects of statistics and probability theory
- Analyze and interpret statistical data using appropriate probability distribution
- Identify and demonstrate suitable sampling and data collection process.
- Identify testing of hypothesis for all size of samples
- Recognize the concept of multivariate analysis

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Inculcate the habit of statistical thinking	K2
	CO2: Enable to identify various probability distribution	K2
	CO3: Apply appropriate modern technology to explore probability/statistical concepts	K4
	CO4: Ability to test the hypothesis using suitable statistical test	K4
	CO5: Respond appropriate procedures for multivariate analysis	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**	**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	3	2	3	1	3	-	-	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
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**ONE DIMENSIONAL 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 VARIABLES**	Periods	**9**

Joint Distributions-Marginal and Conditional distributions-Functions of two dimensional random variables-Regression curve-Correlation

Unit - III	**ESTIMATION THEORY**	Periods	**9**

Signature of BoS Chairman, CSE

Unbiased Estimators-Methods of Moments-Maximum Likelihood Estimation-Curve Fitting by Principle of Least Squares-Regression lines.			
Unit - IV	**TESTING OF HYPOTHESIS**	Periods	**9**
Basic Definitions:- (Population, Sampling, Tests of Significance, Testing a Hypothesis, Null Hypothesis, Alternative Hypothesis, Level of Significance, Types of Errors) – Testing of Hypothesis using : 't'-Test , 'F'-Test , Chi Square Test (ψ^2) - Test for Independence of Attributes & Goodness of Fit.			
Unit - V	**MULTIVARIATE ANALYSIS**	Periods	**9**
Random Vectors and matrices-Mean vectors and Covariance matrices-Multivariate Normal density and its properties-Principal components Population Principal Components- Principal Components from Standardized variables			
		Total Periods	**45**

References

1.	Devore, J.L., Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage Learning, 2011.
2.	Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Probability and Statistics for Engineers 8th Edition, Pearson Education, 2010.
3.	Johnson, R.A. and Wichern, D.W., Applied Multivariate Statistical Analysis, Pearson Education. Asia. 5th Edition, 2002.
4.	Gupta S.C and Kapoor V.K, Fundamentals of Mathematical Statistics, Sultan & sons 2014.
5.	Johnson, D.E., Applied Multivariate Methods for Data Analysis, Thomson and Duxbury Press,1998

E-Resources

1.	http://www.maths.qmul.ac.uk/~pettit/MAS109/chp4.pdf
2.	https://www.brainkart.com/article/Two-Dimensional-Random-Variables_6474/
3.	https://en.wikipedia.org/wiki/Multivariate_analysis
4.	http://www.stat.columbia.edu/~liam/teaching/4107-fall05/notes3.pdf

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS101	**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
- Select and design data structures and algorithms that is appropriate for problems
- Learn the operations of various sorting algorithms
- Know how to find the complexity among different algorithms

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Design and analyze algorithms using divide and conquer, dynamic programming, greedy algorithms.	K3
CO2: Perform probabilistic analysis and amortized analysis of algorithms.	K2
CO3: Use minimum spanning trees, shortest path algorithm, and Maximum flow in graphs to solve problems in networking.	K2
CO4: Solve problems using multithreaded algorithms and linear programming	K4
CO5: Apply String matching algorithms, Computational geometry algorithms to solve problem.	K5

Pre-requisites: Data Structures

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**	**PSO 1**	**PSO 2**
CO 1	3	2	3	3	2	2	1	-	1	2	1	3	2
CO 2	3	3	3	3	2	2	-	2	1	2	1	2	1
CO 3	3	2	2	3	1	3	2	-	1	2	1	3	2
CO 4	3	3	3	2	1	2	-	1	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
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 – Growth of 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**

Signature of BoS Chairman, CSE

Elementary Graph Algorithms – Minimum Spanning trees: Kruskal and Prims Algorithm – 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**
Multithreaded algorithms: Multithreaded matrix multiplication, Multithreaded merge sort –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: Naive string-matching algorithm, Rabin-Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm– Computational Geometry – NP-Completeness – Approximation algorithms.			
		Total Periods	**45**
References			
1.	Thomas H. Cormen, Charles E. Leiseron, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, PHI learning Pvt. Ltd., 2011.		
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		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**				
Department	**CSE & IT**			Semester	**I**				
Course Code	Course name	Periods per week			Credit	Maximum Marks			
P19CS102	**Machine Learning Techniques**	L	T	P	C	CA	ESE	Total	
		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 (3/2/1 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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	1	-	1	2	1	3	2
CO 2	1	3	3	3	2	2	1	1	1	2	1	2	2
CO 3	3	3	2	1	1	3	-	-	1	2	1	3	2
CO 4	2	2	3	2	1	2	-	2	1	2	1	2	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 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**

Signature of BoS Chairman, CSE

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.	Tom Mitchell, “Machine Learning”, McGraw-Hill, 1997		
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/		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**I**		
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS103	**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	Information Security	

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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	-	1	2	1	2	2
CO 2	3	3	2	3	2	1	-	1	1	2	1	2	1
CO 3	2	3	2	3	1	3	1	-	1	2	1	3	1
CO 4	3	2	3	2	1	2	-	-	1	2	1	1	1
CO 5	3	3	2	2	1	1	1	1	1	2	1	3	2

CO/PSO Mapping

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 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**

Signature of BoS Chairman, CSE

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	**SECURITY PRACTICES**	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, 5th Edition, 2010.
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.	Douglas R. Stinson,"Cryptography Theory and Practice", 3rd Edition,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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS104	**Algorithms and Analysis Laboratory**	0	0	4	2	40	60	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: Design and analyze algorithms using divide and conquer, dynamic programming, greedy algorithms.	K2
	CO3: Perform probabilistic analysis and amortized analysis of algorithms.	K2
	CO4: Use 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.	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**	**PSO 1**	**PSO 2**
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 2. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS	**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

Signature of BoS Chairman, CSE

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS105	**Machine Learning Laboratory**	0	0	4	2	40	60	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**	**PSO 1**	**PSO 2**
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 2. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS	**CO's**

Signature of BoS Chairman, CSE

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/

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**			
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS206	**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**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**
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	2	1	2	-	-	1	2	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	**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

Signature of BoS Chairman, CSE

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 information – 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: An introduction", Oxford University Press, 2010.
2.	UlrikBandes, Thomas Erlebach, "Network Analysis: Methodological foundations", Springer, 2004.
3.	David Easey, John Kleinberg, "Networks, Crowds and markets: Reasoning about a highly connected world", Cambridge University Press, 2010.

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS207	**Internet of Things**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the fundamentals of Internet of Things.
- Learn about the basics of IOT protocols.
- Build a small low cost embedded system using Raspberry Pi.
- Apply the concept of Internet of Things in the real world scenario.
- Know the applications of IoT

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Analyze various protocols for IoT	K4
	CO2: Develop web services to access/control IoT devices.	K3
	CO3: Design a portable IoT using Rasperry Pi	K3
	CO4: Deploy an IoT application and connect to the cloud.	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

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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	-	-	2	1	3	2
CO 2	2	3	3	3	2	2	-	-	1	2	1	1	2
CO 3	3	3	2	3	1	3	-	-	-	2	1	3	3
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
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

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

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

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.

Signature of BoS Chairman, CSE

Unit - IV	BUILDING IoT WITH ARDUINO	Periods	9
Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks - Other IoT Platforms - Arduino.			
Unit - V	**REAL-WORLD APPLICATIONS**	Periods	**9**
Real world design constraints - Applications - Asset management, Industrial automation, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.			
		Total Periods	**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 Avesand. 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.
E-Resources	
1.	https://medium.com/datadriveninvestor/4-stages-of-iot-architecture-explained-in-simple-words-b2ea8b4f777f
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-world-applications-of-internet-of-things-iot/

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**		
Course code	Course name	Periods per week			Credit	Maximum Marks	
P19CS208	**Data Analytics**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100
Course Objective	The student should be made to, • Understand Statistical methods • Learn Bayesian, Support Vector and Kernel Methods • Study Time Series Analysis and Rule Induction • Know Neural networks and Fuzzy Logic • Understand Visualization Techniques						
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: Understand the key concepts in data science						K2
	CO3: Understand real-world applications						K2
	CO4: Understand 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**	**PSO 1**	**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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**STATISTICAL CONCEPTS AND METHODS**	Periods	**9**

Statistical Concepts: Probability, Sampling and Sampling Distributions, Statistical Inference, Prediction and Prediction Errors–Resampling- Statistical Method: Linear Models, Regression Modeling, Multivariate Analysis.

Unit - II	**BAYESIAN METHODS AND SUPPORT VECTOR AND KERNEL METHODS**	Periods	**9**

Bayesian Methods: Bayesian Paradigm, modeling, inference and networks – Support Vector and Kernel Methods: Kernel Perceptron, Overfitting and Generalization Bounds, Support Vector Machines, Kernel PCA and CCA.

Signature of BoS Chairman, CSE

Unit - III	TIME SERIES ANALYSIS AND RULE INDUCTION	Periods	9
Analysis of time series: linear systems analysis, nonlinear dynamics, Delay Coordinate Embedding - Rule induction: Propositional Rule Learning, Rule Learning as search, Evaluating quality of rules, Propositional rule induction, First order rules-ILP systems.			
Unit - IV	**NEURAL NETWORKS**	Periods	**9**
Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks. Prescriptive analytics - creating data for analytics: Active learning & Reinforcement learning.			
Unit - V	**VISUALIZATION**	Periods	**9**
Visualization : Classification of Visual Data Analysis Techniques, Data Type to be Visualized, Visualization Techniques, Interaction Techniques and Specific Visual Data Analysis Techniques.			
		Total Periods	**45**

References	
1.	Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics", John Wiley & sons, 2012.
2.	Michael Berthold, David J. Hand, "Intelligent Data Analysis-An Introduction", Second Edition, Springer, 2007.
3.	Jimmy Lin and Chris Dyer, "Data Intensive Text Processing using Map Reduce", Morgan and Claypool Publishers, 2010.
4.	Tom White, "Hadoop: The Definitive Guide", O`Reilly Publishers, 2012.

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS209	**Advanced Networks Laboratory**	0	0	4	2	60	40	100

Course Objective

The student should be made to,

- Understand the architecture network technologies
- Understand the applications current network technologies
- Learn to simulate and analyze various medium access technologies
- Learn to design and analyze network layer routing protocols
- Learn to analyze the WSN energy model.

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: Simulate and analyze IP Traffic for wireless network	K3
CO3: Analyze the performance of different routing algorithms	K4
CO4: Simulate the wireless sensor network model	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

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**	**PSO 1**	**PSO 2**
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 2. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS

1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands.
2. Configuration of IP addressing for a given scenario for a given set of topologies.
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 serve Windows and Linux OS Binaries based on client MAC address.
4. Configure, implement and debug the following: Use open source tools for debugging and diagnostics.
   a. ARP/RARP protocols
   b. RIP routing protocols

Signature of BoS Chairman, CSE

c. BGP routing

d. OSPF routing protocols

e. Static routes (check using net stat)

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.

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.

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

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).

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/

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**				**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CS210	**Data Analytics Laboratory**	0	0	4	2	60	40	100

Course Objective

The student should be made to,

- Optimize business decisions
- create competitive advantage with Big Data analytics
- Imparting the architectural concepts of Hadoop and introducing map reduce
- Paradigm Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Prepare data summarization	K2
	CO2: Prepare query, and analysis.	K2
	CO3: Apply data modeling techniques to large data sets	K3
	CO4: Creating applications for Big Data analytics	K5
	CO5: Understand the importance of analytics	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**	**PSO 1**	**PSO 2**
CO 1	3	3	2	3	-	-	-	-	1	2	-	1	1
CO 2	3	3	2	3	-	-	-	-	2	2	-	2	2
CO 3	3	2	2	3	-	-	-	-	2	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. Pre lab & Post lab test 2. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

SUGGESTED LIST OF EXPERIMENTS

1. (i)Perform setting up and Installing Hadoop in its two operating modes:
   Pseudo distributed
   Fully distributed.
   (ii) Use web based tools to monitor your Hadoop setup.
2. (i) Implement the following file management tasks in Hadoop:
   Adding files and directories
   Retrieving files
   Deleting files
   ii) Benchmark and stress test an Apache Hadoop cluster

Signature of BoS Chairman, CSE

3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
   Find the number of occurrence of each word appearing in the input file(s)
   Performing a Map Reduce Job for word search count (look for specific keywords in a file)
4. Stop word elimination problem:
   Input:
   A large textual file containing one sentence per line
   A small file containing a set of stop words (One stop word per line)
   Output:
   A textual file containing the same sentences of the large input file without the words appearing in the small file.
5. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
6. Write a Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooks available at: Project Gutenberg)
7. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE01	**Soft Computing**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Analyze various neural network architectures
- Learn the various soft computing frame works.
- Be familiar with design of various neural networks.
- Learn genetic programming
- Be exposed to fuzzy logic & Hybrid Systems

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Analyze the ideas of Neural networks, fuzzy logic and use of heuristics.	K4
	CO2: Explain Fuzzy sets and rules.	K2
	CO3: Analyze and gain insight onto Neuro Fuzzy modeling and control.	K4
	CO4: Analyze the genetic algorithms and their applications.	K4
	CO5: Implement soft computing techniques and their applications.	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**	**PSO 1**	**PSO 2**
CO 1	3	2	3	3	2	2	1	-	1	2	2	3	2
CO 2	3	3	3	3	2	2	1	-	1	2	1	2	2
CO 3	3	2	2	3	1	3	1	-	1	2	2	3	2
CO 4	2	3	3	1	2	2	2	-	1	2	2	1	1
CO 5	3	3	2	2	1	2	1	-	1	2	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	**NEURAL NETWORKS**	Periods	**9**

Supervised Learning Neural Networks- Perceptrons- Adaline-Back propagation-Multilayer perceptrons- Radial Basis Function Networks- Unsupervised Learning and Other Neural Networks-Competitive Learning Networks-Kohonen Self- Organizing Networks-LearningVector Quantization-Hebbian Learning.

Unit - II	**FUZZY SET THEORY**	Periods	**9**

Fuzzy Sets-Basic Definition and Terminology- Set-theoretic operations-Member Function-Fuzzy Rules and Fuzzy Reasoning-Extension principle and Fuzzy Relations- Fuzzy If-Then Rules- Fuzzy Reasoning- Fuzzy Inference Systems-Mamdani Fuzzy Models-Sugeno Fuzzy Models-Defuzzification.

Unit – III	**NEURO FUZZY MODELING**	Periods	**9**

Adaptive Neuro-Fuzzy Inference Systems-Architecture-Hybrid Learning Algorithm-learning Methods that Cross-fertilize ANFIS and RBFN-Coactive Neuro-Fuzzy Modeling-Framework- Neuron Functions for Adaptive Networks-Neuro Fuzzy Spectrum

Unit - IV	**GENETIC ALGORITHMS**	Periods	**9**

Signature of BoS Chairman, CSE

Traditional optimization and search methods-Simple Genetic Algorithm-Reproduction- Crossover-Mutation-Schemata-Schema Theorem-Two and K-arm Bandit Problem- Improvements in basic Techniques-Selection Schemes-Scaling Mechanisms-Ranking Procedures			
Unit – V	**HYBRID SYSTEMS**	Periods	**9**
Integration of neural networks, fuzzy logic and genetic algorithms			
		Total Periods	**45**
References			
1.	Jang J. S. R., Sun C.T. and Mizutani E, "Neuro - Fuzzy and Soft Computing ", Pearson Education, 2009.		
2.	Timothy J. Ross, "Fuzzy Logic with Engineering Applications", John Wiley and sons Pvt.Ltd. 2010.		
3.	S.N.Sivanandam and S.N.Deepa, -"Introduction to Genetic Algorithms", Springer, 2007.		
4.	James J. Buckley and Esfandiar Eslami, "Advances in Soft Computing-An Introduction to Fuzzy Logic and Fuzzy Sets", Springer International Edition, 2011..		
5.	David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning",Addison Wesley, 1997.		
6.	Elaine Rich, Kevin Knight, "Artificial Intelligence", Third Edition ,Tata McGraw Hill, 2011.		
E-Resources			
1.	https://en.wikipedia.org/wiki/Neural_network		
2.	https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_set_theory.htm		
3.	https://towardsdatascience.com/introduction-to-genetic-algorithms-including-example-code-e396e98d8bf3		

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai)

Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

Course code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE02	**Advanced Database Technology**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Study the various database models
- Understand the Relational model in detail.
- Write effective queries and optimize the queries.
- Understand concepts related to transaction Processing
- Understand database administration.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Identify and prioritize database assets threats to database asset	K2
	CO2: Present a disaster recovery plan for recovery of database assets after an incident	K3
	CO3: Understand optimization techniques	K2
	CO4: Know transaction processing	K2
	CO5: Deal with database administration	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	PSO 1	PSO 2
CO 1	3	3	3	3	2	2	1	-	1	2	1	3	3
CO 2	3	3	2	3	2	2	1	-	1	2	1	2	2
CO 3	3	2	2	3	1	3	1	-	1	2	1	3	2
CO 4	3	3	3	2	1	2	2	-	1	2	2	2	1
CO 5	3	3	2	1	1	2	2	-	1	2	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**

Data models, structure of relational databases, component of management system – DDL, DML, database languages, SQL standard, database users and administrators

Unit - II	**RELATIONAL DBMS**	Periods	**9**

Design issues - basic normal forms and additional normal forms, Transforming E-R diagram to relations, Integrity constraints, Query processing and optimization.

Unit - III	**TRANSACTION PROCESSING**	Periods	**9**

Transaction concept, concurrent execution, isolation, testing for serializability, Concurrency control, lock based - time-stamp based - validation based protocols, multi-version schemes, deadlock handling.

Unit - IV	**DATABASE ADMINISTRATION**	Periods	**9**

Functions of DBA, Data volume and usage analysis, security and authorization, recovery and atomicity, buffer management, backup systems.

Signature of BoS Chairman, CSE

Unit - V	ADVANCED DATABASES	Periods	9
Object oriented, parallel, distributed, web databases. NoSQL, MongoDB, Advance Databases— PostgreSQL- Riak- CouchDB.			
		Total Periods	**45**
References			
1.	Abraham Silberschatz, Hanry F Korth, Sudarshan S, "Database Systems Concepts", McGraw Hill, 2007.		
2.	Raghu Ramakrishnan, "Database Management Systems", McGraw Hill , 2003.		
3.	Michael Kifer, Arthur Bernstein, Philip M Lewis, Prabin K Panigrahi, "Database Systems – An application oriented approach",Pearson Education, 2008.		
4.	Jeffrey D Ullman, " A First Course in Database Systems", Pearson Education, 2007		
5.	Date C J, "An Introduction to Database Systems", Pearson Education, 2003.		
E-Resources			
1.	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm		
2.	https://en.wikipedia.org/wiki/Transaction_processing		
3.	https://www.udemy.com/course/advanced-tsql-querying-using-sql-2014/		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code		**201**	Regulation		**2019**	
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester		**I**	
Course code	Course name	Periods per week			Credit	Maximum Marks		
P19CSE03	**Introduction to Intelligent Systems**	L	T	P	C	CA	ESE	Total
		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							K5
	CO2: Analyze and compare the relative merits of a variety of AI problem solving techniques.							K4
	CO3: Evaluate traditional algorithmic approach							K4
	CO4: Demonstrate intelligent behavior including dealing with uncertainty							K5
	CO5: Solve real world problems for which solutions are difficult							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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	-	1	2	1	3	2
CO 2	3	2	3	3	2	2	-	-	1	2	1	1	2
CO 3	3	3	2	3	1	3	-	-	1	2	1	3	2
CO 4	3	2	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 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			

Signature of BoS Chairman, CSE

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. (2009). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd edition.

E-Resources

1.	https://courses.lumenlearning.com/wmopen-lifespandevelopment/chapter/biological-foundations-of-human-development/
2.	https://www.javatpoint.com/ai-techniques-of-knowledge-representation
3.	https://www.academia.edu/37768072/Introduction_to_Intelligent_Systems

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai)

Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

Course code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE04	**Advanced Computer Architecture**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the concept of Architecture of Computers
- Understand Internal operations of Computers
- Understand the Pipelining Concepts
- Understand Instruction Level Parallelism
- Understand 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 / 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**	**PSO 1**	**PSO 2**
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	2	3	1	3	1	-	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
3. End-Semester examinations

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-Introduction-Hazards-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.

Signature of BoS Chairman, CSE

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", 4th edition, Morgan Kaufmann / Elsevier, 2007.
2.	William Stallings, "Computer Organization and Architecture – Designing for Performance", Seventh Edition, Pearson Education, 2006.
3.	David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A hardware/ software approach, Morgan Kaufmann / Elsevier, 1997.
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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE05	**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**	**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 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**

Signature of BoS Chairman, CSE

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 MapReduce", 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.

E-Resources

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE06	**Real Time 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.	K3
	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
(3/2/1 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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	1	-	1	2	1	3	2
CO 2	3	3	3	3	2	2	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	2	1	2	2	-	1	2	1	1	1
CO 5	3	3	2	2	1	2	1	-	1	2	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**

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.

Signature of BoS Chairman, CSE

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.	Daniel P. Bovet and Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly Publications, 2005.
2.	Harold Abelson, Gerald Jay Sussman and Julie Sussman, ―Structure and Interpretation of Computer Programs‖, Second Edition, Universities Press, 2013.
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.tutorialspoint.com/operating_system/os_memory_management.htm

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE07	**Social Network Analysis**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Gain knowledge about the current Web development and emergence of Social Web.
- Study about the modeling, aggregating
- Learn knowledge representation of Semantic Web
- Learn about the extraction and mining tools for Social networks
- Gain knowledge on Web personalization and Web Visualization of Social networks

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Apply knowledge for current Web development in the era of Social Web.	K4
CO2: Model, aggregate and represent knowledge for Semantic Web.	K4
CO3: Design extraction and mining tools for Social networks.	K3
CO4: Develop personalized web sites and visualization for Social networks.	K3
CO5: Design Web personalization and Visualization for Social networks	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	-	-	1	2	1	3	2
CO 2	3	3	2	3	2	2	1	-	1	2	1	2	2
CO 3	3	3	1	3	1	3	-	2	1	2	1	3	2
CO 4	3	3	3	2	1	2	-	-	2	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
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**INTRODUCTION TO SOCIAL NETWORK ANALYSIS**	Periods	**9**

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web - Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion networks, Blogs and online communities.

Unit - II	**MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION**	Periods	**9**

Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation - Ontology languages for the Semantic Web – RDF and OWL - Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data,

Signature of BoS Chairman, CSE

Advanced Representations.			
Unit – III	**EXTRACTION AND MINING COMMUNITITES IN WEB SOCIAL NETWORKS**	Periods	**9**
Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities.			
Unit - IV	**PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES**	Periods	**9**
Understanding and Predicting Human Behaviour for Social Communities - User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective Logic - Trust Network Analysis - Combining Trust and Reputation.			
Unit - V	**VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS**	Periods	**9**
Graph Theory- Centrality- Clustering - Node-Edge Diagrams, Matrix representation, Visualizing Online Social Networks, Visualizing Social Networks with Matrix-Based Representations- Matrix + Node-Link Diagrams, Hybrid Representations - Applications - Covert Networks - Community Welfare - Collaboration Networks - Co-Citation Networks.			
		Total Periods	**45**

References	
1.	Peter Mika, "Social networks and the Semantic Web", Springer, 1st edition 2007.
2.	Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st edition, 2010.
3.	Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking Techniques and applications", Springer, 1st edition, 2011.

E-Resources	
1.	https://en.wikipedia.org/wiki/Social_network_analysis
2.	https://www.slideshare.net/pkaviya/cs6010-social-network-analysis-unit-iii
3.	https://www.slideshare.net/socialmediadna/visualization-of-social-networks

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE08	**Embedded Software Development**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand the architecture of embedded processor, microcontroller and peripheral devices.
- Study interface memory and peripherals with embedded systems.
- Study the embedded network environment.
- Understand challenges in Real time operating systems
- Study, analyze and design applications on embedded systems.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand different architectures of embedded processor	K2
	CO2: Understand microcontroller and peripheral devices.	K2
	CO3: Interface memory and peripherals with embedded systems work with embedded network environment.	K3
	CO4: Understand challenges in Real time operating systems	K2
	CO5: Design and analyze applications on embedded systems	K4

Pre-requisites: Advanced Processor

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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	2	2	2	1	-	1	2	1	3	2
CO 2	3	3	3	3	2	2	2	2	1	2	1	1	2
CO 3	3	2	2	3	1	3	1	-	1	2	1	3	2
CO 4	3	3	3	2	1	2	1	2	1	2	1	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
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit - I	**EMBEDDED PROCESSORS**	Periods	**9**

Embedded Computers - Characteristics of Embedded Computing Applications - Challenges in Embedded Computing System Design - Embedded System Design Process- Formalism for System Design - Structural Description - Behavioural Description - ARM Processor - Intel ATOM Processor.

Unit - II	**EMBEDDED COMPUTING PLATFORM**	Periods	**9**

CPU Bus Configuration - Memory Devices and Interfacing - Input/output Devices and Interfacing - System Design - Development and Debugging – Emulator – Simulator - JTAG Design Example – Alarm Clock - Analysis and Optimization of Performance - Power and Program Size.

Unit - III	**EMBEDDED NETWORK ENIVIRONMENT**	Periods	**9**

Signature of BoS Chairman, CSE

Distributed Embedded Architecture - Hardware And Software Architectures - Networks for Embedded Systems - I2C - CAN Bus - SHARC Link Supports – Ethernet – Myrinet – Internet - Network-based Design - Communication Analysis - System Performance Analysis - Hardware Platform Design - Allocation and Scheduling - Design Example - Elevator Controller.			
Unit - IV	**REAL-TIME CHARACTERISTICS**	Periods	**9**
Clock Driven Approach - Weighted Round Robin Approach - Priority Driven Approach - Dynamic versus Static Systems - Effective Release Times and Deadlines - Optimality of the Earliest Deadline First (EDF) Algorithm - Challenges in Validating Timing Constraints in Priority Driven Systems - Off-Line versus On-Line Scheduling.			
Unit - V	**SYSTEM DESIGN TECHNIQUES**	Periods	**9**
Design Methodologies - Requirement Analysis – Specification - System Analysis and Architecture Design - Quality Assurance - Design Examples - Telephone PBX - Ink jet printer - Personal Digital Assistants - Set-Top Boxes.			
		Total Periods	**45**

References	
1.	Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things" Wiley Publication, First edition, 2013
2.	Andrew N Sloss, D. Symes, C. Wright, ‖ Arm system developers guide‖, Morgan Kauffman/Elsevier, 2006.
3.	ArshdeepBahga, Vijay Madisetti, " Internet of Things: A Hands-on-Approach" VPT First Edition, 2014
4.	Muhammad Ali Mazidi , SarmadNaimi , SepehrNaimi, "The AVR Microcontroller and Embedded Systems: Using Assembly and C" Pearson Education, First edition, 2014
E-Resources	
1.	https://www.tutorialspoint.com/embedded_systems/es_processors.htm
2.	https://rmd.ac.in/dept/ece/notes/7/EMB/unit2.pdf
3.	https://www.tutorialspoint.com/embedded_systems/es_overview.htm

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE09	**Cloud Computing Technologies**	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. • Set up a private cloud.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Articulate the main concepts, key technologies,	K3
	CO2: Strengths and limitations of cloud computing	K2
	CO3: Identify the architecture, infrastructure	K3
	CO4: Delivery models of cloud computing	K3
	CO5: Address the core issues of cloud computing such as security and interoperability	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	1	-	2	2	1	3	2
CO 2	3	3	3	3	2	2	1	-	1	2	1	2	2
CO 3	3	3	2	3	1	3	1	-	1	2	1	3	2
CO 4	3	3	3	2	1	2	1	-	1	2	1	1	1
CO 5	3	3	2	2	1	2	1	-	1	2	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**

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**

Signature of BoS Chairman, CSE

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, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer, 2010.		
E-Resources			
1.	https://www.javatpoint.com/virtualization-in-cloud-computing		
2.	https://www.tutorialspoint.com/cloud_computing/cloud_computing_infrastructure.htm		
3.	https://en.wikipedia.org/wiki/Cloud_computing_security		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
P19CSE10	**Virtualization Techniques and Application**	L	T	P	C	CA	ESE	Total
		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**	**PSO 1**	**PSO 2**
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 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			

Signature of BoS Chairman, CSE

- 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 - Routing Protocols. Hardware Devices – SAN backup and recovery techniques – RAID – Classical Storage Model – 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 – VM Backup – VM Migration.			
		Total Periods	**45**
References			
1.	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, Erick M. 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/		

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE11	**Digital Image Processing**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Fundamentals of digital image processing and simple operations.
- Image transformation and image enhancement techniques.
- Different kinds of restoration and image compression techniques.
- Segmentation methods used in image processing, image understanding and recognition.
- Usage of image processing in real time applications.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Process digital images using fundamental steps of image processing and simple arithmetic, logical and geometric operations.	K3
CO2: Analyze and apply image transforms like FFT, DCT, Hadamard, Haar, Slant, KL transforms for images.	K4
CO3: Enhance the quality of images using frequency and spatial domain techniques.	K2
CO4: Identify the degradation modeling and restoring the image using different methods like algebraic approaches and projections**.**	K3
CO5: Apply Lossy and lossless image compression techniques for digital images.	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**	**PSO 1**	**PSO 2**
CO 1	3	3	2	3	2	2	1	-	1	2	1	3	2
CO 2	3	3	2	3	2	2	2	-	2	2	1	2	2
CO 3	3	3	3	3	1	3	-	1	1	2	1	3	2
CO 4	3	3	2	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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

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

Digital image processing systems-elements of visual perception-connectivity and relations between pixels - Arithmetic, logical, geometric operations.

Signature of BoS Chairman, CSE

Unit – II	IMAGE TRANSFORMS AND ENHANCEMENT	Periods	9
Image Transforms: 2D orthogonal and unitary transforms-properties and examples. 2D DFT, FFT, DCT, Hadamard transform, Haar Transform, Slant transform, KL Transform- properties and examples. Image Enhancement: Point processing-filtering in spatial and frequency domain, Nonlinear filtering-Color image processing fundamentals.			
Unit – III	**IMAGE RESTORATION AND COMPRESSION**	Periods	**9**
Image Restoration: Image observation and degradation model-circulant and block circulant matrices and its application in degradation model - SVD and iterative methods, blind deconvolution, image reconstruction from projections. Image compression: redundancy and compression models – Loss less compression: variable-length, Huffman, Arithmetic coding, bit-plane coding, Loss less predictive coding. Lossy compression: Transform based coding (DCT), JPEG standard.			
Unit – IV	**IMAGE SEGMENTATION, UNDERSTANDING AND RECOGNITION**	Periods	**9**
Image segmentation: Edge detection, line detection, curve detection. Edge linking and boundary extraction-boundary representation-region representation and segmentation; morphology: dilation, erosion, opening and closing. Image understanding and recognition: Matching by templates, classifiers-statistical and neural network based model.			
Unit – V	**APPLICATIONS**	Periods	**9**
Applications: Automatic visual system in part inspection-forensic and security system- scientific and medical investigation- entertainment: multimedia.			
		Total Periods	**45**

References

1.	Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Third Edition,Pearson Education, 2012.
2.	Anil K. Jain, "Fundamental of Digital Image Processing", Prentice Hall , 2015.
3.	B.Chanda, D.Dutta majumder, " Digital Image Processing and Analysis", Second Edition, PHI, 2011.

E-Resources

1.	http://www.ee.columbia.edu/~xlx/ee4830/notes/lec5.pdf
2.	http://www.ifp.illinois.edu/~moulin/ece544-chapter5.pdf
3.	https://www.analyticsvidhya.com/blog/2019/04/introduction-image-segmentation-techniques-python/

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE12	**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**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	2	2	2	3	1	1	1	3	2
CO 2	3	3	3	3	2	2	2	3	1	1	1	2	2
CO 3	3	3	2	3	1	3	2	2	1	1	1	3	2
CO 4	3	3	3	2	1	2	2	3	1	1	1	1	1
CO 5	3	3	2	2	1	2	2	2	1	2	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	**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.

Signature of BoS Chairman, CSE

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, 2010
2.	Marc Farley, ―Building Storage Networks‖, Tata McGraw Hill ,Osborne, 2001.
3.	Robert Spalding, ―Storage Networks: The Complete Reference―, Tata McGraw Hill , Osborne, 2003.

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE13	**Computer Vision**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Be familiar with theoretical aspects of computing with images
- Be familiar with practical aspects of computing with images
- Have described the foundation of image formation, measurement, and analysis
- Understand the geometric relationships between 2D images and the 3D world
- Grasp the principles of state-of-the-art deep neural networks

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Developed the practical skills necessary to build computer vision applications	K2
	CO2: Have gained exposure to object and scene recognition	K2
	CO3: Categorization from images	K3
	CO4: Analyze image analysis technologies	K4
	CO5: Analyze pattern analysis technologies	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	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	-	1	2	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**

Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis

Unit - II	**DETECTION TECHNIQUES**	Periods	**9**

Edge detection, Edge detection performance, Hough transform, corner detection

Unit - III	**IMAGE SEGMENTATION**	Periods	**9**

Segmentation, Morphological filtering, Fourier transform

Unit - IV	**IMAGE ANALYSIS**	Periods	**9**

Signature of BoS Chairman, CSE

Feature extraction, shape, histogram, color, spectral, texture, using CVI Ptools, Feature analysis, feature vectors, distance /similarity measures, data preprocessing			
Unit - V	**PATTERN ANALYSIS**	Periods	**9**
Clustering: K-Means, K-Medoids, Mixture of Gaussians Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.			
		Total Periods	**45**
References			
1.	Computer Vision: Algorithms and Applications by Richard Szeliski.		
2.	Deep Learning, by Goodfellow, Bengio, and Courville.		
E-Resources			
1.	https://en.wikipedia.org/wiki/Computer_vision		
2.	https://missinglink.ai/guides/computer-vision/image-segmentation-deep-learning-methods-applications/		
3.	https://www.iit.it/research/lines/pattern-analysis-and-computer-vision		

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE14	**Advanced Software Engineering**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Understand Software Engineering Lifecycle Models
- Do project management and cost estimation
- Gain knowledge of the System Analysis and Design concepts.
- Understand software testing approaches
- Familiar with DevOps practices

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 on project management	K2
	CO3 : Know the approaches as well as cost and schedule estimation strategies	K3
	CO3: Perform formal analysis on specifications	K2
	CO4: Use UML diagrams for analysis and design	K2

Pre-requisites: Software Engineering

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**	**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	1	2	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**

Software engineering concepts – Development activities – Software lifecycle models - Classical waterfall - Iterative waterfall – Prototyping – Evolutionary - Spiral – Software project management – Project planning – Estimation – Scheduling – Risk management – Software configuration 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.

Signature of BoS Chairman, CSE

Unit - III	DESIGN & TESTING	Periods	9
Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Architectural styles – Layered - Pipe and filter.- User interface design Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking.			
Unit - IV	**AGILE METHODOLOGY**	Periods	**9**
Theories for Agile management – agile software development – traditional model vs. agile model - classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values.			
Unit - V	**AGILE PROCESSES & DESIGN**	Periods	**9**
Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, and Extreme Programming: Impact of agile processes in RE – current agile practices – variance – overview of RE using agile – managing unstable requirements Agile Interaction Design - Agile product development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD			
		Total Periods	**45**

References

1.	Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd edition, Pearso Education, 2004.
2.	Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.
3.	Len Bass, Ingo Weber and Liming Zhu, ―DevOps: A Software Architect‘s Perspective‖, Pearson Education, 2016
4.	Dingsoyr, Torgeir, Dyba, Tore, Moe, Nils Brede (Eds.), ―Agile Software Development, Current Research and Future Directions‖, Springer-Verlag Berlin Heidelberg, 2010

E-Resources

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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE15	**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: Defend hacking attacks and protect data assets.	K2
	CO2: Defend a computer against a variety of different types of security attacks using a number of hands-on techniques.	K2
	CO3: Defend a LAN against a variety of different types of security attacks using a number of hands-on techniques.	K2
	CO4: Practice and use safe techniques on the World Wide Web.	K3
	CO5: Understand computer Digital forensics.	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**	**PSO 1**	**PSO 2**
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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**HACKING WINDOWS**	Periods	**9**

Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

Unit - II	**TCP/IP**	Periods	**9**

TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming.

Unit – III	**FUNDAMENTALS OF COMPUTER FRAUD**	Periods	**9**

Signature of BoS Chairman, CSE

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process.			
Unit – IV	**ARCHITECTURE**	Periods	**9**
Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services– Reducing transaction risks.			
Unit – V	**KEY FRAUD INDICATOR SELECTION PROCESS CUSTOMIZED**	Periods	**9**
Forensics – Computer Forensics – Journaling and it requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection.			
		Total Periods	**45**
References			
1.	Kenneth C.Brancik "Insider Computer Fraud" Auerbach Publications Taylor & Francis Group–2008.		
2.	Ankit Fadia " Ethical Hacking" second edition Macmillan India Ltd, 2006		
E-Resources			
1.	https://null-byte.wonderhowto.com/how-to/hacking-windows-10-break-into-somebodys-computer-without-password-setting-up-payload-0183584/		
2.	https://www.acfe.com/uploadedFiles/Shared_Content/Products/SelfStudy_CPE/Fundamentals%20of%20Computer%20and%20Internet%20Fraud%202017_Extract.pdf		
3.	https://oseven.in/files/5936c2ad22cae.pdf		

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE16	**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 viewpoint of human information processing.	K2
	CO2: Describe typical human–computer interaction (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
(3/2/1 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**	**PSO 1**	**PSO 2**
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
4. Continuous Assessment Test I, II & III 5. Assignments 6. End-Semester examinations
Indirect
2. 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: Models – 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.

Signature of BoS Chairman, CSE

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

6.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
7.	Brian Fling, "Mobile Design and Development", First Edition , OReilly Media Inc., 2009 (UNIT – IV)
8.	Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, OReilly, 2009.(UNIT-V

E-Resources

5.	https://course.ccs.neu.edu/csg170/
6.	https://www.cl.cam.ac.uk/teaching/1011/HCI/HCI2010.pdf
7.	https://www.iare.ac.in/sites/default/files/lecture_notes/HCI%20LECTURE%20NOTES.pdf

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE17	**GPU Computing**	3	0	0	3	40	60	100

Course Objective

The student should be made to,

- Define terminology commonly used in parallel computing
- Describe common GPU architectures and programming models.
- Implement efficient algorithms for common application kernels.
- Given a problem, develop an efficient parallel algorithm to solve it.
- Given a problem, implement an efficient and correct code to solve it, analyze its performance

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Students would learn concepts in parallel programming	K2
CO2: Implementation of programs on GPUs	K2
CO3: Debugging and profiling parallel programs	K4
CO4: Develop an efficient parallel algorithm	K4
CO5: implement an efficient and correct code to solve real-time problems	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	1	-	-	-	-	-	2	1	3	2
CO 2	3	3	3	1	-	-	-	-	-	2	1	2	2
CO 3	3	3	2	1	-	-		-	-	2	1	3	2
CO 4	3	3	3	1	-	-	-	-	-	2	1	1	1
CO 5	3	3	2	1	-	-	-	-	-	2	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**

History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps / Wavefronts, Thread blocks / Workgroups, Streaming multiprocessors, 1D / 2D / 3D thread mapping, Device properties, Simple Programs

Unit – II	**MEMORY**	Periods	**9**

Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories

Unit - III	**SYNCHRONIZATION**	Periods	**9**

Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction.

Signature of BoS Chairman, CSE

Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU Functions: Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.			
Unit - IV	**SUPPORT**	Periods	**9**
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	**CASE STUDIES**	Periods	**9**
Case Studies: Image Processing, Graph algorithms, Simulations, Deep Learning			
		Total Periods	**45**

References	
1.	Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-meiHwu; 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)
E-Resources	
1.	http://courses.cms.caltech.edu/cs179/
2.	http://lorenabarba.com/gpuatbu/Program_files/Cruz_gpuComputing09.pdf
3.	https://www.clear.rice.edu/comp422/lecture-notes/index.html

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE18	**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

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**	**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
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**

Signature of BoS Chairman, CSE

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

Signature of BoS Chairman, CSE

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**M.E. & M.Tech.**	Programme code	**201**	Regulation	**2019**
Department	**CSE & IT**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE19	**Information Retrieval**	3	0	0	3	40	60	100

Course Objective

The student should be made to,
- Understand the basics of Information Retrieval.
- Understand machine learning techniques for text classification and clustering.
- Understand various search engine system operations.
- Learn different techniques of recommender system.
- Be familiar with Web Search Engine

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Use an open source search engine framework and explore its capabilities	K2
	CO2: Apply appropriate method of classification or clustering	K2
	CO3: Design and implement innovative features in a search engine.	K4
	CO4: Design and implement a recommender system.	K4
	CO5: Design an efficient search engine and analyze the Web content structure.	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	1	3	2
CO 2	3	3	3	3	-	-	-	-	1	2	1	2	2
CO 3	3	3	2	3	-	-		-	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
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

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

Introduction -History of IR- Components of IR - Issues –Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

Unit – II	**MODELING AND RETRIEVAL EVALUATION**	Periods	**9**

Basic IR Models – Boolean Model – TF-IDF (Term Frequency/Inverse Document Frequency) Weighting – Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

Unit - III	**TEXT CLASSIFICATION AND CLUSTERING**	Periods	**9**

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naive Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier -Feature Selection or

Signature of BoS Chairman, CSE

Dimensionality Reduction – Evaluation metrics – Accuracy and Error -Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching -Multi-dimensional Indexing.			
Unit - IV	**INDEXING**	Periods	**9**
Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency			
Unit - V	**RECOMMENDER SYSTEM**	Periods	**9**
Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture -Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighborhood models.			
		Total Periods	**45**

References	
1.	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2.	J Ricci, F, Rokach, L. Shapira, B.Kantor, Recommender Systems Handbook, First Edition, 2011..
3.	C. Manning, P. Raghavan, and H. Schutze, Introduction to Information Retrieval, Cambridge University Press, 2008.
4.	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

E-Resources	
1.	https://lecturenotes.in/subject/367/information-retrieval-system-ir
2.	https://www.cl.cam.ac.uk/teaching/1314/InfoRtrv/lecture1.pdf
3.	https://pit.ac.in/pitnotes/uploads/CS6007_QB_CSE.pdf

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE20	**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												**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**	**PSO 1**	**PSO 2**
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 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 – agile processes – choosing the right process			
Unit - II	**REQUIREMENTS MANAGEMENT**	Periods	**9**

Signature of BoS Chairman, CSE

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 – test data 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.	Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
4.	Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.
5.	Chris F. Kemerer, "Software Project Management – Readings and Cases", McGraw Hill, 1997.
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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**		

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE21	**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 Auto encoders 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: Apply basic mathematical concepts in Deep Learning.	K1
	CO2: Work with powerful framework for supervised learning.	K2
	CO3: Deal with convolution Neural Networks.	K3
	CO4: Analyze various type efficient data encoders.	K3
	CO5: Apply various network models in deep learning.	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**	**PSO 1**	**PSO 2**
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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION TO DEEP LEARNING**	Periods	**9**

Deep Learning Models – Single Layer Perceptron Model – Multilayer Perceptron Model – Convolutional Neural Networks – Recurrent Neural Network – Restricted Boltzmann Machines – Deep Belief Networks – Feature Selection – Applied Machine Learning and Deep Learning – History of Deep Learning - Statistical Concepts – Linear Algebra.

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.

Signature of BoS Chairman, CSE

Unit – III	SINGLE AND MULTILAYER PERCEPTRON MODELS	Periods	9
Single Layer Perceptron Model – Training – Widrow Hoff Algorithm – Limitations – Statistics – Multilayer Perceptron Model – 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 – Histroy Compressor – Long Short Term Memory – Training LSTM – Structural Damping within RNNs.			
Unit – V	**OTHER 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.	IanGoodfellow,YoshuaBengio,AaronCourville, “DeepLearning”,MITPress,2016.
2.	TawehBeysolow II, “Introduction to Deep Learning using R”, Apress, Springer, 2017.
3.	Jason Brownlee, “DeepLearningwith Python”,ebook,2016
4.	Nikhil Buduma, “Fundamentals of Deep Learning”, O Reilly, 2017
5.	KevinP.Murphy, “MachineLearning:AProbabilisticPerspective”, 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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE22	**Information Security**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the different ways the information systems may be compromised. • Learn to model the various types of threats. • Acquire knowledge by analyzing software systems. • Understand and apply different countermeasures and protect information. • Perform vulnerability testing.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Design an appropriate Policies for the organization.	K1
	CO2: Deliver professional, ethical, legal, security and social issues and responsibilities in an effective manner.	K2
	CO3: Develop risk management strategies for an enterprise.	K3
	CO4: Provide the understanding of different security mechanisms used in various areas of computing.	K3
	CO5: Apply the current technical concepts and practices in the core information technologies.	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**	**PSO 1**	**PSO 2**
CO 1	3	2	2	2	2	1	-	-	1	2	1	3	2
CO 2	3	3	3	2	2	2	-	-	1	2	1	3	2
CO 3	3	2	2	3	1	2	-	-	1	2	1	3	2
CO 4	3	3	3	2	1	2	-	-	-	2	1	1	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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION TO INFORMATION SECURITY**	Periods	**9**

Introduction – Components of Information system – System Development Life Cycle - Security in System lifecycle - Information Security: Is it an art or Science? - Information Assurance Concepts : Defense inDepth Information Assurance in Cyber Security – Need for Security: Threats – Attacks – Secure Software

Signature of BoS Chairman, CSE

Development – Legal, Ethical and Professional Issues in Information Security.			
Unit - II	**RISK MANAGEMENT**	Periods	**9**
Overview – Risk Identification – Risk Assessment – Risk control – Risk management practices – Quantitative vs Qualitative – Recommended Risk Control Practices – Planning for Security – Information Security Planning and Governance – Security Policy, standards and practices.			
Unit – III	**SECURITY TECHNOLOGY**	Periods	**9**
Introduction – Access Control – Firewalls – Protecting Remote Connection – Intrusion Detection and Prevention Systems – Honeypots, Honeynets and Padded Cell systems – Scanning and Analyzing Tools – Biometric Access Control.			
Unit – IV	**CRPTOGRAPHY & PHYSICAL SECURITY**	Periods	**9**
Foundations of Cryptology – Cipher Methods – Algorithms – Tools – Protocols for Secure Communications – Attacks on Cryptosystems – Physical Access Controls – Fire Security and Safety – Failure of Supporting Utilities and Structural Collapse – Interception of Data – Mobile and Portable Systems.			
Unit – V	**INFORMATION SECURITY AND MAINTENANCE**	Periods	**9**
Information Security Project Management – Technical and Nontechnical Aspects of Implementation –System Security Certification and Accreditation – Security Management Maintenance Models – Digital Forensics.			
		Total Periods	**45**

References

1.	Michael. E.Whitman, H.J.Mattord "PrinciplesofInformation Security,5th edition,2015,Thomson Publications, ISBN 1111899134.
2.	Michael. E. Whitman, H.J. Mattord "Management of Information Security" 6th edition, Cengage Learning, 2019.
3.	William Stallings, "Cryptography and Network Security- Principles and Practice", 6 th Edition, Pearson, 2013.
4.	Harold F Tipton, Micki Krause, "Information Security Management Handbook, 6th Edition, CRC press, 2007.

E-Resources

1.	https://www.coursera.org/lecture/information-security-data/what-is-information-security-1qTtP
2.	https://www.csoonline.com/article/3513899/what-is-information-security-definition-principles-and-jobs.html
3.	https://www.sciencedirect.com/science/article/pii/S1877050917329745/pdf?md5=7e3192605ef502c6aced1a5ca6e5d09f&pid=1-s2.0-S1877050917329745-main.pdf

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
P19CSE23	**Cyber Security and Cyber Laws**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the basics of Cyber Security and Cyber law. • Familiarize the issues those are specific to amendment rights • Understand the Cyber Crimes and Cyber Frauds • Understand the Legal Framework • Understand the Ethical Laws of Computer in different Countries	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Gain in depth knowledge in Information on Cyber Security and issues specific to amendment rights.	K2
	CO2: Apply the knowledge on copyright issues with software packages.	K2
	CO3: Comprehend ethical laws of computer for various countries.	K2
	CO4: Define Cyber Crimes and frauds.	K2
	CO5: Apply the knowledge of Legal Framework and Construct the secured environment.	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**	**PSO 1**	**PSO 2**
CO 1	3	3	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	2	2	2	2	-	-	1	3	1	1	1
CO 5	3	3	2	2	2	2	-	-	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	**CYBER CRIMES AND CYBER FRAUDS**	Periods	**9**

Definition of cybercrime – First Cybercrime – Types of cyber frauds – Cyber frauds in India Preventive measures – Cybercrimes – Who commits cyber-crimes? – Penalties and offences under the IT Act, 2000 – Offences under other legislations – Investigation of cyber-crimes in India – Regulatory Authorities.

Unit - II	**CYBER CRIME & LEGAL FRAMEWORK**	Periods	**9**

Signature of BoS Chairman, CSE

Cyber Crimes against Individuals, Institutionand State – Hacking – Digital Forgery – Cyber Stalking/Harassment – Cyber Pornography – Identity Theft & Fraud – Cyber Terrorism – Cyber Defamation – Right to Privacy and Data Protection onInternet – Concept of privacy – Self-regulation approach to privacy – Ingredients to decide confidentiality ofinformation – Intellectual Property Issues in Cyber Space – Interface with Copyright Law & Patent Law.			
Unit – III	**CYBER SECURITY**	Periods	**9**
Network and website Security Risks – Hacking – E-business Risk management issues – Firewall – Security framework – Cryptocurrency – Blockchain –Technology Stack :Protocol – Currency – Crowd Funding – Bitcoin Prediction Markets – Smart Property – Smart Contract – Decentralized Governance Services – E Payments – Digital Token based E payment systems – Online financial services in India – Law to Protect online financial service fraud.			
Unit – IV	**CYBER LAWS**	Periods	**9**
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 theNational Policy on InformationTechnology 2012 – IT Act 2000.			
Unit – V	**INFORMATION TECHNOLOGY ACT**	Periods	**9**
Overview – Applicability of the Act – Scheme of the Act – Important provisions of the Act – Digital Signature under the IT Act, 2000 – E-Governance – Attribution, Acknowledgement and Dispatchof Electronic Records – Certifying Authorities – Controller of Certifying Authorities (CCA) – Security Guidelines for Certifying Authorities – Electronic Signature Certificates – Duties of Subscribers – Penalties and Offences – Intermediaries – Rules issued under the IT Act, 2000			
		Total Periods	**45**
References			
1.	Vasu Deva, “Cyber Crimes and Law Enforcement”, Commonwealth Publishers, New Delhi, (2003).		
2.	Verma S, K, Mittal Raman, “Legal Dimensions of Cyber Space, Indian Law Institute”, New Delhi, (2004)		
3.	Justice Yatindra Singh, “Cyber Laws”, Universal Law Publishing Co, New Delhi, (2012).		
4.	S. R. Bhansali, “Information Technology Act, 2000”, University Book House Pvt. Ltd., Jaipur (2003).		
5.	Nina Godbole, “Cyber Security”, Wiley, 2011.		
E-Resources			
1.	https://www.researchgate.net/publication/27465550_Developments_in_the_global_law_enforcement_of_cyber-crime		
2.	http://14.139.60.114:8080/jspui/handle/123456789/722		
3.	https://www.meity.gov.in/content/information-technology-act-2000		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE24	**Business Analytics**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Investigate data to establish new relationships and patterns • Analyze the correlation between different variables • Analyze the possibility of default and generate customer records • Understand and explore problems in business • Use tools such as Excel and open source to interpret data	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand and critically apply the concepts and methods of business analytics	K2
	CO2: Identify, model and solve decision problems in different settings	K2
	CO3: Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity	K3
	CO4: Create viable solutions to decision making problems	K4
	CO5: Encourage an aptitude for business improvement, innovation and entrepreneurial action	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**	**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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

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

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.

Unit - II	**LIFE CYCLES**	Periods	**9**

Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

Signature of BoS Chairman, CSE

Unit – III	FORMING REQUIREMENTS	Periods	9
Forming Requirements: Overview of Requirements, Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.			
Unit – IV	**TRANSFORMING REQUIREMENTS**	Periods	**9**
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling.			
Unit – V	**FINALIZING REQUIREMENTS**	Periods	**9**
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools. 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 Sciencce 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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSE25	**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 • Prepare test plan based on the requirement document, design test plans and document test plans • Design test cases suitable for a software development in various domains • Validate and document test cases, assuring software component or system satisfies its requirement and meets stakeholder expectations. • Use of automation testing tools	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Identify, design different types of test cases for software development in any domain.	K1
	CO2: Design, develop, implement, validate and document test plans at various levels.	K2
	CO3: Develop Test cases for a given Software/System Specification.	K2
	CO4: Validate Test Cases with the Requirement Specifications.	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**	**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 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‘srole in a software development organization - Test planning - Establishing Test Policy - Structuredapproach to testing Test Factors - Eleven Step software testing process - Origin of Defects - Defect

Signature of BoS Chairman, CSE

Repository andTest Design - Developer/Tester support of developing adefect 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 andMeasurement of Success.			
Unit – IV	**TEST MANAGEMENT**	Periods	**9**
Choice of Standards - Infrastructure Management - Test PeopleManagement - 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**
Intergration 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.	Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices‖", Pearson Education, 2006		
2.	Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.		
3.	Ilene Burnstein, "Practical Software Testing‖", Springer International Edition, 2003.		
4.	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/		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSOE1	**Business Analytics**	3	0	0	3	40	60	100
Course Objective	The student should be made to, • Investigate data to establish new relationships and patterns • Analyze the correlation between different variables • Analyze the possibility of default and generate customer records • Understand and explore problems in business • Use tools such as Excel and open source to interpret data							
Course Outcome	At the end of the course, the student should be able to,							**KL**
	CO1: Understand and critically apply the concepts and methods of business analytics							K2
	CO2: Identify, model and solve decision problems in different settings							K2
	CO3: Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity							K3
	CO4: Create viable solutions to decision making problems							K4
	CO5: Encourage an aptitude for business improvement, innovation and entrepreneurial action							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**	**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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**9**
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.			
Unit - II	**LIFE CYCLES**	Periods	**9**
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.			
Unit – III	**FORMING REQUIREMENTS**	Periods	**9**

Signature of BoS Chairman, CSE

Forming Requirements: Overview of Requirements, Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.			
Unit – IV	**TRANSFORMING REQUIREMENTS**	Periods	**9**
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling.			
Unit – V	**FINALIZING REQUIREMENTS**	Periods	**9**
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools. 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 Sciencce 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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**		
Course Code	Course name	Periods per week		Credit	Maximum Marks		
P19CSOE2	**Machine Learning Techniques**	L	T	P	C	CA	ESE	Total
		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**	**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 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

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

What is Machine Learning? – 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 & NUERAL NETWORK**	Periods	**9**

Signature of BoS Chairman, CSE

Introduction to unsupervised Learning – Association Rules – Cluster Analysis – Reinforcement learning – Kmeans Clustering – Nueral Network – Perception – Backpropagation Algorithm – Training - Convolutional Nueral 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 asentence - 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 sequentialdata - Prepare the Time Series data - Train Gaussian HMM - Visualizing the model - Building Conditional Random Fields forsequential 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 edgedetector - Canny edge detector - Visualize gray scale image - Detecting corners - Detecting SIFT feature points - SIFT feature detection - Visualize the feature detectedimage - Building a Star feature detector - Visualize key points on the inputimage - Visualcodebook 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.	PrateekJoshiandco, “Python:RealWorldMachineLearning”,PacktPublishing, 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		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**		Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**				Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSOE3	**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)											**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**	**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

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 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

Signature of BoS Chairman, CSE

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/		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**		
Course Code	Course name	Periods per week			Credit	Maximum Marks	
P19CSOE4	**Cost Management Of Engineering Projects**	L	T	P	C	CA	ESE	Total
		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**	**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.

Signature of BoS Chairman, CSE

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/

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**III**		
Course Code	Course name	Periods per week		Credit	Maximum Marks		
P19CSOE5	**Internet of Things**	L	T	P	C	CA	ESE	Total
		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**	**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**

Signature of BoS Chairman, CSE

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 WirelessSensor 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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	-		
Course code	Course name	Periods per week			Credit	Maximum Marks	
P19CSOE6	**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**	**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 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

Signature of BoS Chairman, CSE

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, AnandRajaraman 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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E. & M.Tech**	Programme code		**204**	Regulation		**2019**	
Department	**CSE & IT**				Semester		**I**	
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC1	**Research Methodology and IPR**	2	0	0	0	100	-	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 publications	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	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	K3
	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**	**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
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

Signature of BoS Chairman, CSE

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	**REPORT WRITING**	Periods	**9**
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", 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.
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

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**				
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**				
Course code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
P19CSAC2	**English for Research Paper Writing**	2	0	0	0	100	-	100	

Course Objective	The student should be made to, • Understand that how to improve your writing skills • Understand that how to improve your level of readability • Learn about what to write in each section • Understand the skills needed when writing a Title • Ensure the good quality of paper at very first-time submission	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand forming and brake up sentences	K2
	CO2: Analyze and finding plagiarism	K4
	CO3: Conduct reviews	K3
	CO4: Focus on skill development activities	K2
	CO5: Identify the importance of quality of paper	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	2
CO 2	3	3	2	3	-	-	-	-	1	2	-	1	2
CO 3	3	3	2	2	-	-	-	-	1	2	-	3	2
CO 4	3	3	3	2	-	-	-	-	1	2	-	1	3
CO 5	3	3	2	2	-	-	-	-	1	2	-	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments
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			

Signature of BoS Chairman, CSE

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://www.umgc.edu/current-students/learning-resources/writing-center/online-guide-to-writing/tutorial/chapter4/ch4-11.html		
2.	http://crie.org.nz/research-papers/C.Griffiths_OP5.pdf		
3.	https://www.adelaide.edu.au/rsd/docs/rsd_Handbook_Dec09.pdf		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**			
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**			
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC3	**Disaster Management**	2	0	0	0	100	-	100

Course Objective	The student should be made to, • 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.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the effects of disaster	K2
	CO2: Analyze differences between disasters and hazards	K4
	CO3: Know disaster management techniques	K2
	CO4: Identify risk management techniques	K3
	CO5: Analyze risk assessment techniques	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	2
CO 2	3	3	3	3	-	-	-	-	2	2	-	2	3
CO 3	3	2	2	3	-	-	-	-	1	2	-	3	2
CO 4	2	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
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.

Signature of BoS Chairman, CSE

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 - V	**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, PardeepEt.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://wiki.seg.org/wiki/Natural_disasters_and_hazards
2.	https://en.wikipedia.org/wiki/Natural_disasters_in_India
3.	https://media.ifrc.org/ifrc/what-we-do/disaster-and-crisis-management/disaster-preparedness/

Signature of BoS Chairman, CSE

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

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**I**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC4	**Value Education**	2	0	0	0	100	-	100

Course Objective

The student should be made to,
- Understand value of education
- Understand value of self- development
- Understand value of behavior assessment
- Imbibe good values in students
- Let the should know about the importance of character

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand education values	K2
	CO2: Analyze importance of cultivation values	K4
	CO3: Importance of personality development	K3
	CO4: Analyze relationship maintenance	K4
	CO5: Analyze character maintenance	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	3
CO 2	3	2	3	3	-	-	-	-	2	2	-	2	2
CO 3	3	3	2	3	-	-	-	-	1	2	-	3	2
CO 4	3	2	3	2	-	-	-	-	2	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

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**

Signature of BoS Chairman, CSE

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.valuescentre.com/values-are-important/		
2.	http://www.healthofchildren.com/P/Personality-Development.html		
3.	https://www.investopedia.com/terms/r/relationship-management.asp		

Signature of BoS Chairman, CSE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**M.E.**	Programme code	**201**	Regulation	**2019**		
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC5	**Constitution of India**	2	0	0	0	100	-	100

Course Objective	The student should be made to, • Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. • Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role • Address the entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism. • Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the history of Indian Constitution	K2
	CO2: Importance of constitutional rights and duties	K3
	CO3: Understand the functions of Local administration	K2
	CO4: Understand the emergence of nationhood	K2
	CO5: Analyze the role of socialism	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**	**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	2	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
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			

Signature of BoS Chairman, CSE

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 Edn., Lexis Nexis, 2014.
E-Resources	
1.	http://ncert.nic.in/textbook/pdf/keps210.pdf
2.	https://en.wikipedia.org/wiki/Fundamental_Rights,_Directive_Principles_and_Fundamental_Duties_of_India
3.	https://www.enotes.com/homework-help/what-organs-government-legislative-executive-1146133

Signature of BoS Chairman, CSE

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

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC6	**Pedagogy Studies**	2	0	0	0	100	-	100

Course Objective

The student should be made to,

- Review existing evidence on the review topic to inform programme design
- Know policy making undertaken by the DFID, other agencies and researchers
- Identify critical evidence gaps to guide the development
- Know the importance of professional development
- Know about research gaps

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the concept of programme design through evidences	K2
	CO2: Understand the concept of policy making	K2
	CO3: Understand the concept of gap analysis	K2
	CO4: Analyze the importance of professional development	K4
	CO5: Understand future directions of research	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	PSO 1	PSO 2
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	3
CO 2	3	3	3	2	-	-	-	-	2	2	-	2	2
CO 3	3	3	2	3	-	-	-	-	1	2	-	3	2
CO 4	3	2	3	2	-	-	-	-	1	3	-	1	1
CO 5	3	3	2	2	-	-	-	-	1	2	-	2	2

CO/PSO Mapping

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignments
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.

Signature of BoS Chairman, CSE

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://en.wikipedia.org/wiki/Pedagogy
2.	https://www.scribbr.com/methodology/thematic-analysis/

Signature of BoS Chairman, CSE

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

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC7	**Personality Development Through Life Enlightenment Skills**	2	0	0	0	100	-	100

Course Objective

The student should be made to,
- Learn to achieve the highest goal happily
- Become a person with stable mind
- Become pleasing personality
- Become determinate
- Awaken wisdom in students

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Helps to identify goals	K2
	CO2: Helps to Personality development	K2
	CO3: Helps to have stable mind	K2
	CO4: Helps to be a determinate person	K2
	CO5: Helps to improve self growth	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	2
CO 2	3	2	3	2	-	-	-	-	2	2	-	2	3
CO 3	3	3	2	3	-	-	-	-	1	2	-	3	2
CO 4	3	3	3	2	-	-	-	-	1	3	-	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
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**

Signature of BoS Chairman, CSE

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 SwarupanandaAdvaita Ashram (Publication Department), Kolkata		
2.	Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,		
3.	Rashtriya Sanskrit Sansthanam, New Delhi.		
E-Resources			
1.	http://vbu.ac.in/wp-content/uploads/2016/02/SEC_Study-Material-on-life-skill.pdf		
2.	https://leaderonomics.com/functional/the-power-of-role-models		

Signature of BoS Chairman, CSE

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

Programme	**M.E.**	Programme code	**201**	Regulation	**2019**
Department	**COMPUTER SCIENCE AND ENGINEERING**			Semester	**II**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
P19CSAC8	**Online Course**	2	0	0	0	100	-	100

Course Objective

The student should be made to,

- Know about various online certification courses
- Know the importance of online courses
- Identify the needs of certification
- Understand the importance of online certification courses
- Know about job opportunities

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Analyze the need of certification courses	K4
	CO2: Improve the programming skills	K2
	CO3: Analyze the importance of certification courses	K4
	CO4: Get placement in reputed companies	K2
	CO5: Know the value of the courses and job opportunities	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**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3	-	-	-	-	1	2	-	3	2
CO 2	3	2	3	2	-	-	-	-	2	2	-	2	3
CO 3	3	3	2	3	-	-	-	-	1	2	-	3	2
CO 4	3	3	3	2	-	-	-	-	1	3	-	2	1
CO 5	3	3	2	2	-	-	-	-	1	2	-	2	2

Course Assessment Methods

Direct
1. Assignments
Indirect
1. Course - end survey

Content of the syllabus

LIST OF COURSES

Online Courses :

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

Signature of BoS Chairman, CSE