Course Code	18CSE392T	Course Name	MACHINE LEARNING - I	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	CSE	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	To provide basic concepts of machine learning			
CLR-2 :	To provide deeper understanding of various tools and techniques for Machine learning Algorithms and outputs			
CLR-3 :	Understand and Implement the major classification techniques			
CLR-4 :	Understand and Implement the various Clustering Methods			
CLR-5 :	Learn and Understand the Tree based machine Learning Algorithms			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand the concepts of machine learning	2	80	85
CLO-2 :	Learn and understand machine tools and libraries of machine learning	2	75	80
CLO-3 :	Learn and understand the linear learning models and classification in machine learning	2	85	80
CLO-4 :	Understand the clustering techniques and their utilization in machine learning	2	80	75
CLO-5 :	Study the tree based machine learning techniques and to appreciate their capability	2	75	85

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
H	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H	H	H	-	H	-	-	-	-	-	-	-	-	-	-
H	H	-	-	H	-	-	-	-	-	-	-	-	-	-
H	H	-	-	H	-	-	-	-	-	-	-	-	-	-
H	H	-	H	H	-	-	-	-	-	-	-	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	Machine Learning: What and Why?	Platform for machine learning	Ridge Regression	Measuring (dis)similarity	Decision tree representation
	SLO-2	Types of Machine Learning	Machine learning python libraries		Evaluating output of clustering methods	
	SLO-1	Supervised Learning	Scikit-learn	Maximum likeliwood estimation (least squares)	Spectral clustering	Basic decision tree learning algorithm
S-2	SLO-2	Unsupervised Learning	training data – testing data – validation data		Hierarchical clustering	
S-3	SLO-1	Reinforcement learning	k-fold cross validation	principal component analysis	Agglomerative clustering	Inductive bias in decision tree
	SLO-2	The Curse of dimensionality	Features		Divisive clustering	
	SLO-1	Over fitting and under fitting	Performance metrics		Choosing the number of clusters	
S-4	SLO-2	linear regression	MSE, accuracy, confusion matrix, precision	Bayesian classifier	Clustering datapoints and features	Decision tree construction
S-5	SLO-1	Bias and Variance tradeoff	recall, F- score	Support vector machine	Bi-clustering	Issues in decision tree
	SLO-2	Testing – cross validation				
S-6	SLO-1	Regularization	Linear Regression with multiple variables	Support vector machine + kernels	Multi-view clustering	Classification and regression trees (CART)
	SLO-2	Learning Curve				
S-7	SLO-1	Classification	Logistic Regression	Multi class classification	K-Means clustering	Random Forest
	SLO-2	Error and noise				Random Forest with scikit-learn
S-8	SLO-1	Parametric vs. non-parametric models	spam filtering with logistic regression	K nearest neighbour classification	K-meloids clustering	Multivariate adaptive regression trees (MART)
	SLO-2					Introduction to Artificial Neural Networks
S-9	SLO-1	Linear Algebra for machine learning	Naive Bayes with scikit-learn	Application: face recognition with PCA	Application: image segmentation using K-means clustering	Perceptron learning
	SLO-2					

Learning Resources	
	1. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012. 2. Ethem Alpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005 3. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997. 4. Sebastian Raschka, Vahid Mirjilili,"Python Machine Learning and deep learning", 2nd edition, kindle book, 2018 5. Carol Quadros,"Machine Learning with python, scikit-learn and Tensorflow", Packet Publishing, 2018. 6. Gavin Hackeling," Machine Learning with scikit-learn", Packet publishing, O'Reily, 2018.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*40 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
	Understand										
Level 2	Apply	*40 %*	-	*40 %*	-	*40 %*	-	*40 %*	-	*40%*	-
	Analyze										
Level 3	Evaluate	*20 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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