Semester Examination to be held in the Year December 2021, 2022, 2023, 2024

CLASS: B.E. 7th SEMESTER **CREDITS: 3**

BRANCH: COMPUTER ENGINEERING

COURSE NO: PCS-703

COURSE TITLE: MACHINE LEARNING

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
2	1	0	100	50

COURSE OUTCOMES **At the end of the course the student will be able to: -**	
CO1	To understand basics of machine learning
CO2	To apply different machine learning models using various datasets
CO3	To develop an understanding of the role of machine learning in massive scale automation

Detailed Syllabus

Section- A

Basics of Machine Learning: Definition of Machine learning, Applications, Feature set, Dataset division Introduction to Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning, bias-variance trade off, overfitting-underfitting **(5 HOURS)**

Supervised learning: Classification and Regression: K-Nearest neighbours, Linear Regression, Logistic Regression, gradient descent algorithm, Support Vector Machine (SVM), Evaluation Measures: SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve. **(9 HOURS)**

Unsupervised learning: Introduction to clustering, Hierarchical clustering, K-means clustering, Density based clustering **(6 HOURS)**

Section B

Bayesian learning: Probability theory and Bayes rule, Naive Bayes learning algorithm, Bayes nets **(4 HOURS)**

Decision trees: Representing concepts as decision trees, Recursive induction of decision trees, best splitting attribute: entropy and information gain, Overfitting, noisy data, and pruning. **(8 HOURS)**

Reinforcement learning and ensemble methods: Reinforcement learning through feedback network, function approximation, Bagging, boosting, stacking and learning with ensembles, Random Forest **(8 HOURS)**

BOOKS RECOMMENDED:		
1.	Machine Learning: The New AI	Ethem Alpaydin
2.	Machine Learning	Tom M. Mitchell
3.	Machine Learning: a Probabilistic Perspective	Kevin P. Murphy

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

Semester Examination to be held in the Year December 2021, 2022, 2023, 2024

CLASS: B.E. 7th SEMESTER **CREDIT: 1**

BRANCH: COMPUTER ENGINEERING

COURSE NO.: PCS -713

COURSE TITLE: MACHINE LEARNING LAB

Hours/ Week			Marks Distribution
L	T	P	Practical
0	0	2	50

LABORATORY OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Install Python
CO2	Understand various Loops and Conditions
CO3	Understand the supervised and unsupervised approaches
CO4	Implement various classification and regression techniques
CO5	Understand various performance parameters for evaluating the machine learning models

Lab Experiments:

Experiment 1	Implement loops and conditional statements
Experiment 2	Mathematical computing with Python packages like: numpy, MatplotLib, pandas Tensor Flow, Keras
Experiment 3	Linear regression and Logistic regression
Experiment 4	K nearest neighbour, K means clustering
Experiment 5	Support Vector Machine
Experiment 6	Naïve Bayes
Experiment 7	Decision Tree

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.