

SEMESTER S8

PATTERN RECOGNITION

Course Code	OEEVT 831	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	PBECT304	Course Type	Theory

Course Objectives:

1. To introduce the fundamental algorithms for pattern recognition
2. To instigate the various classification and clustering techniques

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction: Basics of pattern recognition system, various applications, Machine Perception, classification of pattern recognition systems Design of Pattern recognition system, Pattern recognition Life Cycle. Statistical Pattern Recognition: Review of probability theory, Gaussian distribution, Bayes decision theory and Classifiers	8
2	Concept of feature extraction and dimensionality, Curse of dimensionality, Hidden Markov Models (HMM) - basic concepts, Gaussian mixture models. Non-Parametric methods: Non-parametric techniques for density estimation - Parzen-window method, K-Nearest Neighbour method.	9
3	Decision trees: Construction, splitting of nodes, choosing of attributes, overfitting, pruning Linear Discriminant based algorithm: Perceptron, Support Vector Machines	9
4	Multilayer perceptrons, Back Propagation Algorithms. Artificial Neural Networks Classifier Ensembles: Bagging, Boosting/ AdaBoost Unsupervised learning: Clustering - Criterion functions for clustering, Algorithms for clustering: K-means and Hierarchical methods, Cluster validation	10

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
<ul style="list-style-type: none"> • 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks <p style="text-align: center;">(8x3 =24marks)</p>	<ul style="list-style-type: none"> • Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. <p style="text-align: center;">(4x9 = 36 marks)</p>	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Design a pattern recognition system	K2
CO2	Know the major approaches in statistical and syntactic pattern recognition.	K2
CO3	Become aware of the theoretical issues involved in pattern recognition system design such as the curse of dimensionality.	K2
CO4	Implement pattern recognition technique	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										3
CO2	2	2										3
CO3	2	2										3
CO4	2	2										3

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Pattern Recognition and Machine Learning,	C M Bishop	Springer	2006
2	Pattern Classification and scene analysis,	R O Duda, P.E. Hart and D.G. Stork,	John Wiley	2 nd edition, 2001

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Pattern Recognition Engineering	Morton Nadler, Eric P. Smith	John Wiley & Sons, New York	1993.
2	Pattern Recognition : Statistical, Structural and Neural Approaches	Robert J. Schalkoff	John Wiley & Sons Inc. New York	2007
3	Pattern Recognition	S.Theodoridis and K. Koutroumbas	Academic Press	4/e,2009
4	Machine Learning	Tom Mitchell	McGraw Hill	1997
5	Pattern Recognition Principles	Tou, J.T. and Gonzalez, R.C.	Addison-Wesley Publishing Company,	1974

Video Links (NPTEL, SWAYAM...)

Module No.	Link ID
1	https://www.youtube.com/watch?v=mfePdDh9t6Q
2	https://www.youtube.com/watch?v=yG1nETGyW2E
3	https://www.youtube.com/watch?v=pMHOPezBUfU
4	https://youtu.be/EWmCkVfPnJ8?si=re_1ZpaXCtOohvwq