Duration: 3hr. **Max. Marks: 80**

Instructions:
(1) Question one is Compulsory.
(2) Assume suitable data wherever required but justify it.
(3) Solve any THREE from Question No. 2 to 6.
(4) Figure to the right indicate full marks.

Q1	(a)	Which are the various metrics for evaluating the classifier performance?	**10**
	(b)	Briefly explain CNN architecture with detailed?	**10**
Q2	(a)	Explain the XOR function using McCulloch-Pitts model (use binary data representation)	**10**
	(b)	How do you explain random forest? Does random forest need pruning, explain in detail?	**10**
Q3	(a)	What is need of Markov Decision Processes? Explain MDP in detail.	**10**
	(b)	Explain the process of building a cognitive application?	**10**
Q4	(a)	Using Mamdani fuzzy model design a fuzzy logic controller to determine the wash time of domestic washing machine. Assume the inputs are dirt and grease on clothes. Use three descriptors for each input variable and five descriptor for output variables. Derive necessary membership functions and required fuzzy rules for the application.	**10**
	(b)	What are the essential components of Autoencoder explain in detail? Which activation function is best for autoencoder.	**10**
Q5	(a)	How does class imbalanced affect on classification? What are the ways to solve class imbalanced problem.	**10**
	(b)	Explain Data science for Multimodal applications?	**10**
Q6		Write Short Note on **Any Four**	**20**
	(a)	Holdout method	
	(b)	LSTM	
	(c)	Defuzzification Methods	
	(d)	Design Principles for Cognitive Systems	
	(e)	Bayes Theorem	
	(f)	Application of Data science for text	
