3 Hours **Total marks: 80**

Note: 1. Question number 1 is **compulsory.**
2. Solve any **three** questions out of the remaining **five** questions
3. Assume suitable data if necessary.
4. Figure to the right indicates full marks.

Q.1 Solve any **Four** of the following.

(a) Write short note on breadth first search **05**

(b) Biological neurons have a cell body, axons, dendrites and synapses. Draw a diagram and label these terms on it and explain each in brief. **05**

(c) State the reason for increase in the popularity of data mining in the field of machine learning. **05**

(d) Calculate accuracy, precision, recall and F1-score for following confusion matrix **05**

		Predicted Class	
		No	**Yes**
True Class	**No**	55 (TN)	5 (FP)
	Yes	10 (FN)	30 (TP)

(e) Illustrate the impact of outliers in a data set. **05**

Q.2 **(a)** Draw the block diagram of error back propagation algorithm and explain with a flow chart the concept of back propagation. **10**

(b) List different types of activation function and describe any three in brief. **10**

Q.3 **(a)** Explain with suitable examples the advantages of Bayesian approach over classical approaches to probability. **10**

(b) Consider the following 2-D dataset in Table. Construct a SVM classifier model. Given (2,1), (2, -1), and (4, 0) as support vectors, estimate the parameters of the model and classify (4, 2). **10**

(X1, X2)	(1, -1)	(2, -1)	(5, -1)	(4, 0)	(6, 0)	(1, 1)	(2, 1)	(5, 1)
Class	C1	C1	C2	C2	C2	C1	C1	C2

Q.4	**(a)**	Describe the steps to reduce dimensionality using the principal component analysis method by clearly stating mathematical formulas used.	**10**
	(b)	Explain reinforcement learning in detail along with the various elements involved in forming the concept.	**10**
Q.5	**(a)**	Explain voltage control expert system (VCES) along with its advantages over algorithmic approach.	**10**
	(b)	Discuss the challenges faced in demand side management and explain how machine learning enhances the demand side management process.	**10**
Q.6		Write short notes on any **Four**	
	(a)	Informed and uninformed strategies	**05**
	(b)	Structured and unstructured data	**05**
	(c)	Tradeoff between Bias and Variance	**05**
	(d)	Linear regression	**05**
	(e)	Load pattern classification using machine learning	**05**
