CBCS SCHEME

USN | | | | | | | | | | |

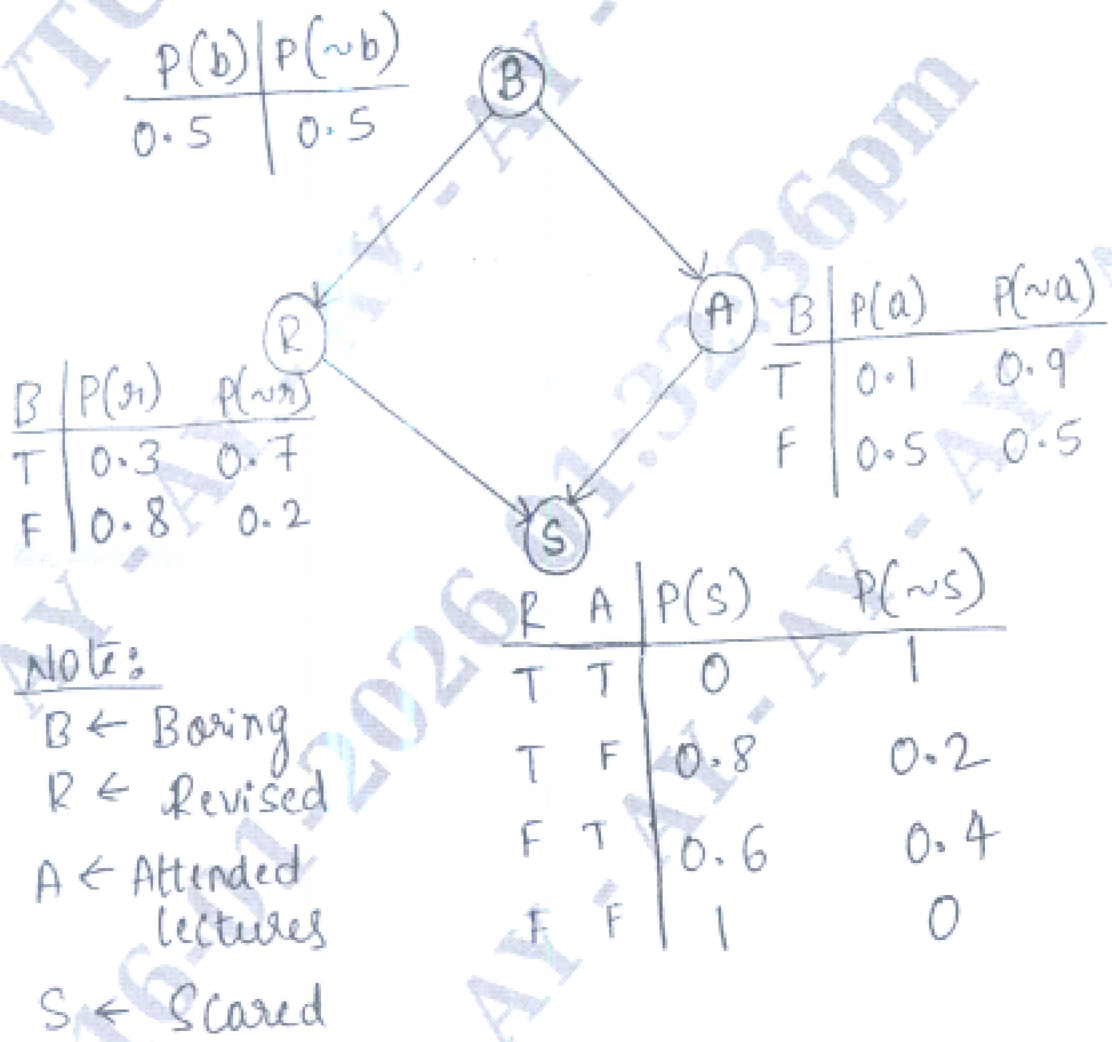
BAI702

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Machine Learning - II

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	a.	Explain the fundamental design issues and approaches considered while developing a machine learning program for playing checkers game.	10	L2	CO1
	b.	Describe the key perspectives and issues in machine learning.	04	L2	CO1
	c.	State and prove the Version space representation theorem. Clearly show that : i) Every hypothesis 'h' satisfying $(\exists s \in S)\ (\exists g \in G)\ (g \geq_g h \geq s)$ is a member of $VS_{H,D}$ ii) Every hypothesis in $VS_{H,D}$ satisfies this condition.	06	L3	CO1
		OR			
Q.2	a.	Describe well – posed learning problems in machine learning with suitable examples.	05	L2	CO1
	b.	Explain Enjoy Sport concept learning task.	05	L2	CO1
	c.	Outline the steps involved in the candidate – Elimination algorithm for computing version space and explain with an example.	10	L3	CO1
		Module – 2			
Q.3	a.	Explain general – to – specific beam search and LEARN –ONE –RULE algorithm.	10	L2	CO2
	b.	Using a small relational dataset, explain the FOIL algorithm and apply the same to generate first – order rule.	10	L3	CO2
		OR			
Q.4	a.	Outline the explanation –based learning algorithm PROLOG – EBG with help of SafeToStack example.	10	L3	CO2
	b.	Describe how explanation based learning can be used to derive search control knowledge.	06	L2	CO2
	c.	List the three different methods for using prior knowledge to alter the search performed by purely inductive methods.	04	L2	CO2
		Module – 3			
Q.5	a.	Explain the AdaBoost algorithm and how it sequentially improves weak classifiers.	08	L2	CO2
	b.	Outline the steps of basic random forest training algorithm.	04	L2	CO2
	c.	Explain the K – means algorithm with an example.	08	L2	CO2
		OR			
Q.6	a.	Explain ensemble learning and why combining multiple models often improves performance compared to a single model.	06	L2	CO3
	b.	Explain the K – Means neural network algorithm.	08	L2	CO3
	c.	Outline the steps of the mixture of experts algorithm.	06	L2	CO3

		Module – 4			
Q.7	a.	Describe the vector quantization with diagram that shows an interpretation of prototype vectors in two dimensions.	04	L2	CO3
	b.	Illustrate the self organizing feature map algorithm.	08	L3	CO3
	c.	Explain the following with respect to self organizing feature map. i) Self – Organization ii) Network dimensionality and boundary conditions.	08	L2	CO3
		OR			
Q.8	a.	Discuss the following : i) The Box – Muller scheme ii) Monte Carlo Principle.	10	L2	CO4
	b.	Describe Markov Chain Monte Carlo (MCMC) and explain Metropolis – Hastings algorithm used for MCMC.	10	L3	CO4
		Module – 5			
Q.9	a.	Consider the Bayesion network as shown in fig. Q. 9 (a) and identify the following. i) The probability of being scared ii) The probability the student revised given that they are scared iii) The probability they attended given that they are scared.  Fig. Q. 9(a)	10	L3	CO4
	b.	Explain the Hidden Markov Models (HMMs) Forward algorithm and HMM Viterbi algorithm.	10	L2	CO4
		OR			
Q.10	a.	Illustrate the steps of Kalman filter algorithm and particle filter algorithm.	10	L3	CO4
	b.	Explain the Baum – Welch algorithm.	10	L2	CO4