Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U6B03

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Sixth Semester

Biomedical Engineering

21UBM603 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TECHNIQUES

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

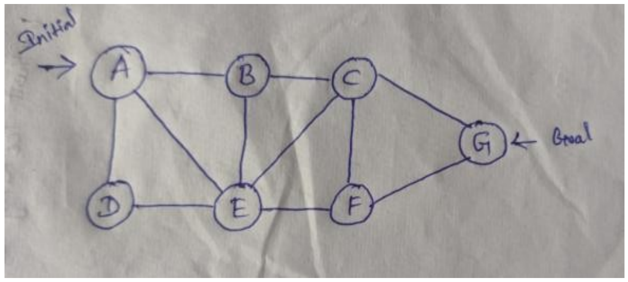
Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	How might DFS be applied to analyze the network of wearable devices for disease monitoring?	CO2-App
2.	Differentiate local beam search and genetic algorithm.	CO1-U
3.	Define rational decision.	CO1-U
4.	In a binary classification problem, a Naive Bayes model is trained with a dataset containing 800 instances, where 300 belong to class A and 500 belong to class B. If a new instance is presented, and the model predicts it as Class A with a probability of 0.75, what is the probability of it being predicted as Class B?	CO2-App
5.	List out the popular machine learning algorithms.	CO1-U
6.	Differentiate Classification and regression.	CO1-U
7.	Write down the types of ensemble learning.	CO1-U
8.	Write the advantages of expectation maximization algorithm.	CO1-U
9.	What is Perceptron and its types?	CO1-U
10	Which activation function is used in Multilayer perceptron?	CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) Design a scheduling system for telemedicine appointments considering the availability of both healthcare providers and patients. Explain how Depth First Search can be applied to optimize appointment scheduling. provide the optimal path between the healthcare providers and patients — CO2-App (16)



(b) Implement a map interface displaying the recommended routes for the mobile blood bank using BFS. Nodes on the map represent locations, and edges indicate potential routes. Highlight the shortest path calculated by BFS algorithm and provide details such as travel time, distance, and potential obstacles. — CO2-App (16)

12. (a) i) Define Baye's rule. How Baye's rule can be applied to tackle uncertain Knowledge. — CO1-U (4)

ii) Consider the following set of propositions: Patient has spots, Patient has measles, Patient has high fever, Patient has Rocky mountain spotted fever. Patient has previously been inoculated against measles. — CO2-App (12)

Patient was recently bitten by a tick Patient has an allergy.

a) Create a network that defines the casual connections among these nodes.

b) Make it a Bayesian network by constructing the necessary conditional probability matrix.

(b) i) Briefly explain the joint tree algorithm in Bayesian networks. — CO1-U (4)

ii) Construct a Bayesian Network and define the necessary CPT's for the given scenario. We have a bag of three biased coins a, b and c with probabilities of coming up heads of 20%, 60% and 80% respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins) and then the coin is flipped three times to generate the outcomes X1, X2 and X3. — CO2-App (12)

a) Draw a Bayesian network corresponding to this setup and define the relevant CPTs.

b) Calculate which coin is most likely to have been drawn if the flips come up HHT.

13.	(a)	With neat diagram explain in detail about the Decision tree classification algorithm.	CO1-U	(16)
	(b)	Elaborate in detail about the linear classification Models with examples.	CO1-U	(16)
14.	(a)	(i) Explain in briefthe K-Nearest Neighbor algorithm with an example.	CO1-U	(8)
		(ii) Analyze the computational resources required for training and deploying stacking ensembles in large-scale healthcare systems.	CO4-Ana	(8)
		Or		
	(b)	(i) Explain in brief the Expectation maximization algorithm.	CO1-U	(8)
		(i) Analyze how bagging and boosting algorithms handle noisy or incomplete data in healthcare data analytics.	CO4-Ana	(8)
15.	(a)	We have fine-tuning pre-trained convolutional neural networks (CNNs) for brain tumour segmentation in medical images. Analyze the given statement and how can hyperparameter tuning methods such as learning rate schedules or layer freezing strategies be employed to optimize model performance while leveraging knowledge from large-scale image datasets, and how does the choice of transfer learning strategy affect model robustness and generalization to new clinical settings?	CO1-U	(16)
	(b)	Develop a Back propagation algorithm for Multilayer feed forward neural network consisting of one input layer and one hidden layer and output layer from first principles.	CO1-U	(16)