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B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Seventh Semester

18AIE424T - ARTIFICIAL INTELLIGENCE AND INTERNET OF THINGS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Which layer is used for wireless connection in IoT devices? (A) Application layer (B) Network layer (C) Device layer (D) Service layer	1	1	1
2.	Which of the following is false about IoT devices? (A) IoT devices use the internet for collecting and sharing data (B) IoT devices need microcontrollers (C) IoT devices use wireless technology (D) IoT devices are completely safe	1	2	1
3.	How many layers in IOT reference model? (A) 4 (B) 7 (C) 6 (D) 8	1	1	1
4.	What is the output of .import stud.csv command? (A) import data from stud.csv file into student table (B) export data from stud.csv file into student table (C) import data from student table into stud.csv file (D) export data from student table into stud.csv file	1	2	1
5.	The best fit line method for data in Linear Regression? (A) Least Square Error (B) Maximum Likelihood (C) Logarithmic Loss (D) High accuracy	1	1	2
6.	The error function most suited for gradient descent using logistic regression is (A) The entropy function. (B) The squared error. (C) The cross-entropy function. (D) The number of mistakes.	1	1	2
7.	You are given a labeled binary classification data set with N data points and D features. Suppose that N < D. In training an SVM on this data set, which of the following kernels is likely to be most appropriate? (A) Linear kernel (B) Quadratic kernel (C) Higher-order polynomial kernel (D) RBF kernel	1	2	2
8.	What is the purpose of regularization in machine learning algorithms? (A) To reduce bias (B) To reduce variance (C) To improve model interpretability (D) To speed up training	1	1	2
9.	You are increasing the size of the layers (more hidden units per layer) in your neural network. What kind of impact it will have on bias and variance? (A) increases, increases (B) increases, decreases (C) decreases, increases (D) decreases, decreases.	1	2	3

10. What is the purpose of the loss function in a neural network? 1 1 3

(A) To measure the accuracy of the model's predictions
(B) To optimize the model's parameters during training
(C) To prevent overfitting
(D) To handle missing data

11. Which of the following functions can be used as an activation function in the output layer if we wish to predict the probabilities of n classes (p1, p2..pk) such that sum of p over all n equals to 1? 1 2 3

(A) Softmax
(B) ReLu
(C) Sigmoid
(D) Tanh

12. Assume a simple MLP model with 3 neurons and inputs= 1,2,3. The weights to the input neurons are 4,5 and 6 respectively. Assume the activation function is a linear constant value of 3. What will be the output ? 1 2 3

(A) 32
(B) 64
(C) 96
(D) 128

13. Given below are two statements: 1 2 4

Statement I: A genetic algorithm is a stochastic hill-climbing search in which a large population of states is maintained.
Statement II: In nondeterministic environments, agents can apply AND-OR search to generate contingent plans that reach the goal regardless of which outcomes occur during execution.
In the light of the above statements, choose the Correct answer from the options given below

(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is correct but Statement II is false
(D) Statement I is incorrect but Statement II is true

14. Which of the following operation is responsible to jump from one hill to another hill? 1 1 4

(A) Mutation
(B) Cross Over
(C) Fitness Function
(D) Natural Selection

15. Which algorithm is particularly well-suited for environments with continuous action spaces? 1 1 4

(A) Q-Learning
(B) Deep Q-Network (DQN)
(C) Policy Gradient
(D) Monte Carlo Tree Search (MCTS)

16. Which algorithm combines both value-based and policy-based methods in reinforcement learning? 1 1 5

(A) Q-learning
(B) Actor-Critic
(C) Monte Carlo methods
(D) Deep Q-Network (DQN)

17. _____ is a component on top of Spark Core. 1 1 5

(A) RDDs
(B) Spark SQL
(C) Spark Streaming
(D) Spark Context

18. The primary Machine Learning API for Spark is now the _____ based API 1 1 5

(A) Data Frame
(B) Dataset
(C) RDD
(D) context

19. Which of the following is an example of an IoT application in home automation? 1 1 5

(A) Smart lighting system
(B) Online grocery delivery service
(C) Smart home security system
(D) Virtual reality entertainment system

20. In IIoT, what does the term "edge computing" refer to? 1 1 5

(A) Centralized data processing in the cloud
(B) Processing data at the source or near the source
(C) Data encryption and security measures
(D) Data visualization techniques

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	With a neat diagram, write shortly the layers in IoT architecture.	4	1	1
22.	Brief about how to handle SQL databases using SQLite and MySQL.	4	1	2
23.	What are the techniques adopted to resolve uneven data and overfitting?	4	2	3
24.	Write the back propagation algorithm is used to train the Multi-layer Perceptron.	4	2	3
25.	Describe the deterministic and analytic methods to solve optimization problems.	4	1	4
26.	Describe the training process of a GAN. How does the generator learn to improve its output, and how does the discriminator adapt to become more discerning?	4	2	4
27.	Discuss about the different components and workflow of Spark.	4	1	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Explain how to read, save and process the data collected from IoT systems using different file formats.	12	2	1
	(OR)			
	(b) With the help of an illustration, Explain how IoT, big data, and AI together can help us shape a better world?			
29.	(a) Explain how to find an optimal hyperplane with maximum margin separating the two classes using Support Vector Machine? Explain why kernel is used in SVM.	12	3	2
	(OR)			
	(b) (i) Consider a sample of 40 students; we have three variables: the gender (boy or girl; discrete), class (XI or XII; discrete), and height (5 to 6 feet; continuous). Eighteen students prefer to go to the library in their spare time and rest prefer to play. Explain how to build a decision tree to predict who will be going to the library and who will be going to the playground in their leisure time. [6 marks] (ii) Explain the fundamental principles of linear regression and how it is applied in statistical modeling and predictive analysis? [6 marks]			
30.	(a) (i)Explain in detail about artificial neurons and how they can be connected to solve non-linear problems. [6 marks] (ii) What are some common activation functions used in artificial neurons, and under what circumstances would you choose one over the other? [6 marks]	12	2	3
	(OR)			
	(b) (i) Explain how the CNN works and the concept behind kernel, padding, and strides. [6 marks] (ii)What is the purpose of pooling layers in CNNs, and how do they contribute to feature reduction? [6 marks]			
31.	(a) You are training a deep neural network for a computer vision task. How might you use genetic algorithms to search for the best hyperparameters, such as learning rate, batch size, and network architecture? What would the genetic encoding and fitness evaluation involve?	12	3	4
	(OR)			
	(b) (i) In the taxi problem, how would you represent the states in the Q-learning algorithm? What are the components of a state, and how do you encode them? [6 marks] (ii)How does the Q-value change after an iteration of Q-learning, and what role do the learning rate and discount factor play? [6 marks]			

32. (a) How does IIoT facilitate supply chain optimization and logistics management? What role does real-time tracking and monitoring play in this context? 12 2 5

(OR)

(b) Explain how IoT devices address the key challenges posed by excessive urban population; they can help with traffic management, healthcare, energy crisis, and many other issues

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