| С | | Reg. No. : | | | | | | | | | | |
|-----------------------------|--|-----------------|---------|-----------------------|--------------|--------|--------------|--------|-------|--------|------|--------------|
| | Question Paper Code: UG405 | | | | | | | | | | | |
| | B.E./B.Tech. DEGREE EXAMINATION, NOV 2024 | | | | | | | | | | | |
| | Fourth Semester | | | | | | | | | | | |
| | Artificial Intelligence & Machine learning | | | | | | | | | | | |
| | 21UAM40 | 95 - FUNDAME | NTAL | S OF MAC | CHIN | e le | EARI | NINC | Ĵ | | | |
| | | (Re | gulatio | ns 2021) | | | | | | | | |
| Dura | ation: Three hours | | | | | | N | /laxi1 | mum | n: 100 |) Ma | rks |
| | | Answ | ver All | Questions | | | | | | | | |
| | | PART A | - (5 x | 1 = 5 Mark | xs) | | | | | | | |
| 1. | The term machine leas | rning was coine | d in wh | ich year? | | | | | | | CO | 1 - U |
| | (a) 1958 | (b) 1959 | | (c) 19 | 960 | | | (| (d) 1 | 961 | | |
| 2. | The Unsupervised learning problems can be grouped as | | | | | CO | 1 - U | | | | | |
| | (a) Clustering | (b) Association | n | (c) Both (| (a) ar | nd (b |) (| (d) N | one | of th | e Ab | ove |
| 3. | What can help to reduce overfitting in an SVM classifier? CO1-U | | | | 1 - U | | | | | | | |
| | (a) High-degree polynomial features (b) Setting a very low learning rate | | | | | | | | | | | |
| | (c) Use of slack variable | oles | | (d) Norm | alizin | g the | e data | a | | | | |
| 4. | Clustering is a | | | | | | | | | | CO | 1 - U |
| | (a) Supervised Learnin | ng | | (b) Unsur | pervis | ed le | earnii | ng | | | | |
| | (c) Reinforcement Learning | | | (d) None of the above | | | | | | | | |
| 5. | Which of the following is an application of reinforcement learning?CO1-U | | | | 1 - U | | | | | | | |
| | (a) Topic modeling | | | (b) Recor | nmen | datio | on sy | stem | S | | | |
| | (c) Pattern recognition | 1 | | (d) Image | class | sifica | tion | | | | | |
| PART - B (5 x 3 = 15 Marks) | | | | | | | | | | | | |
| 6. | What is Machine Le learning? | earning? What a | are the | important | t obje | ective | es of | f Ma | chin | e | CO | 1-U |
| 7. | Distinguish Overfit, Underfit and Best fit. CO1-U | | | | 1 - U | | | | | | | |
| 8. | State the parameters in a Perceptron network and its significance CO1-U | | | | 1 - U | | | | | | | |
| 9. | What is meant by Principal Component Analysis?CO1-U | | | | 1 - U | | | | | | | |

10. What are the Applications of Reinforcement Learning?

PART – C (5 x 16= 80 Marks)

 11. (a) Illustrate with an Example of Supervised, Unsupervised and CO1-U (16) Reinforcement Learning and Discuss any four Examples of Machine Learning Applications

OR

- (b) Explain in detail Theory of Generalization and Generalization CO1-U (16) Bound.
- 12. (a) Consider the five weeks sales data (in Thousands) is given as CO2- App (16) shown. Apply Linear Regression to predict the 7th and 12th week sales.

| Week X1 | Sales (in Thousands) Y1 |
|---------|-------------------------|
| 1 | 1.2 |
| 2 | 1.8 |
| 3 | 2.6 |
| 4 | 3.2 |
| 5 | 3.8 |
| | Or |

(b) Consider the four weeks sales data is given as shown. Apply CO2-App (16) Multiple Regression for the values given in table where weekly sales along with sales for products x1 and x2 are provided.

| e | 1 | 1 |
|-------------------|-------------------|----------------|
| X1 Product1 Sales | X2 Product2 Sales | Y Weekly Sales |
| 1 | 4 | 1 |
| 2 | 5 | 6 |
| 3 | 8 | 8 |
| 4 | 2 | 12 |

13. (a) Assume that the Neurons have a Sigmoid Activation Function, CO2-App (16) Perform a Forward pass and a Backward pass on the Network. Assume that the actual output of Y is 0.5 and Learning rate is 1. Perform another Forward pass.



CO1-U

 (b) Apply Classification and Regression Trees for the data set. The CO2-App (16) Target Attribute 'Job Offer' has 7 instances as Yes and 3 instances as No.

OR

| CGPA | Interactive | Practical Common | | Job | |
|------|-------------|------------------|----------|-------|--|
| | | Knowledge | Skills | Offer | |
| >=9 | Yes | Very Good | Good | Yes | |
| >=8 | No | Good | Moderate | Yes | |
| >=9 | No | Average | Poor | No | |
| <8 | No | Average | Good | No | |
| >=8 | Yes | Good | Moderate | Yes | |
| >=9 | Yes | Good | Moderate | Yes | |
| <8 | Yes | Good | Poor | No | |
| >=9 | No | Very Good | Good | Yes | |
| >=8 | Yes | Good | Good | Yes | |
| >=8 | Yes | Average | Good | Yes | |

14. (a) Cluster the following data points into three clusters, where the CO2-App (16) point are A1(2,10), A2(2,5),A3(8,4), B1(5,8), B2(7,5), B3(6,4), C1(1,2), C2(4,9).

OR

(b) Given the following data, use Principal Component Analysis to CO2-App (16) reduce the dimension from 2 to 1.

| Feature | Example1 | Example2 | Example3 | Example4 |
|---------|----------|----------|----------|----------|
| Х | 4 | 8 | 13 | 7 |
| у | 11 | 4 | 5 | 14 |

- 15. (a) Explain in detail Passive Reinforcement Learning with Examples. CO1-U (16) OR
 - (b) Explain in detail how Utility Function works well in CO1-U (16) Reinforcement Learning.

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