

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Sixth Semester B.E. Degree Examinations, September/October 2024

MACHINE LEARNING**(Artificial Intelligence & Machine Learning)**

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

| <u>Q. No</u> | <u>Question</u> | <u>Marks</u> | <u>(RBTL:CO:PI)</u> |
|--------------|-----------------|--------------|---------------------|
|--------------|-----------------|--------------|---------------------|

Module-1

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|----|----|--|----|-------------|
| 1. | a. | What is ML? Explain types of ML algorithms with example. | 10 | (1:1:1.6.1) |
| | b. | Consider the “Japanese Economy Car” concept and instance given in Table 1, Illustrate the hypothesis using Find-S algorithm. | 06 | (3:1:2.1.2) |

Table. 1

| Orig | Manufacture | Colour | Decade | Type | Example Type |
|-------|-------------|--------|--------|---------|--------------|
| Japan | Honda | Blue | 1980 | Economy | Positive |
| Japan | Toyota | Green | 1970 | Sports | Negative |
| Japan | Toyota | Blue | 1990 | Economy | Positive |
| USA | Chrysler | Red | 1980 | Economy | Negative |
| Japan | Honda | White | 1980 | Economy | Positive |

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|----|---|----|-------------|
| c. | Explain inductive biased hypothesis space and unbiased learner. | 04 | (2:1:1.6.1) |
| | (OR) | | |

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|----|----|--|----|-------------|
| 2. | a. | Consider the “Enjoy Sports” concept and instance given in Table 2, Illustrate the hypothesis using Candidate Elimination Learning algorithm. | 08 | (3:1:2.1.2) |
|----|----|--|----|-------------|

Table. 2

| Example | Sky | Air Temp. | Humidity | Wind | Water | Forecast | Enjoy Sport |
|---------|-------|-----------|----------|--------|-------|----------|-------------|
| 1 | Sunny | Warm | Normal | Strong | Warm | Same | Yes |
| 2 | Sunny | Warm | High | Strong | Warm | Same | Yes |
| 3 | Rainy | Cold | High | Strong | Warm | Change | No |
| 4 | Sunny | Warm | High | Strong | Cold | Change | Yes |

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|----|---|----|-------------|
| b. | What are challenges and applications of ML? | 06 | (1:1:1.6.1) |
| c. | Explain concept learning with example. | 06 | (2:1:1.6.1) |

Module-2

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|----|----|--|----|-------------|
| 3. | a. | Explain the methods adopted for creating a test set? Also explain the problems associated with it and solutions. | 06 | (2:2:2.1.2) |
| | b. | In context to prepare the data for ML algorithm's, write a note on: | 08 | (2:2:2.7.1) |
| | | (i) Data Cleaning (ii) Handling text and Categorical attributes | | |
| | | (iii) Feature scaling. | | |

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

- c. With code snippet, write a note on (i) Creating Workspace (ii) Frame the Problem. **06** (3:2:2.5.1)

(OR)

4. a. Explain the following with example: **08** (2:2:2.5.1)
Head(), info(), value_counts(), and Describe()
- b. With code snippet, explain binary classifier and its different types. **06** (2:2:2.8.1)
- c. Using code snippets, outline the concepts involved in **06** (2:2:2.8.1)
(i) Measuring accuracy using Cross-Validation
(ii) Confusion Matrix (iii) Precision and Recall

Module-3

5. a. Explain polynomial regression. **06** (2:3:2.7.1)
- b. What is gradient descent algorithm? Discuss its various types. **10** (2:3:2.5.1)
- c. What is learning curves? Explain. **04** (2:3:2.5.1)

(OR)

6. a. What is linear regression? Explain normal equation and computational complexity. **10** (2:3:2.5.1)
- b. In regularized linear models illustrate the three different methods to constrain the weights. **10** (2:3:2.5.2)

Module-4

7. a. With example dataset, explain how decision trees are used in making predictions. **08** (2:4:3.5.1)
- b. In the context of ensemble methods determine the concepts of **08** (2:4:3.5.1)
(i) Bagging and Pasting (ii) Voting classifiers.
- c. Explain the CART training algorithm. **04** (2:4:2.5.1)

(OR)

8. a. Explain the following boosting methods along with code snippets: **10** (2:4:2.5.1)
(i) Ada Boost (ii) Gradient Boosting.
- b. Using parents decision dataset, construct a decision tree given in Table 3 using Gini Index. **10** (3:4:3.5.1)

Table. 3

| Weekend | Weather | Parent | Money | Decision |
|---------|---------|--------|-------|----------|
| 1 | Sunny | Yes | Rich | Cinema |
| 2 | Sunny | No | Rich | Tennis |
| 3 | Windy | Yes | Rich | Cinema |
| 4 | Rainy | Yes | Poor | Cinema |
| 5 | Rainy | No | Rich | Stayin |
| 6 | Rainy | Yes | Poor | Cinema |
| 7 | Windy | No | Poor | Cinema |
| 8 | Windy | No | Rich | Shopping |
| 9 | Windy | Yes | Rich | Cinema |
| 10 | Sunny | No | Rich | Tennis |

Module-5

9. a. Write a note on Gibbs algorithm. **04** (2:5:2.5.1)
b. Consider the dataset about stolen vehicles. Using Naïve Bayes classifier **08** (3:5:2.7.1)
classify the new data {Red, Suv, Domestic}.

| Colour | Type | Origin | Stolen? |
|--------|--------|----------|---------|
| Red | Sports | Domestic | Yes |
| Red | Sports | Domestic | No |
| Red | Sports | Domestic | Yes |
| Yellow | Sports | Domestic | No |
| Yellow | Sports | Imported | Yes |
| Yellow | SUV | Imported | No |
| Yellow | SUV | Imported | Yes |
| Yellow | SUV | Domestic | No |
| Red | SUV | Imported | No |
| Red | Sports | Imported | Yes |

- c. Explain Bayesian belief network with suitable example. **08** (2:5:2.5.1)
(OR)
- 10 a. Describe how SVM makes prediction using **08** (2:5:2.5.1)
(i) Quadratic programming (ii) Kernelized SVM
b. Explain features of Bayesian method. **04** (2:5:2.5.1)
c. Explain the EM algorithm in detail. **08** (2:5:2.5.1)

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