

Roll No. ....

Total Pages : 03

**LMDQ/M-24**

**7515**

MACHINE LEARNING

Paper : ST-403 & ST-404 (Opt-(iii))

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) What do you mean by machine learning ?
  - (b) Provide some examples of reinforcement learning and justify how they use it.
  - (c) Comment on the role of the Vapnik-Chervonenkis dimension.
  - (d) How random forests are different from decision trees ?
  - (e) What is meant by smoothing parameter in non-parametric classification ?
  - (f) State major applications of neural networks.
- 6×2.5=15**

### Unit I

2. (a) Discuss various steps involved in the machine learning process using suitable examples. **7.5**  
(b) Discuss the major applications of machine learning in detail. **7.5**
3. (a) Explain the various evaluation metrics used in machine learning using suitable examples. **10**  
(b) Differentiate between supervised and unsupervised learning. **5**

### Unit II

4. (a) Discuss the procedure to learn a class from examples using suitable examples. **7.5**  
(b) Explain the working of SVM using a suitable example. **7.5**
5. (a) How a model selection is done in supervised learning ? Explain how can it be generalized using suitable examples ? **7.5**  
(b) How can you tune complexity in multivariate methods ? Explain. **7.5**

### Unit III

6. (a) Explain the working of multivariate trees using suitable examples. **7.5**

- (b) What are the various estimators for density estimation used in non-parametric methods ? Explain in brief. **7.5**

7. (a) Discuss the concept of pruning in decision trees using suitable examples. **7.5**  
(b) Discuss the various ways for non-parametric classification using suitable examples. **7.5**

### Unit IV

8. Explain the various types of clustering in detail using suitable examples. Also, discuss how supervised learning is done after clustering. **15**
9. Write and explain the back-propagation algorithm using suitable examples. **15**