

(3Hrs)

Max Marks: 80

N.B.: (1) Question No. 1 is compulsory.

(2) Attempt any **three** of remaining **five** questions.

(3) Assume any suitable **data** if necessary and clearly state it.

- 1 (a) Define well posed learning problem. Hence, define robot driving learning problem. [05]
- (b) Explain, in brief, Bayesian Belief networks. [05]
- (c) Write short note on Temporal Difference Learning. [05]
- (d) Explain procedure to construct decision trees. [05]
2. (a) Explain how support vector machine can be used to find optimal hyperplane to classify linearly separable data. Give suitable example. [10]
- (b) Explain procedure to design machine learning system. [10]
3. (a) What is linear regression? Find the best fitted line for following example: [10]

| i | x_i | y_i | \hat{y}_i |
|-----|-------|-------|-------------|
| 1 | 63 | 127 | 120.1 |
| 2 | 64 | 121 | 126.3 |
| 3 | 66 | 142 | 138.5 |
| 4 | 69 | 157 | 157.0 |
| 5 | 69 | 162 | 157.0 |
| 6 | 71 | 156 | 169.2 |
| 7 | 71 | 169 | 169.2 |
| 8 | 72 | 165 | 175.4 |
| 9 | 73 | 181 | 181.5 |
| 10 | 75 | 208 | 193.8 |

- (b) What is decision tree? How you will choose best attribute for decision tree classifier? Give suitable example. [10]
- 4 (a) Explain K-mean clustering algorithm giving suitable example. Also, explain how K-mean clustering differs from hierarchical clustering. [10]
- (b) What is kernel? How kernel can be used with SVM to classify non-linearly separable data? Also, list standard kernel functions. [10]

- 5. (a) What is Q-learning? Explain algorithm for learning Q. [10]
- (b) Explain following terms with respect to Reinforcement learning: delayed rewards, exploration, and partially observable states. [10]
- 6 Write short notes on
 - (a) Soft margin SVM [05]
 - (b) Radial Basis functions [05]
 - (c) Independent Component Analysis [05]
 - (d) Logistic Regression [05]
