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Roll No: \_\_\_\_\_

**Computer Science and Engineering Department**  
**Thapar University, Patiala, Punjab.**

Mid Sem Exam (Dated: 15-03-2016)  
(ME-CSE, ME-CSA, PhD)

Course: Machine Learning  
Instructor: Dr. Prashant Singh Rana (PSR)  
Time: 2hrs

Code: PCS206

MM: 125

Note: Attempt ALL questions. Answer must be brief and point to point. Paper is lengthy kindly manage time accordingly.

Q1. Describe the following term with their significance and formula (if any): [20]

- (i) Correlation (r)
- (ii) Determinant of Coefficient ( $R^2$ )
- (iii) RMSE
- (iv) Accuracy

Q2. Actual and prediction using any model is given below: [25]

Actual	2.5	4.5	0.5	2.2	3.4	2.3	3.4	1.6
Predicted	1.3	2.3	1.5	3.6	1.9	2.2	3.3	1.5

Calculate the following evaluation parameters:

- (i) Correlation (r)
- (ii) Determinant of Coefficient ( $R^2$ )
- (iii) RMSE
- (iv) Accuracy (acceptable err is  $\pm 0.5$ )
- (v) Draw the Scatter Plot between actual and predicted.

Q3. What is random number? Discuss five different techniques to generate random numbers? How random numbers are generated in R and python, write the functions? How to check the goodness of random number generator other than plotting? [10]

Q4. What is sampling? How it is useful? Discuss different types of sampling techniques? [10]

Q5. What is data normalization? How it is useful? Discuss different types of normalization techniques? [10]

Q6. What is data distribution? How it is useful? Discuss different types of distributions? [10]

Q7. Describe the following terms: [10]

- (i) Cross Validation
- (ii) BoxPlot
- (iii) Convergence
- (iv) ROC
- (v) Error Matrix

Q8. Initial population is describing below. Apply DE to generate next set of population and show all the steps. Given: PopSize=5, CR=0.5, F=0.5, D=5, LB=-10, UB=10. Fitness function is the sum of all the values of a chromosome. Make assumption if any. Best fitness values is 999999. [15]

-4	-6	1	8	-7
10	2	-10	10	2
8	-8	-4	2	10
-3	-9	-5	1	-2
7	-3	3	5	0

Fitness

-8
14
8
-18
12

Q9. What is least sum of square? Explain with formula in detail. Write a complete code in python to implement linear model using PSO. [15]

\_\_\_\_\_ All the Best \_\_\_\_\_