

**MASTER OF CONSTRUCTION ENGG.3<sup>rd</sup> SEM.EXAM-2017**  
**STRUCTURAL SAFETY, RELIABILITY & MAINTENANCE MANAGEMENT**

Time: Three hours

Full Marks: 100

Answer any four questions.

1. a) From the following probability distribution find the value of k, E(x) and Var (x)

x	1	5	6	7	8
p	4k	5k	7k	4k	7k

- b) Define Probability distribution function and Probability Density function. Describe any two Probability Density functions for discrete and continuous type Random Variable.

(10+15)

- 2) a) What do you mean by Reliability?

(5)

- b) Derive Safety Index or Reliability Index considering Load and Resistance as normal and log normal variables. (Derive only for single load case.)

(10+10)

- 3) a) Develop a linear regression model between X and Y :

(20)

X	65	63	67	64	68	62	70	66
Y	68	66	68	65	69	66	68	65

- b) Explain Coefficient of Correlation.

(5)

- 4) a) The Joint function of two random variable X and Y can be represented as

(15)

$$f_{X,Y}(x,y) = c(x^2 - 4)(y^2 - 9) \quad \text{where } 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3.$$

$$= 0 \quad \text{elsewhere}$$

- i) Determine the constant c.
- ii) Determine the marginal density function of X.
- iii) Determine the marginal Density function of Y.
- iv) Are X and Y statistically independent?

- b) Explain Bay's Theorem and Total Probability Theorem.

(10)

- 5) The annual precipitation of a city in inches per year during past 30 years is as follows:

11.60, 7.19, 12.69, 11.86, 14.81, 8.07, 11.15, 8.00, 9.55, 11.02, 19.54, 8.63, 12.33, 8.53, 16.55,  
 19.74, 18.40, 11.37, 10.55, 8.68, 9.62, 6.93, 14.80, 10.64, 14.76, 15.19, 14.56, 9.68, 11.13, and 4.35.

Calculate the Mean, Variance, Standard Deviation, Coefficient of Variation and Skewness for the Precipitation.

(25)