

FACULTY OF INFORMATICS**M.C.A. I Year I – Semester (Main) Examination, February 2015****Subject: Probability and Statistics****Time: 3 Hours****Max.Marks: 80****Note: Answer one question from each unit. All questions carry equal marks.****Unit – I**

- 1 a) State the steps involved in data classification and data tabulation with an outline frame. 8
- b) Draw an appropriate chart/diagram for the following data (lakhs of Rs.) 8

| Plan of Expenditure | Country A | Country B |
|---------------------|-----------|-----------|
| Irrigation | 35,250 | 20,100 |
| Education | 5,750 | 10,000 |
| Defence | 75,000 | 50,000 |
| Communication | 12,500 | 15,000 |
| Salaries | 25,000 | 20,000 |
| Other | 50,000 | 50,000 |

OR

- 2 a) State and explain the methods used for data abstraction. 8
- b) Explain the method of construction of ogive curves, histograms and frequency polygons with suitable example diagrams. 8

Unit – II

- 3 a) Give the classical and statistical definitions to the probability. Discuss their merits and demerits. 8
- b) A commuter residing in Dadar and working in Colaba must either return by Central Railway (CR) or Western Railway (WR) to get home. He varies his route choosing the C.R. with probability $\frac{1}{3}$ and WR with probability $\frac{2}{3}$. If he goes by CR he gets home by 6 pm 75% of time. If he goes by WR he gets home by 6 pm only 70% of the time, but he likes the scenary better that way. If he gets home after 6 pm and used WR, what is the probability? 8

OR

- 4 a) Stating the physical conditions for the occurrence of Poisson distribution, define the distribution. 4
- b) Derive the mean and variance of binomial distribution. 6
- c) A certain hospital usually admits 50 patients per day. On the average 3 patients in 100 require special facilities found in special rooms. On the morning of a certain day, it is found that there are three such rooms available. Assuming that 50 patients will be admitted, find the probability that more than three patients will require such special rooms. 6

Unit – III

- 5 a) Define Beta distribution of first kind and derive $E(x^2)$. Hence find mean and variance. 8
 b) The average life of certain type of electric bulb is 1200 hours. What percentage of this type of bulbs is expected to fail in the first 800 hours of working? What percentage is expected to fail between 800 and 1000 hours? Assume a normal distribution with $\sigma=200$ hours. 8

OR

- 6 a) Derive the mode and mean derivations of normal distribution. 8
 b) Derive the β_1 and β_2 for gamma distribution. 8

Unit – IV

- 7 a) In a certain distribution $n = 25$, $\bar{x} = 60$ and $\sigma = 2.5$. It was later discovered that one recorded measurement given as 70 was a mistake. Find the mean and SD after omitting that measurement from the data. 6
 b) Obtain Karl Pearson's coefficient of Skewness for the following data:

| | | | | | | |
|-----------|------|-------|-------|-------|-------|-------|
| Class | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 |
| Frequency | 6 | 8 | 17 | 21 | 15 | 11 |

OR

- 8 a) In an experiment when two dice are thrown simultaneously find expected value of the sum of number of points on them. 5
 b) Let X be a random variable defined by the density function

$$f(x) = \frac{5}{4}(1-x^4) ; 0 < x \leq 1$$

- Find $E(x)$, $V(x)$. 5
 c) Explain the concept of Kurtosis. Show that for any frequency distribution coefficient of Kurtosis is greater than unity. 6

Unit – V

- 9 a) Let (X, Y) be bivariate random variables with a Pdf $f(x,y)$. Assume there is a linear relationship between them. If (x_i, y_i) be the random sample of size n drawn from the bivariate distribution derive the two regression lines. 10
 b) Find the coefficient of correlation between the heights of father and son from the following data: 6

| | | | | | | | | | |
|------------------------------|----|----|----|----|----|----|----|----|----|
| Height of father (in inches) | 65 | 66 | 67 | 67 | 68 | 69 | 71 | 72 | 73 |
| Height of son (in inches) | 67 | 68 | 64 | 68 | 72 | 70 | 70 | 69 | 70 |

OR

- 10 a) A random sample of 10 boys had the following I.Q's 102, 109, 100, 97, 85, 90, 103, 112, 122, 72. Can you assume the mean I.Q. of the parent population to be 102. (use table value as 1.96). 5
 b) In a random sample of ten persons selected from a population their heights were noted to be (in inches) 63, 63, 66, 67, 68, 69, 70, 71, 72 and 73. Test at 5% level whether the sample is drawn from population whose variance is 12. (use table value). 5
 c) In recent census of educated unemployed in certain towns the number of married unemployed was found to be 840 out of a total of 1460 in town A and 648 out of 900 in town B. Is there a significant difference in the two populations (use table value as 4.52). 6
