R13

Code No: 811AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations June/July - 2018
PROBABILITY AND STATISTICS

Time: 3hrs **Max.Marks:60**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A

5 × 4 Marks = 20

1.a) A class of 12 boys and 8 girls three students are selected at random one after the other. Find the probability that i) first two are boys and third is girl ii) first and third are of the same sex and the second is of opposite sex. [4]

b) In the month of September, on an average, rain falls on 10days. Find the probability: i) that the rain fall on just two days of a given work, ii) that in three days of a given week, it rains and the remaining four days it won't rain. [4]

c) Construct a 99% confidence interval for the true mean weight loss if 16 persons on diet control after one month had a mean weight loss of 3.42 kgs with s.d. of 0.68kgs. [4]

d) Test the claim of a manufacturer that 95% of his 'stabilizers' confirm to ISI specifications if out of a random sample of 200 stabilizers produced by this manufacturer 18 were faulty. Use 0.01 L.O.S. [4]

e) Show that the coefficient of correlation lies between -1 and 1. [4]

PART - B

5 × 8 Marks = 40

2.a) The probabilities of passing in subject A,B,C and D are ¾, 2/3, 4/5 and ½ respectively. To qualify in the examination a student should pass in A and two subjects among the three what is the probability of qualifying in that examination.

b) A card is drawn from a well shuffled pack of cards, if the card shows up red, one die is thrown and the result is recorded but if the card shows black two dies are thrown and their sum is recorded. What is the probability that the recorded number will be 2? [4+4]

OR

3.a) Two sets of candidates competing for the positions of the board of directors of a company. The probability that the first and second set will win are 0.6 and 0.4 respectively. If the first set wins the probability of introducing a new product is 0.8 and the corresponding probability in the second set wins is 0.3 what is the probability that the new product will be introduced.

b) If E_1, E_2, E_3 are mutually independent events of a sample space S, then E_1 U E_2 and E_3 are also independent events. [4+4]

4.a) A continuous random variable has the PDF $f(x) = \begin{cases} 2e^{-2x} & if \quad x > 0 \\ 0 & elsewhere \end{cases}$. Find the probabilities that it will take on a value i) between 1 and 3 ii) greater than 0.5.

b) A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variant with mean 1.5. Calculate the proportion of days on which i) Neither car is used ii) Some demand is refused. [4+4]

OR

5. The income of a group of 10,000 persons was found to be normally distributed with mean Rs.750 p.m. and standard deviation Rs.50. Show that of this group about 95% had income exceeding Rs.668 and only 5% had income exceeding Rs.832. What was the lowest income among the richest 100? [8]

6. A Professor's feeling about the mean mark is the final examination in "probability" of a large group of students is expressed subjectively by normal distribution with $\mu_0 = 67.2$ and $\sigma_0 = 1.5$. a) If the mean mark lies in the interval (65.0, 70.0) determine he prior probability the professor should assign to the mean mark. b) Find the posterior mean μ_1 and posterior s.d. σ_1= if the examination is conducted on a random sample of 40 students yielding mean 74.9 and s.d. 7.4. Use s = 7.4 as an estimate of σ. c) Determine the posterior probability which he will thus assign to the mean mark being in the interval (65, 70), using results obtained is (b) and (c) construct a 95% Bayesian interval for μ. [8]

OR

7. A population consists of five numbers 3, 4, 5, 6, 7. Consider all possible district samples of size three without replacement. Find a) the population (S.D) mean b) the population standard deviation (s.d.) c) the sampling distribution of means d) the mean of the S.D. of means e) standard deviation. of S.D. of means. Verify (c) and (e) directly from (a) and (b) by use of suitable formulae. [8]

8.a) Is there reason to believe that the life expected in south and north India is same or not from the following data

South	34	39.2	46.1	48.7	49.4	45.9	55.3	42.7	43.7	
North	49.7	55.4	57	54.2	50.4	44.2	53.4	57.5	61.9	56.6 5

b) A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest to believe that machines are used on the average more than 125 hours annually at 0.05 level of significance? [4+4]

OR

9.a) The heights of 6 randomly chosen sailors are (in inches) 63, 65, 68, 69, 71 and 72. Those of 9 randomly chosen soldiers are 61, 62, 65, 66, 69, 70, 71, 72 and 73. Test whether the sailors are on the average taller than soldiers.

b) The sales in a supermarket during a week as given below. Test the hypothesis that the sales do not depend on the day of the week, using a significant level of 0.05.

Days :	Mon	Tues	Wed	Thurs	Fri	Sat
Sales (in 1000Rs):	65	54	60	56	71	84

[4+4]

10.a) Find if there is any significant correlation between the heights and weights given below

Heights in inches	57	59	62	63	64	65	55	58	57
Weights in lbs	113	117	126	126	130	129	111	114	112

b) If the two regression lines of y on x and x on y are respectively $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ prove that $a_1b_2 < a_2b_1$. [4+4]

OR

11. The following are the marks obtained by 132 students in test X and test Y

X\Y	30-40	40-50	50-60	60-70	70-80	Total
20-30	2	5	3			10
30-40	1	8	12	6		27
40-50		5	22	14	1	42
50-60		2	16	9	2	29
60-70		1	8	6	1	16
70-80			2	4	2	83
Total	3	21	63	39	6	132

Calculate: a) The correlation coefficient b) The regression equation. [8]

---oo0oo---