



Code No:821AD

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****MCA I Semester Examinations, April/May - 2019****PROBABILITY AND STATISTICS****Time: 3hrs****Max.Marks:75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**5 × 5 Marks = 25**

- 1.a) Two cards are selected at random from 10 cards numbered 1 to 10, find the probability that the sum is even if the two cards are drawn one after the other with replacement. [5]
- b) Find the mean of the probability distribution of the number of heads obtained in three flips of a balanced coin. [5]
- c) A sample of size 400 is taken from a normal population whose variance is 4. Find the standard error of mean of sampling distribution. [5]
- d) Discuss types of error of statistical hypothesis and give example. [5]
- e) Derive the normal equations for the straight line $y = a + bx$ by least squares. [5]

PART - B**5 × 10 Marks = 50**

- 2.a) Three students A, B and C are in a running race. A and B have the same probability of winning and each is twice as likely to win as C. Find the probability that B or C wins.
- b) Three machines I, II and III produce 40%, 30%, 30% of the total number of items of a factory. The percentages of defective items of these machines are 4%, 2% and 3% respectively. If an item is selected at random, find the probability that the item is defective. [5+5]

OR

- 3.a) If $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{5}$. Prove that $\frac{2}{15} \leq P(A \cap B) \leq \frac{1}{5}$.
- b) Three machines produces 70%, 20% and 10% of the total number of a factory. The percentage of defective output of these machines are respectively 4%, 3% and 2%. An item is selected at random and found defective. Find the probability that it is from the machine I. [5+5]

- 4.a) A continuous random variable X is defined by

$$f(x) = \begin{cases} \frac{(3+x)^2}{16} & \text{if } -3 \leq x < -1 \\ \frac{(6-2x^2)}{16} & \text{if } -1 \leq x < 1 \\ \frac{(3-x)^2}{16} & \text{if } 1 \leq x < 3 \\ 0 & \text{elsewhere} \end{cases}$$

Verify that $f(x)$ is a density function.

- b) Find the probability of getting 1 or 4 or 5 or 6 in throwing a die 5 to 7 times among 9 trials using normal distribution. [5+5]

OR

5. Show that for normal distribution the quartile deviation, mean deviation and standard deviation are approximately 10:12:15. [10]





6. A random sample of size 100 is taken from an infinite population having the mean 80 and standard deviation 20. What is the probability that $\bar{x}$ will be greater than 85? [10]

OR

- 7.a) The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative?
- b) Construct 95% confidence interval for the true proportion of computer literates if 47 out of 150 persons from rural areas are computer literates. [5+5]

8. A random sample from a company's very extensive files shows that orders for a certain piece of machinery were filled, respectively in 10, 12, 19, 14, 15, 18, 11 and 13 days. Use 0.01 level of significance to test the claim that on the average such order filled in 10.5 days. Choose the alternative hypothesis so that rejection of the null hypothesis implies that it takes longer than indicated. [10]

OR

- 9.a) A briefcase manufacturing company claims that 80% of executives carried briefcases produced by them. Verify its claims if in a random sample of 900 executives, 675 used the company's briefcases. Use 5% level of significance.
- b) Explain why the larger variance is placed in the numerator of the statistic F. Discuss the application of F-test in testing if two variances are homogenous. [5+5]
10. Find the least squares regression equation of X_1 on X_2 and X_3 from the following data [10]

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

OR

- 11.a) Fit $y = a \cdot b^x$ by the method of least squares to the following data

x	0	1	2	3	4	5	6	7
y	10	21	35	59	92	200	400	610

- b) The tangent of the angle between two regression lines is 0.6 and if $\sigma_x = \frac{1}{2}\sigma_y$, find the correlation coefficient between x and y . [5+5]

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