R18

Code No: 153BN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, December - 2019

PROBABILITY AND STATISTICS

(Civil Engineering)

Time: 3 Hours **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 as sub questions.

PART – A

(25 Marks)

1.a) Ten coins are tossed simultaneously. Find the probability that of getting No head. [2]

b) State the assumptions of Binomial probability distribution [2]

c) If the probability density function of a continuous random variable is $f(x) = \begin{cases} K.e^{Kx}, & x > 0, K > 0 \\ 0, & elsewhere \end{cases}$. Find K. [2]

d) Explain briefly about method of least square. [2]

e) What is meant by a statistical hypothesis? [2]

f) If P(A) = P(B) = P(A∩B), prove that $P(A \cap \bar{B} + \bar{A} \cap B) = 0$. [3]

g) Find the mean and variance of the distribution $f(x) = e^{-x}, x > 0$. [3]

h) Derive the mean of the Exponential Distribution. [3]

i) Derive the normal equations for the straight line $y = a + bx$ by least squares. [3]

j) Explain types of errors of decision that arise in testing a hypothesis? [3]

PART – B

(50 Marks)

2. Two dice are thrown X assigned to the number of heads is a random variable.
a) Write the distribution
b) Find mean
c) Find variance. [10]

OR

3. If the p.d.f of a continuous random variable is

$$f(x) = \frac{1}{2}\sin x, 0 \le x \le \pi$$

Find: a) mean b) Mode c) $P\left(0 \le x \le \pi/2\right)$ [10]

4.a) Prove that Poisson distribution is the limiting case of Binomial distribution.

b) 10 cards are selected from a pack of 52 cards. Find the probability that there are:
i) Atleast one diamond ii) $P(1 \le x < 4)$ [5+5]

OR

5.a) The chance of an individual being a consumer is 1/2. Assuming that 100 investigators each take 10 individuals to see whether they are consumers of rice, how many investigators would you expect to report that 3 people or less were consumers of rice?

b) A manufacturer of pins knows that 2% of his product is defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that a box will fail to meet the guaranteed quality? [5+5]

6.a) The masses of 500 students is normally distributed with mean 70 kgs with a S.D of 3 kgs. Find the number of students whose mass:

i) lie between 65 and 73 ii) Less than 66

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

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

8. Estimate y at $x = 5$ by fitting a least squares curve of the form $y = \frac{b}{x(x-a)}$ to the following data [10]

x	3.6	4.8	6.0	7.2	8.4	9.6	10.8
y	0.83	0.31	0.17	0.10	0.07	0.05	0.04

OR

9. Calculate the correlation coefficient and the lines of regression from the following data: [10]

X	62	64	65	69	70	71	72	74
Y	126	125	139	145	165	152	180	208

10. The owner of a machine shop must decide which of two snack vending machines to install in his shop. If each is tested 250 times, the first machine fails to work 13 times and the second machine fails to work 7 times. Test at the 0.05 level of significance whether the difference between the corresponding sample proportions is significant. [10]

OR

11. In a certain city 125 men in a sample of 500 were found to be smokers. In another city, the number of smokers was 375 in a random sample of 1000. Does this indicate that there is a greater population of smokers in the second city than in the first? [10]

---ooOoo---