

Code No: 123AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2019

**PROBABILITY AND STATISTICS**

(Common to ME, CSE, IT, MCT, AME, MIE, MSNT)

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, c as sub questions.

**PART- A****(25 Marks)**

1.a) If the moment generating function of a random variable X is  $M_X(t) = (1-2t)^{-3}$ , then find the mean. [2]

b) A continuous Random variable has the p.d.f  $f(x) = \begin{cases} K + x/6 & \text{if } 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$ . Determine K. [3]

c) If the two coefficients of regression are 0.1 and 0.4, then find the coefficient of correlation. [2]

d) The joint probability density function is given by

$f(x) = \begin{cases} \frac{x}{5} + Ky, & 0 < x < 1, 1 < y < 5 \\ 0, & \text{elsewhere} \end{cases}$ . Find the value of K. [3]

e) Define Null hypothesis. [2]

f) If the sample number is 500 and the standard deviation is 15, then find the maximum error with 95% confidence. [3]

g) Define Reneging. [2]

h) Define Mean arrival rate. [3]

i) Define recurrent state. [2]

j) If  $\begin{bmatrix} 0 & x & 0 \\ 0.31 & 0.42 & y \\ 0 & 0.172 & z \end{bmatrix}$  is Transition probability matrix, then find the values of x, y and z. [3]

**PART-B****(50 Marks)**

2.a) Six cards are drawn from a pack of 52 cards. Find the probability that:

i) At least three are diamonds      ii) 4 are diamonds.

b) In a test on electrical bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and S.D of 40 hrs. Estimate the number of bulbs likely to burn for more than 2140 hrs. [5+5]

**OR**

- 3.a) A sample of 5 items is selected at random from a box containing 15 items of which 8 are defective find:  
 i) Mean            ii) variance of defective items.
- b) 1000 students appear for an examination. It was found that the marks are normally distributed with mean 35 and standard deviation 5. Find the number of students who get marks between 25 and 40. [5+5]

4. The joint probability density function is given by

$$f(x, y) = \begin{cases} x + y, & 0 < x < 1, 0 < y < 1 \\ 0, & \text{elsewhere} \end{cases}$$

Find:

- a) Marginal probability density function for X  
 b) Marginal probability density function for Y  
 c) Conditional P.D.F of X given Y  
 d) Conditional P.D.F of Y given X. [10]

**OR**

- 5.a) The equations of two Regression lines are  $7x - 16y + 9 = 0$ ,  $5y - 4x - 3 = 0$ , find the Coefficient of Correlation and the means of x and y.
- b) Calculate the coefficient of rank correlation: [5+5]

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

6. Given below is the No. of male births in 1000 families with 5 children each. Is this result coincides with the hypothesis that male births are equally probable? [10]

No. of boys	0	1	2	3	4	5
No. of families	40	300	250	200	30	180

**OR**

7. The following figures refer to the observations in independent samples

Sample-I    25    30    28    34    24    20    13    32    22    38

Sample-II    40    34    22    20    31    40    30    23    36    17

Analyze whether the samples have been drawn from the populations of equal means. [10]

8. The milk plant at a city distributes its products by trucks, loaded at the loading dock. It was its own fleet of trucks plus trucks of a private transport company. The trucks arrive at the interval of 20 minutes. The service time is 4 minutes.
- a) What is the probability that there are more than or equal to 4 trucks in the queue.  
 b) What is the waiting time of a truck in the queue?  
 c) What is the variance of queue length?  
 d) What is the probability that the waiting time will exceeds 10 minutes? [10]

**OR**

9. Workers come to tool store room to enquire about special tools. The average time between two arrivals is 90 seconds and the arrivals are assumed to be in Poisson distribution. The average service time is 50 seconds. Determine:
- Average queue length
  - Average length of non empty queue
  - Average waiting time of an arrival who waits. [10]

10.a) Define:

- Marcov chain
  - Absorbing marcov chain.
- b) Find the equilibrium vector of  $\begin{bmatrix} 0.25 & 0.75 \\ 0.5 & 0.5 \end{bmatrix}$ . [5+5]

**OR**

11. If the transition probability matrix is  $\begin{bmatrix} 0.5 & 0.25 & 0.25 \\ 0.5 & 0 & 0.5 \\ 0.25 & 0.25 & 0.5 \end{bmatrix}$  and the initial

probabilities are  $\left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$  then find:

- the probabilities after three periods
- Equilibrium vector. [5+5]

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