JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2018
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 probability density function $f(x) = \begin{cases} Kx^3, & 0 \le x \le 3 \\ 0, & elsewhere \end{cases}$. Find the value of K.

[2]

b) If X is a continuous random variable whose probability density function is given
by $f(x) = \begin{cases} x, 0 < x < 1 \\ 2-x, 1 \le x \le 2 \\ 0, \ elsewhere \end{cases}$ Find the moment generating function [3]

c) If the two coefficients of regression are 0.4 and 0.9, then find the coefficient of correlation. [2]

d) The Joint Probability distribution of X and Y is

Y→ X↓	0	1	2	Total
0	3/28	9/28	3/28	15/28
1	3/14	3/14	0	12/28
2	1/28	0	0	1/28
Total	10/28	15/28	3/28	1

　　Find the Marginal probabilities for x. [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 99% confidence. [3]

g) Define the Expected queue length. [2]

h) If $\bar{x}=4, \bar{y}=8, \sigma_x = 2, \sigma_y = 3$ and $r = 0.3$ then find the regression line of y on x. [3]

i) Define the State space. [2]

j) Write the properties of a Transition Probability matrix. [3]

PART-B

(50 Marks)

2.a) An insurance agent accepts policies of 5 men all of identical age and in good health. The probability that a man of this age will be alive 30 years is $\frac{2}{3}$. Find the probability that in 30 years. (i) all five men (ii) at least one man will alive.

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 formore than 2140. [5+5]

OR

3.a) Given that P(x=2)=45p(x=6)-3p(x=4) for a Poisson variate X. Find:
i) P(x>1)   ii) P(x<3).

b) Suppose the weights of 500 male students are normally distributed with mean μ=150 with a standard deviation of 15. Find the number of students whose weights are i)Between 140 and 165 ii) More than 170. [5+5]

4. The joint probability density function is given by

$$f(x) = \begin{cases} \dfrac{x}{5} + Ky, & 0 < x < 1, 1 < y < 5 \\ 0, & elsewhere \end{cases}$$. Find:

a) The value of K
b) Marginal probability density function for X
c) Marginal probability density function for Y
d) P(X + Y > 3). [10]

OR

5. Calculate the coefficient of rank correlation: [10]

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

6. 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]

OR

7.   A survey of 400 families with 5 children each revealed the following distribution. Is this result with the hypothesis that male births are equally probable?   [10]

No. of boys	0	1	2	3	4	5
No. of families	25	60	110	113	62	30

8.   Consider a box office ticket window being manned by a single individual customers arrive to purchase tickets according to a poisson process. The arrival rate is 30 per hour. The mean service rate is 90 seconds. Find
     a) Expected queue length.
     b) Expected waiting time in the system
     c) Expected waiting time in the queue.   [10]

OR

9.   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. Find:
     a) The probability that there are more than or equal to 4 trucks in the queue
     b) The waiting time of a truck in the queue.
     c) The variance of queue length.
     d) The probability that the waiting time will exeeds 10 minutes   [10]

10.a) Define i) Transient state   ii) recurrent state.

   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 of a Marcov chain is
$$\begin{bmatrix} 0.1 & 0.2 & 0.7 \\ 0.2 & 0.2 & 0.6 \\ 0.6 & 0.1 & 0.3 \end{bmatrix}$$
     Find a) $P[X_3 = 1/X_1 = 0]$ b) $P[X_3 = 1/X_0 = 0]$ c) $P[X_3 = 2/X_0 = 1]$. [10]

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