

Code No: 114DK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2016

PROBABILITY AND STATISTICS

(Common to CE, CHEM, CEE)

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 X is a continuous random variable whose probability density function is given

$$\text{by } f(x) = \begin{cases} \frac{1}{3}, & -1 < x < 2 \\ 0, & \text{else where} \end{cases}$$

Find the moment generating function. [2]

- b) A sample of 3 items is selected from a box having 6 items of which 3 are defective then find the mean of the distribution of defective items. [3]

- c) If X and Y are two random variables with joint probability density function
- $f(x, y) = Ke^{-|x|-|y|}$
- . Find the value of K. [2]

- d) If the two lines of regression are
- $y = 0.3x + 1.2$
- and
- $x = 0.79y + 1$
- , then find the means of x and y. [3]

- e) Define type II error. [2]

- f) A sample of 150 items is taken from a population whose standard deviation is 12. Find the standard error of means. [3]

- g) Define mean arrival rate. [2]

- h) Define Transient state in queuing system. [3]

- i) Define a Regular transition matrix. [2]

- j) If
- $\begin{bmatrix} 0.2 & x & 0.2 \\ 0.1 & 0 & x+y \\ z & 0.2 & 0.1 \end{bmatrix}$
- is a transmission probability matrix, then find the values of x, y and z. [3]

PART- B**(50 Marks)**

- 2.a) If X is the continuous random variable whose probability density function is

$$f(x) = \begin{cases} ax + bx^2, & 0 < x < 1 \\ 0, & \text{else where} \end{cases} \text{ and } E(X) = 0.6. \text{ Find the values a and b.}$$

- b) If the weights of 1000 students are normally distributed with mean 75 kgs. and standard deviation 10 kgs. How many students have weight greater than 90 kgs. [5+5]

OR

3. The mean and variance of a binomial distribution are 2 and 8/5. Find:

a) n and Mode b) Maximum probability c) $P(x > 2)$. [4+3+3]

4. 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

OR

5. The following table gives the experimental values of x, y and z. Fit a multiple regression of the type $z = ax + by$.

[10]

x	1	2	3	5
y	1	3	4	2
z	7	18	25	23

6. Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results.

Horse A	28	30	32	33	35	29	34
Horse B	29	30	30	24	27	29	

Test whether the two horses have the same running capacity.

[10]

OR

7. A die is thrown 60 items with the following results.

Face	1	2	3	4	5	6
Frequency	8	7	12	8	14	11

Test at 5% level of significance if the die is honest.

[10]

8. A computer shop has a laser printer. The jobs for laser printing are randomly distributed approximately a poisson distribution with mean service rate of 10 jobs per hour, since job pages vary in length (pages to be printed). The jobs arrive at a rate of 6 per hour during the entire 8 hours working day. If the laser printer is valued Rs. 30 per hour, determine:

- The percent time an arriving job has to wait
- Average system time
- Average idle time cost of the printer per day.

[3+3+4]

OR

9. In a telephone exchange the arrival of calls follow Poisson distribution with an average of 8 minutes between two consecutive calls. The length of a call is 4 minutes. Determine:

- The probability that the call arriving at the booth will have to wait.
- The average queue length that forms from time to time.
- The probability that an arrival will have to wait for more than 10 minutes before the phone is free

[3+4+3]

10. The transition probability matrix is given by $\begin{bmatrix} 0.4 & 0.4 & 0.6 \\ 0.1 & 0.2 & 0.7 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ and

$P_0 = [0.2, 0.3, 0.5]$. Find

- The distribution after three transitions.
- The limiting probabilities.

OR

11. A country is divided into three demographic regions. It is found that each year 5% of the residents of region1 move to region2 and 5% move to region3, from the residents of region2, 15% move to region1 and 10% move to region3 and from the residents of region3, 10% move to region1 and 5% move to region2. What percentage of the population resides in each of the three regions after a long period of time?

[10]

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