Civil II/II

Code No: 114DK **R13**

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 by $f(x)=\begin{cases}\frac{1}{3}, & -1<x<2\\ 0, & else\ where\end{cases}$
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 = 0.3 x + 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 $f(x)=\begin{cases}ax+bx^2, & 0<x<1\\ 0, & else\ where\end{cases}$ and $E(X)=0.6$. 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 $xz = ax + by$. [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:
a) The percent time an arriving job has to wait
b) Average system time
c) 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:
a) The probability that the call arriving at the booth will have to wait.
b) The average queue length that forms from time to time.
c) 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 $\begin{bmatrix} 0 & 0.4 & 0.6 \\ 0.1 & 0.2 & 0.7 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ and $P_0 = [0.2, 0.3, 0.5]$. Find

a) The distribution after three transitions.
b) The limiting probabilities. [5+5]

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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