Code No: 123AN **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
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) A continous Random variable has the p.d.f $f(x)=\begin{cases} Kxe^{-\lambda x} & if\ x\ge 0,\lambda\ge 0 \\ 0 & otherwise \end{cases}$. Determine K. [2]

b) If x is a Poisson variate such that 3P(x=4)=1/2P(x=2)+P(x=0). Find μ. [3]

c) Write the relation between correlation and regression coefficients. [2]

d) If the joint probability density function is $f(x,y)=\frac{x+y}{K}, x=1,2; y=1,2$ then find K. [3]

e) A random sample of 500 Apples was taken from a large consignment of 60 were found to be bad, find the standard error. [2]

f) Among 100 students in a class, 60 people use ball pens. With 95% confidence, find the maximum error for true proportion. [3]

g) Define steady state of a queuing system. [2]

h) Define Explosive state. [3]

i) If $\begin{bmatrix} 0.5 & x \\ y & 0.124 \end{bmatrix}$ is Transition probability matrix, then find the values of x and y. [2]

j) Define limiting probability. [3]

PART- B

(50 Marks)

2.a) Let X be a random variable with the density function $f(x)=\begin{cases} x, & 0<x<1 \\ 0, & elsewhere \end{cases}$ Find the moment generating function for X.

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 Between 140 and 165. [5+5]

OR

3.a) Average number of accidents on any day on a national highway is 1.6. Determine the probability that the number of accidents is i) At least one ii) At the most one.

b) The marks obtained by 500 students is normally distributed with mean 65 % and Standard deviation 8%. Determine how many get more than 80%. [5+5]

4. The joint probability density function is given by

$$f(x,y)=\begin{cases}10xy^2, 0<x<y<1\\ 0, elsewhere\end{cases}$$

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. The marks obtained by 10 students in Mathematics and Statistics are given below. Find the Coefficient of correlation between the two subjects. [10]

Marks in Maths	75	30	60	80	53	35	15	40	38	48
Marks in Statistics	85	45	54	91	38	63	35	43	45	44

6. In a sample of 1000 students 500 use ball pen and in another sample of 3500 students 1400 use ball pens. Test the significance between the difference of two proportions at 5% level. [10]

OR

7. Two random samples are drawn from two normal populations are as follows.

Sample I	17	27	18	25	27	29	13	17
Sample II	16	16	20	27	26	25	21	

Test whether two populations have been drawn from the same normal population.[10]

8. A fast food restaurant has one drive window. Cars arrive according to a poisson process. Cars arrive at the rate of 2 per 5 minutes. The service time per customer is 1.5 minutes. Determine:
a) The Expected number of customers waiting to be served.
b) The probability that the waiting line exceeds 10
c) Average waiting time until a customer reaches the window to place an order.
d) The probability that the facility is idle. [10]

OR

9. A ticket issuing office is being manned by a single server. Customer arrive to purchase tickets according to a Poisson distribution with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 90 seconds. Find:
a) Average number of customers in the system.
b) Average number of customers in the queue.
c) Average time a customer spending in the system. [10]

10. 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:

a) the probabilities after three periods b) Equilibrium vector. [10]

OR

11. If the transition probability matrix of market shares of three brands A, B and C is $\begin{bmatrix} 0.2 & 0.4 & 0.4 \\ 0.7 & 0.2 & 0.1 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ and the initial market shares are 30%, 30% and 40%. Find:

a) The market shares in second and third periods

b) The limiting probabilities. [10]