

Code No: 123AN

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 continuous Random variable has the p.d.f $f(x) = \begin{cases} Kxe^{-\lambda x} & \text{if } x \geq 0, \lambda \geq 0 \\ 0 & \text{otherwise} \end{cases}$. 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 $f(x) = \begin{cases} x, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$ Find the moment generating function for X .
- b) Suppose the weights of 500 male students are normally distributed with mean $\mu = 150$ 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

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

- 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]