Code No: 124DK **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2017

PROBABILITY AND STATISTICS

(Common to CE, 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) The probability of a man hitting a target is $\frac{1}{3}$. How many times must he fires so that the probability of his hitting the target at least once is more than 90%. [2]

b) Find the mean and variance of the distribution $f(x) = e^{-x}, x > 0$. [3]

c) Define standard error and correlation coefficient. [2]

d) The continuous random variable X has probability density function

$$f_x(x) = \begin{cases} \frac{2}{25}(x+2), \text{for} -2 < x < 3 \\ 0, \quad \text{elsewhere} \end{cases}.$$

Find the probability density function of $Y = X^2$. [3]

e) Write the properties of Z-distribution. [2]

f) Construct 99% confidence interval for the true proportion of computer literates if 47 out of 100 persons from rural areas are computer literates. [3]

g) Explain about exponential distribution. [2]

h) Define the terms Busy period and Traffic intensity. [3]

i) Discuss about classification of random process. [2]

j) Define stationary and non-stationary random process. [3]

PART-B

(50 Marks)

2.a) Show that for normal distribution the quartile deviation, mean deviation and standard deviation are approximately 10:12:15.

b) A player tosses 3 fair coins. He wins Rs.500 if 3 heads appear, Rs.300 if 2 heads appear, Rs.100 if one head occurs. On the other hand, he loses Rs.1500 if 3 tails occurs. Find the expected gain of the player. [5+5]

OR

3.a) Find the moment generating function of $f(x) = \frac{1}{8}(3c_x), x = 0, 1, 2, 3.$ and hence find its mean and variance.

b) If 3 fair coins are tossed and if X is the total number of heads in the outcome. Show that X is a random variable. [5+5]

4. The joint probability density function of the random variable X and Y is given by $f(x, y) = K(xy + y^2), 0 \le x \le 1, 0 \le y \le 2.$

Find $P(X > 1), P\left(X > \frac{1}{2}, Y < 1\right)$ and $P(X + Y \le 1)$ [10]

OR

5. Use formula $\rho = \frac{\sigma_{x+y}^2 - \sigma_x^2 - \sigma_y^2}{2\sigma_x\sigma_y}$, compute the correlation coefficient to the following data. [10]

x	62	56	36	66	25	75	82	78
y	58	44	51	58	60	68	62	84

6.a) Discuss test of independence of attributes with a suitable example.

b) A briefcase manufacturing company claims that 80% of executives carry briefcases produced by them. Verify its claims if in a random sample of 900 executives, 675 used the company's briefcases. Use 5% level of significance. [5+5]

OR

7.a) Discuss various types of alternative hypothesis with suitable example.

b) The average weekly losses of man hours due to strikes in an institute before and after a disciplinary program was implemented are as follows

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Is there reason to believe that the disciplinary program is effective at 0.05 LOS? [5+5]

8.a) Discuss basic queuing process.

b) Workers come to a tool store room to enquiry about the special tools for a particular job. The average time between the arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time is 40 seconds. Find i) average queue length ii) Average length of non-empty queue. [5+5]

OR

9. A PC repairman finds that the time spend on jobs has an exponential distribution with mean 30 minutes. If the sets are repaired in the order, in which they come in, and if the arrival of sets is approximately Poisson with an average of 10 per 8 hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? [10]

10.a) A fair die is tossed repeatedly. If X_n denotes the maximum of the number occurring in the first n tosses, find the transition probability matrix P of the Markov chair $\{X_n\}$. Find also P^2 and $P(X_2 = 6)$.

b) The transition probability matrix of a Markov chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$.

Is this matrix irreducible? [5+5]

OR

11. Three boys A, B, C are throwing a ball to each other. B always throws the ball to C; C always throws the ball to A; but A is just a likely to throw the ball to C as to B. Show that the process is Markovian. Find the transition matrix and classify the states. Do all the states are ergodic? [10]

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