R13

Code No. 113AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examination, December-2014

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) What are the axioms of probability? [2M]
b) Define a random variable. [3M]
c) Define covariance. [2M]
d) Explain is rank correlation? [3M]
e) What is a statistic? Give an example. [2M]
f) Define is standard error of a statistic. [3M]
g) What is Queue size? [2M]
h) What is Transient and study states of a Queuing System? [3M]
i) Define Stochastic Process. [2M]
j) Define a statistic matrix. [3M]

Part – B **(50 Marks)**

2.a) Define a Binomial distribution.
b) Derive the mean and variance of a Binomial distribution.
c) Derive the movement generating function of a Poisson distribution.

OR

3.a) Define a Normal distribution and derive the Mean, Median and Mode of a Normal distribution.
b) In a Normal distribution find the ratio of Mean deviation, Standard Deviation and Quartile Deviation.

4.a) Define Karl Pearon's Coefficient correlation.
b) Show that the correlation coefficient is independent of change of origin and scale.
c) Derive the coefficient of correlation for the following Bi-variable Probability distribution.

x	1	2	3
0	1/15	2/15	3/15
1	2/15	3/15	4/15

OR

5.a) What are the lines of regression.
b) Derive the formula for finding angle between two lines of regression.
c) Find the line of regression of X and Y for the following data.

x :	40	52	60	68	70	72	80
y :	80	110	121	140	145	148	165

6.a) Explain the terms Null Hypothesis and alternate hypothesis.

b) Explain the t- test for the equality of two means in small samples.

c) Test the hypothesis that the average content of containers of a particular lubricant is 10 litres if the contents of a random sample of 10 containers are 10.2, 9.7, 10.1, 10.3, 10.1, 9.8, 10.4, 10.3, and 9.8 liters. Use a 0.01 level of signification and assume that the distribution of contents is normal.

OR

7.a) Explain the terms Type I and type II errors.

b) Explain Chi-square test of independence of attributes.

c) A random sample of 90 adults is classified according to gender and the number of hours they watch television during a week:

	Gender	
	Male	**Female**
Over 25 hours	15	29
Under 25 hours	27	19

Use a 0.01 level of significance and test the hypothesis that the time spent watching television is independent of whether the viewer is male or female.

8.a) Explain the essential features of a Queuing System.

b) A television repairman finds that the time spent on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per 8-hour day, what is the repairman's expected idle the time each day? How many jobs are ahead of the average set just brought in?

OR

9.a) Explain the different characteristics of M/M/I Queuing System.

b) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time (the time taken to hump a train) distribution is also exponential with an average of 36 minutes. Calculate.

i) Expected queue size (line length)

ii) Probability that the queue size exceeds 10.

iii) If the input of trains increases to an average of 33 per day, what will be the change in (i) and (ii).

10.a) Define a Stochastic Process and its State Space.

b) Explain the classification of Random Processes.

c) Explain the pure Birth-Death Process.

OR

11.a) Define a Markov chain.

b) What is Matrix of Transitional Probability? Explain the steps to construct such a matrix.

c) Explain the Procedure for determining the steady state condition of a Market chain.

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