

Code No: 09A30302

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**

B.Tech II Year I Semester Examinations, June/July-2014

**PROBABILITY AND STATISTICS**

(Common to ME, CSE, MCT, AME, MS & NT, MIE)

Time: 3 hours

Max. Marks: 75

**Answer any five questions  
All questions carry equal marks**

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- 1.a) A businessman goes to hotels X, Y and Z, 20%, 50% and 30% of the time respectively. It is known that 5%, 4% and 8% of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability that businessman room having faulty plumbing is assigned to hotel Z.
- b) If a random variable has the probability density function  $f(x) = \begin{cases} 2e^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$
- Find
- i)  $P(0 < x < 2)$
  - ii) Mean
  - iii) Variance.
- 2.a) If 'x' is a Poisson variate such that  $3p(x = 4) = \frac{1}{2}p(x = 2) + p(x = 0)$ . Find
- i) The mean of x
  - ii)  $P(x \leq 2)$
- b) 1000 students had written an examination. The mean of test is 35 and standard deviation is 5. Assuming the distribution to be normal find
- i) How many students marks lie between 25 and 40?
  - ii) How many students get more than 40?
- 3.a) Measurements of the weights of a random sample of 200 ball bearings made by a certain machine during one week showed a mean of 0.824 and a standard deviation 0.042. Find 95% confidence limits for the mean weight of all the ball bearings.
- b) A sample of 100 iron bars is said to be drawn from a large number of bars. Whose lengths are normally distributed with mean 4 feet and S.D. 0.6 ft. If the sample mean is 4.2 feet, can the sample be regarded as a truly random sample?
- 4.a) In a random sample of 60 sections of pipe in a chemical plant, 8 showed signs of serious corrosion. Construct a 95% confidence interval for the true proportion of pipe sections using large sample confidence interval formula.
- b) The owner of a machine shop must decide which of two snack vending machines to install in his shop. If each machine is tested 250 times, the first machine fails to work 13 times and the second machine fails to work 7 times. Test at the 0.05 level of significance whether the difference between the corresponding sample proportions is significant.

5. To compare the prices of a certain product in two cities ten shops were selected at random in each town. The prices noted are given below.

City I	61	62	56	63	56	63	58	56	44	61
City II	55	54	47	59	51	61	57	54	64	58

Test whether the average prices can be said to be same in the two cities.

- 6.a) The equations of two Regression lines are  $3x+12y = 19$ , and  $3y+9x = 46$ , then find
- The Coefficient of Correlation
  - The means of  $x$  and  $y$
  - The ratio of the variances of  $x$  to that of  $y$ .
- b) Calculate the coefficient of rank correlation.

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

7. Consider a box office ticket window being manned by a single individual customers arrive to purchase tickets according to a poisson process. The arrival rate is 30 per hour. The mean service rate is 90 seconds. Find
- Expected length in the system
  - Expected queue length.
  - Expected waiting time in the system
  - Expected waiting time in the queue.
- 8.a) What are the properties of a transition matrix? Give one example of a transition matrix and test whether it has those properties.
- b) Represent the following transition matrix as a digraph.

$$\begin{bmatrix} 0.25 & 0.75 & 0 \\ 0 & 1 & 0 \\ 0.3 & 0.5 & 0.2 \end{bmatrix}$$

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