

R09

Code No: 09A30302

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, November/December-2013

Probability and Statistics

(Common to ME, CSE, MCT, AME, MIE, MIM, MSNT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) If the probability density of a random variable X is given by
- $$f(x) = \begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & \text{Otherwise} \end{cases}$$
- Find (i) k and (ii) The cumulative distribution function of X .
- b) Of the three men, the chances that a politician or businessman or an academician will be appointed as V.C of a university are 0.5, 0.3, and 0.2 respectively. Probabilities that these three persons promote research in the university, if they are appointed as V.C, are 0.3, 0.7, and 0.8 respectively. Determine
- The probability that the research is promoted.
 - If research is promoted, what is the probability that V.C is politician? [15]
- 2.a) Out of 800 families with 5 children each, How many would you expect to have a
- 3 boys
 - at least one boy
 - either 2 or 2 boys.
- b) Suppose the weights of 800 male students are normally distributed with mean 28.8 kg and standard deviation of 2.06 kg. Find the number of students whose weights are
- between 28.4 kg and 30.4 kg
 - more than 31.3 kg. [15]
- 3.a) The guaranteed average life of a battery is 700 days with standard deviation of 60 days. It is required to sample the output so as to ensure that 95% of the batteries do not fall short of guaranteed average life by more than 2.5%. What is the minimum sample size?
- b) A random sample of 500 items has mean 20 and another sample of size 400 has mean 15. Can you conclude that the two samples are taken from the same population with 4 as Standard deviation. [15]
- 4.a) In a referendum submitted to the student's body at a university 850 men and 566 women voted. 530 of the men and 304 of the women voted in favor of a matter. Does this indicate a significant difference of the opinion on the matter at least 1% level, between men and women students?
- b) If the mean of a normal population is 6.48 and S.D is 1.5. How large a sample must be so that there will be 2% that the mean of the sample is less than 6.75? [15]
- 5.a) The nine items of a sample had values 45, 47, 50, 52, 48, 47, 49, 53, and 51. Does the mean of the nine items differ significantly from the assumed population mean of 47.57.
- b) A survey of 320 families with 5 children each revealed the following distribution

No boys	5	4	3	2	1	0
No. of Girls	0	1	2	3	4	5
No. of families	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally probable? [15]

6. Calculate the coefficient of Correlation for the following data. [15]

X	9	8	7	6	5	4	3	2	1
Y	15	16	14	13	11	12	10	8	9

7. Consider a self-service store with one cashier. Assume Poisson arrival and exponential service times. Suppose 9 customers arrive on the average every 5 minutes and the cashier can serve 10 in 5 minutes. Find
- average number of customers queuing for service
 - probability of having more than 10 customers in the system
 - Probability that a customer has to queue for more than 2 minutes.
 - average waiting time of the customers
 - probability for n persons in the system.
- [15]

8. The transition probability matrix is given by

$$P = \begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \\ 0.7 & 0.2 & 0.1 \end{bmatrix} \text{ and } P_0 = [0.4, 0.4, 0.2]$$

- Find the distribution after three transitions.
- Find the limiting probabilities.

[15]

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