R09

Code No: 56066

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, December - 2018
PROBABILITY AND STATISTICS
(Common to MMT, AE)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Explain conditional probability. A speaks truth in 60% cases and B speaks in 70% cases. In what percentage of cases are they likely to contradict each other in stating the same fact.

b) State Baye's theorem. An urn contains four balls. Two balls are drawn at random and are found to be white. What is the probability that all the balls are white? [7+8]

2.a) Explain binomial distribution.
A radar complex consists of 8 units that operate independently. The probability that a unit detects an incoming missile is 0.90. What is the probability that an incoming missile will not be detected by any unit?

b) Let the random variable X is normally distributed with mean 8 and standard deviation 4. Find (i) $P(5 \leq X \leq 10)$ and (ii) $P(X \geq 15)$. [8+7]

3.a) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken and taken
15, 17, 10, 18, 16, 9, 7, 11, 13, 14.

b) An oceanographer wants to check whether the depth of the ocean in a certain region is 57.4 fathoms, as had previously been recorded. What can he conclude at 0.05 level of significance, if reading taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms? [7+8]

4.a) Write the applications of Chi-square test.

b) In order to make a survey of buying habits, two markets A and B are chosen in two different parts of the city. 400 women shoppers are chosen at random in market A. Their average daily expenditure on food is found to be Rs. 250 with a standard deviation of Rs. 40. The figures are Rs. 220 and Rs. 55, respectively in the market B, where also 400 women shoppers are chosen. Test at 1% level of significance whether the average daily expenditure of the two populations of shoppers are equal. [7+8]

5.a) Two independent samples of sizes 8 items had the following values.

Sample I	11	12	9	13	15	12	10	14
Sample II	6	11	10	13	9	8	10	10

Is the difference between the means of the sample significant? Test at 5% LOS.

b) Two sample polls of votes for two candidates A and B for a public office are taken, from among the residents of rural areas and urban areas. The results are given in the following table. Examine whether the nature of the area is related to voting preference in this election. [7+8]

Area	Votes For		Total
	A	B	
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

6.a) Find the coefficient of correlation for the following data:

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

b) Obtain the rank correlation coefficient for the following data on marks in two subjects A and B and interpret the result. [7+8]

A	45	67	39	50	56	76	55	45
B	47	60	68	45	43	67	68	48

7.a) What is pure birth-death process? Explain the characteristic features of an M/M/1 queueing model.

b) At a certain petrol pump, customers arrive in a Poisson process with an average time of six minutes between arrivals. The time intervals between services at the petrol pump follow exponential distribution and the mean time taken to service a unit is three minutes. Find (i) the average time a customer has to wait. (ii) By how much time the flow of customers be increased to justify the opening of another service point, where the customer has to wait for five minutes for the service. [7+8]

8.a) What is a Markov chain? Give a brief note on classification of Markov chain. When is a Markov chain aperiodic?

b) If the Markov chain consisting of the states 0, 1, 2, 3 have the transition probability matrix $\begin{bmatrix} 0 & 0 & 1/2 & 1/2 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$, determine which states are transient and which are recurrent. [7+8]

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