

Code No: 54001

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

PROBABILITY AND STATISTICS

(Common to CE, CHEM, IT, PTM)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. Two dice, one green and the other red, are thrown. Let A be the event that the sum of the points on the faces shown is odd, B be the event of at least once ace (number 1).
a) Describe (i) Sample space (ii) Events A, B, B^c , $A \cap B$, $A \cap B^c$ and find their probabilities assuming that all the 36 sample points have equal probabilities.
b) Find the probabilities of the events
i) $(A^c \cup B^c)$ ii) $(A^c \cap B^c)$ iii) $(A \cap B^c)$ iv) $(A^c \cap B)$ v) $(A \cap B)^c$. [8+7]
- 2.a) If a Poisson distribution is such that $3 P(X=1) = 2 P(X=3)$. Find:
i) $P(X \geq 1)$ ii) $P(X \leq 3)$ iii) $P(2 < X \leq 5)$.
b) In a normal distribution 32% of the items are under 45 and 8% are over 80. Find the mean and variance of the distribution. [8+7]
- 3.a) A company manufacturing Electrical bulbs claims that the average life of its bulb is 1650 hours. The average life and standard deviation of a random sample of 100 such bulbs were 1550 hours and 120 hours respectively. Should we accept the claim of the company?
b) The mean yield of wheat from a district A was 210kgs with S.D. of 10 kgs per acre from a sample of 100 plots. In another district B, the mean yield was 220kgs with S.D. of 12 kgs from a sample of 150 plots. Test whether there is any significant difference between the mean yield of crops in the two districts. Test at 5% level of significance. [7+8]
- 4.a) In a sample of 1000 people in Maharashtra 560 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% of level of significance?
b) Before an increase in excise duty on tea, 750 persons, out of a sample of 1000 persons were found to be tea drinkers. After an increase in excise duty 850 people were tea drinkers in a sample of 1200 people. Using standard error of population whether there is a significant decrease in the consumption of tea after the increase in excise duty. [7+8]
- 5.a) The IQ's of 20 students from one area of a city showed a mean of 107 with a standard deviation of 10. While the IQ's of 16 students from another area of the city showed a mean of 112 with a standard deviation of 8. Is there a significant differences between the IQ's if the two groups at 0.01 level of significance.
b) Find the value of χ^2 for the following data and test the goodness of fit.
Observed frequency: 14 15 18 20 15 10
Expected frequency: 17 10 15 25 10 15 [7+8]

6. Predict y at $x = 5$ by finding the regression line of y on x

X	2	4	6	8	10	12
Y	1.8	1.5	1.4	1.1	1.1	0.9

Find also the regression line of x on y .

[15]

7. The rate of arrival of customers at a telephone booth follows Poisson distribution with an average of 10 minutes between two successive arrivals. The duration of a phone call is assumed to follow exponential distribution with mean time of 3 minutes.

a) Find the probability that a new arrival has to wait to make the call.

b) What is the average length of the nonempty queue.

c) It is proposed to establish one more booth when the customers would expect waiting time for at least 3 minutes for their turn to make a call. By how much time should the flow of customers increase in order to justify a second booth.

d) Estimate the fraction of a day that the phone will be in use.

e) What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call?

[15]

8.a) Define:

i) Periodic state

ii) irreducible state

iii) ergodic state

iv) regular matrix of a tpm.

b) State the nature of states of the Markov chain with tpm

$$P = \begin{matrix} 0 & \begin{bmatrix} 0 & 1 & 0 \\ 1/2 & 0 & 1/2 \\ 2 & 0 & 1 & 0 \end{bmatrix} \end{matrix}$$

[7+8]

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