R09

Code No: 54001

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2020
PROBABILITY AND STATISTICS
(Common to CE, CHEM, IT)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) State and prove Baye's theorem.

b) The daily consumption of electric power (in millions of kw-hours) is a random variable having the probability density function

$$f(x)=\begin{cases}\frac{1}{9}xe^{-x/3}, & x>0\\ 0, & x\le 0\end{cases}$$

If the total production is 12 million kw-hours, determine the probability that there is power cut on any given day. [7+8]

2.a) In a Normal distribution, 7% of items are under 35 and 89% are under 63. Determine the mean and variance of distribution.

b) If X is a normal variate with mean 30 and standard deviation of 5. Find the probabilities that: i) $26 \le X \le 40$ ii) $X \ge 45$ iii) $X \le 22$. [7+8]

3. A simple sample of the height of 6,400 Englishmen has a mean of 67.85 inches and standard deviation of 2.56 inches. While a simple sample of heights of 1600 Austrians has a mean height of 68.55 inches and standard deviation of 2.52 inches. Do the data indicate that the Austrians are on the average taller than the English men. (L.O.S=5%). [15]

4.a) If in a random sample of 600 cars making a right turn at a certain traffic junction 157 drove into the wrong lane, test whether actually 30% of all drivers make this mistake or not at this given junction. Use 0.05 level of significance.

b) Among 100 fish caught in a large lake, 18 were inedible due to the pollution of the environment with what confidence can we assert that the error of this estimate is at most 0.065? [7+8]

5.a) Construct a 99% confidence interval for the true mean weight loss. If 16 persons on diet control after one month had a mean weight loss of 3.42kgs with standard deviation of 0.68 kgs.

b) Write the properties of Student t-distribution and its applications. [8+7]

6. Find the coefficient of co-relation and the lines of regression between x and y. [15]

x	10	15	18	22	25	30	28	25	27	30
y	40	35	38	37	36	40	35	32	40	37

7.a) Explain (M/M/1):(N/FIFO) queuing model.

b) A fast food restaurant has one drive-in window. It is estimated that cars arrive according to a Poisson distribution at the rate of 2 every 5 minutes and that there is enough space to accommodate a line of 10 cars. Other arriving cars can wait outside this space, if necessary. It takes 15 minutes on the average to fill an order, but the service time actually varies according to an exponential distribution. Determine the following

i) The probability that the facility is idle.

ii) The expected number of customers waiting to be served. [7+8]

8.a) Give brief notes on stochastic processes.

b) Explain Markov chain.

c) The transition probability matrix of Markov chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$. Is this matrix irreducible? [5+5+5]

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