R09

Code No: 54001

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, March - 2022
PROBABILITY AND STATISTICS
(Common to CE, IT)

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

Answer any five questions
All questions carry equal marks

1.a) State and prove Boole's inequalities.
b) A, B, C in order toss a coin. The first one to toss head wins the game. What are the probabilities of winning, assuming that the game may continue indefinitely? [7+8]

2. Show that for normal distribution the quartile deviation, mean deviation and standard deviation are approximately 10:12:15. [15]

3.a) Discuss the properties of a good estimator.
b) A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest believing that machines are used on the average more than 125 hours annually at 5% level of significance? [5+10]

4.a) Construct 95% confidence interval for the true proportion of computer literates if 47 out of 150 persons from rural areas are computer literates.
b) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Show that the S.E. of the proportion of bad ones in a sample of this size is 0.015 and deduce that the percentage of bad pineapples in the consignment almost certainly lies between 8.5 and 17.5. [7+8]

5.a) Write the properties of t-distribution.
b) Weights in kg. of 10 students are given as 38, 40, 45, 53, 47, 43, 55, 48, 52, 49. Can we say that variance of the distribution of weights of all students from which the above sample was taken is equal to 20 square kg. [5+10]

6. Find correlation coefficient and lines of regression for the following data and hence predict Y if X = 67.5. [15]

X	65	66	67	67	68	69	71	73
Y	67	68	64	68	72	70	69	70

7.a) Define the terms i) Busy period and ii) Mean service rate.

b) Workers come to a tool store room to enquiry about the special tools for a particular job. The average time between the arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time is 40 seconds. Find i) average queue length ii) Average length of non-empty queue. [5+10]

8. The transition probability matrix of a Markov chain $\{x_n\}$; n = 1, 2, 3 having three states 1, 2 and 3 is $P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$ and the initial distribution is $P^{(0)} = (0.7, 0.2, 0.1)$. Find:

a) $P\{X_2 = 3\}$ b) $P\{X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2\}$. [15]

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