Code No: 56066 **R09**

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

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

Answer any five questions
All questions carry equal marks
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1.a) A can hit a target once in five shots. B can hit a target twice in 3 shots. C can hit a target once in 4 shots. What is the probability that the target is hitted, if A, B and C try to hit the target?

b) Let $f(x) = 3x^2$, when $0 \le x \le 1$ be the probability density function of a continuous random variable X. Determine a and b such that: [7+8]
i) $P(X \le a) = P(X > a)$ ii) $P(X > b) = 0.05$.

2.a) Prove that Poisson distribution is the limiting case of Binomial distribution.

b) Take 30 slips of paper. Label 5 each with -4 and 4, four each with -3 and 3, three each with -2 and 2, 2 each with -1, 0 and 1. If each slip of paper has the same probability of being drawn find the probability of getting -4, -3, -2, -1, 0, 1, 2, 3, 4 and find the mean and variance of this distribution. [7+8]

3.a) Discuss various types of alternative hypothesis with suitable example.

b) A random sample of boots worn by 40 combat soldiers in a desert region showed an average life of 1.08 years with a standard deviation of 0.05 years. Under standard conditions the boots are known to have an average life of 1.28 years. Is there reason to assert at a level of significance of 0.05 that use in the desert causes the mean life of such boots to decrease? [7+8]

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) In a certain city 125 men in a sample of 500 were found to be smokers. In another city, the number of smokers was 375 in a random sample of 1000. Does this indicate that there is a greater population of smokers in the second city than in the first? [7+8]

5.a) Explain, stating clearly the assumptions involved, the t-test for testing the significance of the difference between the two sample means.

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. [7+8]

6.a) For 20 army personal, the regression of weight of kidneys (y) on weight of heart (x) both measured in Australia is $y = 0.399x + 6.394$ and the regression of weight of heart on weight of kidneys is $x = 1.212y - 2.461$. Find the correlation coefficient between the two variables and also their means.

b) The difference between the ranks are 0.5, -6, -4.5, -3, -5, -1, 3, 0, 5, 5.5, 0 and -0.5 for repeated ranks x and y $\sum \frac{m(m^2-1)}{12} = 3.5$. The rank correlation coefficient is 0.44. Find the number of terms. [7+8]

7.a) In a colour T.V. manufacturing plant, a loading unit takes exactly 10 minutes to load 2 T.V. sets into a wagon and again comes back to the position to another set of T.V. If the arrival rate is 2 T.V. sets per 20 minutes. Calculate the average time of T.V. sets in a stationary state.

b) Discuss about classification of queuing models. [7+8]

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) $P\{X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2\}$. [7+8]

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