Code No: 56086 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, December - 2017
PROBABILITY AND STATISTICS
(Bio-Technology)

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

Answer any five questions
All questions carry equal marks
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1.a) What is the probability that at least two out of n people have the same birthday in a non-leap year?
b) Two persons A and B toss a dice. The person who first throws 4 or 5 wins. A starts the game. Show that the probabilities of A's and B's winning are in the ratio 3:2. [7+8]

2. The diameter of an electric cable is assumed to be continuous random variable with probability density function $f(x) = 6x(1-x)$, $0 \le x \le 1$, Jusitfy. Find the mean and variance of the distribution. [15]

3.a) Find the probability that out of 100 patients between 84 and 95 inclusive will survive a heart-operation given that the chances of survival is 0.9.
b) On an average, 2 vehicles pass by a road per minute. Find the probability of 0, 1, 2, 3, 4, 5 vehicles per minute. [7+8]

4.a) A random sample of size 81 is taken from an infinite population having the mean 65 and standard deviation 10. What is the probability that $\bar{X}$ will lie between 66 and 68?
b) Determine the probability that the sample mean area covered by the sample of 40 of 1 liter paint boxes will be between 510 and 520 square feet, given that a 1 liter of such paint box covers on the average 513.3 square feet with standard deviation of 31.5 square feet. [7+8]

5.a) Why are interval estimates in most cases more useful than point estimates?
b) Find the degree of confidence to assert that the average salary of school teachers is between Rs.272 and Rs.302 if a random sample of 100 such teachers revealed a mean salary of Rs.287 with standard deviation of Rs.48. [7+8]

6.a) Discuss various types of alternative hypothesis with suitable example.
b) A coin was tossed 400 times and returned heads 216 times. Test the hypothesis that the coin is unbiased. Use a 0.05 level of significance. [7+8]

7.a) Write the conditions of validity of χ^2-test.
b) A die is thrown 120 times and frequencies of various faces are as follows

Face No.	1	2	3	4	5	6
Frequency	10	15	25	25	18	27

Test whether the die was fair. [7+8]

8.a) Define the terms:

i) Expected queue length

ii) Ideal period

iii) Busy period

iv) Mean service rate.

b) Show that for a single service station, Poisson arrivals and exponential service time, the probability that exactly n calling units are in the queuing system is $P_n = (1-\rho)\rho^n$, $n \geq 0$, where ρ is the traffic intensity. [8+7]

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