Code No: 56066 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, May - 2019
PROBABILITY AND STATISTICS
(Aeronautical Engineering)

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

Answer any five questions
All questions carry equal marks

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 2 shots 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) A manufacturer of pins knows that 2% of his product is defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that a box will fail to meet the guaranteed quality.

b) Find the probability of getting 1 or 4 or 5 or 6 in throwing a die 5 to 7 times among 9 trials using normal distribution. [8+7]

3.a) Discuss types of error of statistical hypothesis and give example.

b) A normal population has a mean 0.1 and a standard deviation of 2.1. Find the probability that the mean of simple sample of 900 members will be negative. [7+8]

4.a) A biased coin was thrown 400 times and head resulted 240 times. Find the standard error of the observed proportion of heads and deduce that the probability of getting a head in a single throw of the coin lies almost certainly between 0.53 and 0.67.

b) The owner of a machine shop must decide which of two snack vending machines to install in his shop. If each is tested 250 times, the first machine fails to work 13 times and the second machine fails to work 7 times. Test at the 0.05 level of significance whether the difference between the corresponding sample proportions is significant. [7+8]

5.a) Explain why the larger variance is placed in the numerator of the statistic F. Discuss the application of F-test in testing if two variances are homogenous.

b) Under quality improvement programme some teachers are trained by instruction methodology A and some by methodology B. In a random sample of size 10, taken from a large group of teachers exposed to each of these two methods, the following marks are obtained in an appropriate achievement test

Method A	65	69	73	71	75	66	71	68	68	74
Method B	78	69	72	77	84	70	73	77	75	65

Assuming that populations sampled are approximately normally distributed has same variance. Test the claim that method B is more effective at 0.05 LOS. [7+8]

6. Twenty five pairs of value of variates X and Y led to the following results N = 25, $\sum x$ = 127, $\sum y$ = 100, $\sum x^2 = 760, \sum y^2$ = 449, $\sum xy$ = 500. A subsequent scrutiny showed that two pairs of values were copied down as (8, 14) and (8, 6) instead of (8, 12) and (6, 8). Find correct value of r and correct lines of regression. [15]

7.a) Discuss about classification of queuing models.

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. [7+8]

8. A gambler has Re.1. He bets Rs.0.5 at a time and wins Rs.0.5 with probability ½. He stops playing if he loses Re.1 or wins Rs.2.
a) What is the transition probability matrix of the related Markov chain?
b) What is the probability that he has lost his money at the end of 5 plays?
c) What is the probability that the game lasts more than 7 plays? [15]

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