



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech I/II Semester Supplementary Examinations - July, 2017

Regulation: IA-R16

PROBABILITY AND STATISTICS [Common for : II Semester (CSE and IT)]

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) The probability function (discrete random variable) for a random variable X is [7M]

$$f(x) = \begin{cases} 2k, & x = 10 \\ k, & x = 20 \\ k - 0.2, & x = 30 \\ 0, & \text{otherwise} \end{cases} \quad \text{where } k \text{ is some constant.}$$

i. k

ii. $P(X > 15 \text{ or } X < 40)$

- (b) The probability density function for a continuous random variable X is [7M]

$$f(x) = \begin{cases} \frac{x+2}{18}, & -2 < x < 4 \\ 0, & \text{otherwise} \end{cases}$$

i. $E(X)$

ii. $Var(X)$

2. (a) In an intelligence test administered on 1000 children, the average was 60 and a standard deviation of 20. Assuming that the marks obtained by the children follow a normal distribution find the number of children who have scored. [7M]

i. more than 90 marks

ii. below 40 marks

iii. between 50 and 80 marks

- (b) Prove that mean and Variance of Poisson distribution are same. [7M]

UNIT – II

3. (a) Let $f(x, y) = be^{-x} \cos(y)$, $0 \leq x \leq 2$; $0 \leq y \leq \pi/2$; and $f(x, y) = 0$, all other x and y be a valid joint probability density function of two random variables X and Y then find b. [7M]

- (b) Obtain the rank correlation coefficient for the following data: [7M]

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

4. (a) Two random variables X and Y have the following joint probability density function [7M]

$$f(x, y) = \begin{cases} 2 - x - y; & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

Find marginal density functions of X and Y

- (b) Find a least square regression line of X on Y for the following data: [7M]

X	1	3	8	10	13
Y	80	100	110	120	140

UNIT – III

5. (a) Determine all possible samples of size 2 without replacement from a population consisting of 3, 6, 9, 12, 15 and find mean and variance of sampling distribution of means. [7M]
- (b) A certain brand of tires has a mean life of 25,000 miles with a standard deviation of 1600 miles. What is the probability that the mean life of 64 tires is less than 24,600 miles? [7M]
6. (a) A survey was conducted in a slum locality of 2000 families by selecting a sample of size 800. It was revealed that 180 families were illiterates. Find the probable limits of illiterates' families in the population of 2000? [7M]
- (b) The mean of a certain population is equal to the standard error of the distribution of means of samples of size 100 drawn from that population. Find the probability that the mean of the sample of size 25 from the population will be negative? [7M]

UNIT – IV

7. (a) A sample of 900 members has a mean 3.4 cms, and standard deviation 2.61 cms. Is the sample from population of mean 3.25 cm and standard deviation 2.61 cms.? [7M]
- (b) In a year there are 956 births in a town A, of which 52.5% were males, while in towns A and B combined this proportion in a total of 1406 births was 0.496. Is there any significant difference between in the proportion of male births in two towns? [7M]
8. (a) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% Level of Significance. [7M]
- (b) Random sample of 1000 engineering students from a city A and 800 from city B were taken. It was found that 400 students in each of the sample were from Payment quota. Does the data reveal a significant difference between the two cities in respect of Payment quota students? Test at 99% Level of Significance. [7M]

UNIT – V

9. Fit a poisson distribution to the following data and test the goodness of fit. [14M]

x	0	1	2	3	4	5	6
y	275	72	30	7	5	2	1

10. (a) Two samples of size 9 and 8 gave the sum of the squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn from the same population?

[7M]

- (b) A completely randomized design experiment with 10 plots and 3 treatments are as follows: [7M]

Plot No:	1	2	3	4	5	6	7	8	9	10
Treatment:	A	B	C	A	C	C	A	B	A	B
Yield:	5	4	3	7	5	1	3	4	1	7

Analyze the results for treatment effects.

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