(i) Is the difference between the means significance at 5% level of significance ?

(ii) Is the difference between the standard deviations significant at 5% level of significance ?

Roll No. ..... Total Pages : 04

BT-2/J-21 **42037**

PROBABILITY & STATISTICS

BS-134A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) In a bolt factory, machine A, B and C manufacture 25%, 35% and 40% of the total product respectively, of these output 5%, 4% and 2% respectively are defective bolts. A bolts is drawn at random from the product and is found defective. What are probabilities that it was manufactured by machine A, B or C ?

(b) A coin and a die were tossed together. Find the probability of getting either 'a head and 5' or 'a tail and 6'.

2. (a) Let X be a discrete random variable with the following Probability Mass Function :

$$P_X(x) = \begin{cases} 0.1 \text{ for } x = 0.2 \\ 0.2 \text{ for } x = 0.4 \\ 0.2 \text{ for } x = 0.6 \\ 0.3 \text{ for } x = 0.8 \\ 0.2 \text{ for } x = 1 \\ 0 \quad \text{otherwise} \end{cases}$$

(i) Find the range of the random variable X.

(ii) Find $P(X \leq 0.5)$

(iii) Find $P(0.25 < X < 0.75)$

(iv) Find $P(X = 0.2 | X < 0.6)$

(b) An integer is chosen at random from first 200 positive integers. What is the probability that the integer chose is divisible by 6 or 8 ?

Unit II

3. Define the Normal distribution and give a situation in real life where the distribution is likely to be realized. Obtain the mean and variance of the distribution.

4. (a) The probability density function of X is :

$$f(x) = \begin{cases} a + bx^2 & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

If E(X) = 3/5, find a and b.

(b) Show that Poisson distribution is a limiting case of binomial distribution.

Unit III

5. The line of regression equations are $y = x + 5$ and $16x - 9y = 94$. If the variance of y is 16. Find the mean of X and Y, variance of X and covariance of x and y.

6. (a) Discuss briefly the merits and demerits of the various measures of dispersion.

(b) Show that sum of the deviations about mean is zero.

Unit IV

7. (a) Explain the procedure for fitting of second degree curve in detail.

(b) Below are given the gain in weights (in lbs.) of pigs fed on two diets A and B. Gain in weight using :

Diet A : 25, 32, 30, 34, 24, 14, 32, 24, 30, 31, 35, 25

Diet B : 44, 34, 22, 10, 47, 31, 40, 30, 32, 35, 18, 21, 35, 29, 22

8. Random sample drawn from two countries gave the following data relating to the heights of adult males :

	Country A	**Country B**
Mean Height (in inches)	67.42	67.25
Standard Deviation (in inches)	2.58	2.50
Number in samples	1000	1200