

BT-2/M-20

32037

PROBABILITY AND STATISTICS

Paper : 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) State and prove addition theorem of probability for n events.
- (b) 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 bolt is drawn at random from the product and is found defective. What are probabilities that it was manufactured by machine A, B or C?
(08+07)
2. (a) Discuss the following terms:
- (i) Discrete Random Variable.
 - (ii) Probability Mass Function.
 - (iii) Distribution Function.
- (b) Show that the mathematical expectation of the sum of n random variables is equal to the sum of their expectation, if all the expectation exist? (08+07)

UNIT-II

3. (a) A continuous random variable X has a p.d.f.

$$f(x) = 3x^2 ; \quad 0 < x < 1$$
$$0 \quad \text{otherwise}$$

Find a and b such that (i) $P(X \leq a) = P(X > a)$ and
(ii) $P(X > b) = 0.05$.

- (b) If $F(x)$ is a continuous distribution function then show that $F(x)$ lies between 0 and 1. (08+07)

4. Define the Poisson distribution and give a situation in real life where the distribution is likely to be realized. Obtain the mean and variance of the distribution. (15)

UNIT-III

5. The distribution of age of males at the time of marriage was as follows :

Age (in years) :	18-20	20-22	22-24	24-26	26-28	28-30
No. of males :	5	18	28	37	24	22

Find at the time of marriage

- (i) The Average age (ii) The Modal Age (iii) Median Age. (15)

6. Calculate Pearson's coefficient of correlation between advertisement cost and sales as per data given below :

Cost (in '000 Rs.) :	39	65	62	90	82	75	25	98	36	78
Sales (in lakh Rs.) :	47	53	58	86	62	68	60	91	51	84

(15)

UNIT-IV

7. Explain in detail fitting of a straight line by the method of least square. (15)
 8. How would you test the significance for difference of means of two large populations? (15)
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