Roll No. ..... Total Pages : 3

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)

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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 Model 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)

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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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