Roll No. ..... Total Pages : 03

BT-2/M-19 32038

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) Define classical and statistical definitions of probability and also discuss the merits and demerits of classical and statistical definitions of probability. 8

(b) State and prove Bayes' theorem of probability. 7

2. (a) If n random variables are independent, then show that the mathematical expectation of their product is the product of their expectations. 7

(b) A random variable X has probability function : 8

$$f(x)=\frac{1}{x^2} \quad x=1,2,3,.....$$

$$0 \quad \text{otherwise}$$

Find mean and variance of X.

Unit II

3. A continuous random variable X has a probability density function as : 15

$$f(x)=\begin{cases} k\left[1-\left[1-x\right]\right], & 0<x<2 \\ 0 & \text{otherwise} \end{cases}$$

(i) Determine the constant k

(ii) Computer $p\left(X \le \frac{2}{3}\right)$.

(iii) Find the mean and variance of random variable X.

4. Define Binomial 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 at the time of marriage of grooms was as follows : http://www.kuonline.in

Age (in years) :	15-19	19-23	23-27	27-31	31-35	35-39
No. of grooms :	8	59	47	23	6	4

Find (i) Mean deviation about mean (ii) Variance (iii) Standard deviation. 15

6. Calculate Pearson's coefficient of correlation for the following data : 15

X	:	65	66	67	67	68	69	70	72
Y	:	67	68	65	68	72	72	69	71

Unit IV

7. Explain in detail fitting of a exponential curve by the method of least square. 15

8. A sample analysis of examination results of 200 M.Sc. students was made. It was found that 46 students had failed, 68 secured a third divison, 62 secured a second division and the rest were placed in first division. Are these figures commensurate with the general examination result which is in the ratio of 4 : 3 : 2 : 1 for various categories respectively ? $p\left(\chi_3^2 < 7.815\right) = 0.05$ 15