

This question paper contains 4+2 printed pages]

Your Roll No.

1426

B.A. (Prog.)/III

E-I

APPLICATION COURSE : BASIC STATISTICS

Time : 3 Hours

Maximum Marks : 100

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory. Attempt any *four* questions from.

Question Nos. 2 to 7, selecting at least *one* question from each

section and give full explanation for each question.

Marks are indicated against each question.

Use of simple calculator is allowed.

Candidates can ask for Log/Statistical Tables.

P.T.O.

1. Short answers with proper justification are expected in all the five parts of this question. Each part is of 4 marks : $5 \times 4 = 20$

- (i) A judge has to decide whether a person has committed the crime :

H_0 : Person is innocent

H_1 : Person is criminal.

Write the statements on the basis of type I and type II error.

- (ii) The manufacturer of a certain brand of cigarettes claims that the average nicotine content does not exceed 2.5 mg. State the null hypothesis and the alternative hypothesis to be used in this claim.

- (iii) Show that :

$$E \left[\left(\frac{X - \mu}{\sigma} \right)^2 \right] = 1.$$

- (iv) Find the value of the constant k for which

$$f(x) = kx(x - 1), 0 \leq x \leq 1$$

represents the probability density function of a continuous random variable X .

- (v) Find the expected value of the number obtained in a single throw of a die.

SECTION I

2. Find the median and the median class of the data given below : 20

Class boundaries	Frequency
15—25	4
25—35	11
35—45	19
45—55	14
55—65	0
65—75	2

3. The following summations are given for 30 items :

$$\Sigma X^2 = 61, \Sigma Y^2 = 90, \Sigma XY = 56,$$

$$\Sigma X = 15 \text{ and } \Sigma Y = -6.$$

Calculate the correlation coefficient and the regression equation of Y on X. 20

SECTION II

4. If the probability of defective bulbs produced by a machine is 0.2, find the probability that, out of 4 bulbs chosen at random : 20

- (i) exactly 1 bulb will be defective
- (ii) exactly 2 bulbs will be defective
- (iii) no bulb will be defective
- (iv) at most 2 bulbs will be defective.

5. The daily wages of 10,000 women (in Rupees) in a city is found to be normally distributed with mean 750 and standard deviation 50. Find how many women are there whose daily wages are : 20

- (i) more than Rs. 668
- (ii) less than Rs. 850.

SECTION III

6. Let P be the probability that a coin will fall Head in a single toss in order to test :

$$H_0 : P = \frac{1}{2} \text{ against } H_1 : P = \frac{3}{4}.$$

The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Find Type I and Type II error. 20

7. The specifications for a certain kind of ribbon call for a mean breaking strength of 185 pounds. If five pieces randomly selected from different rolls have breaking strength of 171.6, 191.8, 178.3, 184.9 and 189.1 pounds. Test the null hypothesis $\mu = 185$ pounds against the alternative hypothesis $\mu < 185$ pounds at 5% level of significance. $t_{0.05, 4} = 2.132$.

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