

This question paper contains 4+2 printed pages+1 table attached]

Your Roll No.....

5613

**B.A. (Programme)/III D**

**APPLICATION COURSE—BASIC STATISTICS**

*Time : 2 Hours*

*Maximum Marks : 55*

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

Instructions to candidates regarding the number of questions to be answered etc. should be indicated in the space provided below.

Question No. 1 is compulsory. Attempt any *four* questions from Question No. 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. Standard normal distribution table, which is part of the question-paper, is attached herewith.

- i. Short answers with proper justification are expected in all the five parts of this question. Each part is of 3 marks :

3×5=15

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- (i) The following is the distribution of the numbers of mistakes 200 students made in translating a certain passage from French to English :

No. of Mistakes	No. of Students
10-14	50
15-19	64
20-24	40
25-29	17
30-34	28
35-39	1

Draw a histogram of this distribution.

- (ii) If 10 is the mean of a set of 7 observations and 5 is the mean of a set of 3 observations, then find the combined mean.

- (iii) Find expected value of head tossing a coin thrice.
- (iv) Determine whether the given function can serve as the probability distribution of a random variable with the given range :

$$f(x) = \frac{x-2}{5} \quad \text{for } x = 1, 2, 3, 4, 5.$$

- (v) For a given sample of 200 items drawn from a large population, the mean is 65 and the standard deviation is 8. Find the 95% confidence limits for the population mean. (Given :  $Z_{0.005} = 2.58$ ,  $Z_{0.025} = 1.96$ ).

### Section I

2. Find the skewness and comment on the nature of the distribution : 10

Class Interval	Frequency
0-10	1
10-20	3
20-30	4
30-40	2

3. Each student's grade (Y) on the 10 point scale and the number of hours they studied (X) are given. Calculate the coefficient of correlation and hence interpret : 10

X	Y
4	5
1	3
3	1
6	5
8	9
2	7

### Section II

4. In a certain factory turning out razor blades, there is a small chance of 0.2% for any blades to be defective. The blades are supplied in packets of 10, use Poisson distribution to calculate the approximate numbers of packets containing no

defective, one defective and at least two defective blades respectively in a consignment of 10000 packets. ( $e^{-0.02} = 0.9802$ ,  $e^{-0.2} = 0.819$ ).

10

5. A sample of 100 dry battery cells tested to find the length of life produced was normally distributed with mean 12 hours and S.D. 3 hours. What percentage of battery cells are expected to have life :

- (a) more than 15 hours
- (b) between 10 and 14 hours
- (c) less than 6 hours.

10

### Section III

6. The mean breaking strength of the cables supplied by a manufacturer is 1800 with a standard deviation 100. By a new technique in the manufacturing process, it is claimed that the breaking strength of the cables have increased. In order to

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test this claim a sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support the claim at 0.01 level of significance ? (Given :  $Z_{0.01} = 2.58$ ,  $Z_{0.01} = 2.33$ ).

10

7. A soft drink vending machine is set to dispense 6.0 ml per cup. The machine is tested nine times, yielding a mean cup fill of 6.2 ml with a standard deviation of 0.15 ml. Test at the 0.05 level of significance that the machine is on the average overfilling cups.

10

(Given :  $t_{0.05,7} = 1.895$ ,  $t_{0.05,8} = 1.860$ ,  $t_{0.05,9} = 1.833$ ).

