This question paper contains 4+2 printed pages]

*Your Roll No.* .....

**4585**

**B.A. Prog. / III** **AS**

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.

(*a*) (*i*) Question No. **1** is compulsory.

(*ii*) Attempt *four* more questions from question numbers **2** to **7** selecting at least *one* from each of the Sections, **I**, **II** and **III**. Full explanation is to be given for these questions.

(*iii*) Marks are indicated against each question.

(*b*) Use of calculator is allowed.

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

(*i*) The following is the distribution of the number of meals

P.T.O.

which 60 real estate salesperson charged as business expenses in a given week :

| Number of Meals | Frequency |
|---|---|
| 0—1 | 16 |
| 2—3 | 25 |
| 4—5 | 13 |
| 6—7 | 4 |
| 8—9 | 2 |

Convert the distribution into a 'less than' cumulative distribution and draw its ogive.

(*ii*) The following are the wind velocities reported at an airport at 6 p.m. on six consecutive days :

13, 8, 15, 11, 3 and 10.

Find the variance of these figures.

(*iii*) A union wage negotiator feels that the probabilities are .40, .30, .20 and .10 that the union members will get a Rs. 1.50 an hour raise, a Re. 1.00 raise, a Re. 0.50 raise or no raise at all. What is their expected raise ?

(*iv*) In a given city, medical expenses are given as the reason for 75 percent of all personal bankruptcies. What is the probability that medical expenses will be given as the reason for two of the next four personal bankruptcies field in that city ?

(*v*) The systolic blood pressure of 90 normal males has a mean of 128.9 mm of mercury and a standard deviation of 17 mm of mercury. Assuming these are random sample of blood pressure, calculate a 95% confidence interval for the population mean blood pressure. 3×5=15

**Section I**

2. A researcher wanted to measure the effect of length of a criminal trial on the length of jury deliberation. He observed in a sample of 5 randomly selected court-room trials, the

following data on length of trials (in days) and length of jury deliberation (in hours) :

| $x$ (in days) | $y$ (in hours) |
|---|---|
| 1 | 2 |
| 2 | 3 |
| 3 | 3 |
| 4 | 4 |
| 5 | 3 |

Obtain a regression from which we can predict the length of jury deliberation for the length of trials. 10

3. Compute the Kurtosis for the following frequency distribution of the scores of attitudes towards older people for 15 students :

| $x$ | $f$ |
|---|---|
| 0 | 5 |
| 2 | 4 |
| 3 | 3 |
| 4 | 2 |
| 5 | 1 |

Also interpret the result. 10

## Section II

4. In a certain factory turning out razor blades, there is a small chance 1/500 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson's distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets ($e^{-0.02} = 0.9802$). 10

5. If the yearly number of major earthquakes, the world over, is a random variable whose distribution can be approximated with a normal distribution having $\mu = 20.8$ and $\sigma = 4.5$, find the probability that there will be at least 22 major earthquakes in any given year. (It is given that area under the standard normal curve between $Z = 0$ and $Z = 0.26$ is 0.1026 and that between $Z = 0$ and $Z = 0.27$ is 0.1064). 10

## Section III

6. A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved ? (At 1% level of significance, the critical value of $Z = \pm 2.58$). 10

7. A soap manufacturing company was distributing a particular brand of soap through a large number of retail shops. Before a heavy advertisement campaign, the mean sales per week per shop was 140 dozens. After the campaign a sample of 26 shops was taken and the mean sales was found to be 147 dozens with standard deviation 16. Can you consider the advertisement effective ? (It is given that the critical value of $t$ for 24, 25, 26 degrees of freedom at 5% level of significance is 2.064, 2.060 and 2.056): 10