This question paper contains 6 printed pages.]

5538 *Your Roll No. ....*

B.A. Prog./III J

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 **not** allowed.

Note : *The maximum marks printed on the question paper are applicable for the students of the regular colleges (Cat. 'A'). These marks will, however, be scaled up proportionately in respect of the students of NCWEB at the time of posting of awards for compilation of result.*

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

3×5=15

(i) Distinguish between :

(a) Descriptive and inferential statistics

(b) Univariate and bivariate distribution

(c) Point and interval estimation.

(ii) Let the two samples of human males yield the following results :

	Sample 1	Sample 2
Age	25 years	11 years
Mean Weight	65.77 kg	36.28 kg
Standard Deviation	4.53 kg	4.53 kg

Determine which is more consistent the weights of the 25 year olds or the weights of 11 year olds.

(iii) The following is the distribution of the length of stay in a hospital after a minor operation :

Days :	2	3	4	5	6
Probability :	0.05	0.20	0.40	0.20	0.15

Find the average length of stay in the hospital.

(iv) Find the probability that seven of 10 persons will recover from a disease if we can assume independence and the probability is 0.80 that any one of them will recover from the disease.

(v) Among 100 fish caught in a certain lake, 18 were inedible as a result of the chemical pollution of the environment. Construct a 99 per cent confidence interval for the corresponding true proportion.

SECTION I

2. Do reading and TV viewing compete for leisure time ? To find out, a communication specialist interviewed a sample of 6 children regarding the number of books they had read during the last year and the number of hours they had spent watching TV on daily basis. His results are as follows :

Number of books :	0	7	2	1	5	4
Hours of TV viewing	3	1	2	2	0	1

Compute the Pearson's coefficient of correlation between number of books and hours of TV viewing. Also interpret the result.

10

3. According to an NGO, 7 per cent of the population has lung disease. Of those having lung disease, 90 per cent are smokers. Determine the probability that a randomly selected smoker has lung disease.

10

SECTION II

4. The burning time of an experimental rocket is a random variable which has a normal distribution with $\mu = 4.36$ seconds and $\sigma = 0.04$ seconds. What are the probabilities that this kind of rocket will burn for

(i) less than 4.25 seconds,

(ii) more than 4.40 seconds,

(iii) 4.30 to 4.42 seconds ?

It is given that $P(0 \leq Z \leq 2.75) = .4970$, $P(0 \leq Z \leq 1) = 3.413$, $P(0 \leq Z \leq 1.5) = .4332$. Z being standard normal variate.

10

5. (a) If 1.2 per cent of the inhabitants of a border city are illegal imigrants, use the Poisson approximation to the binomial distribution to find the probability that in a random sample of 300 of them, two are illegal immigrants ? Use the information that

$e^{-3.6} = 0.027, e^{-1.2} = 0.301, e^{-2.4} = 0.0907$

8

(b) Write the interpretation of Central Limit Theorem.

2

SECTION III

6. In six test runs it took 13, 14, 12, 16, 12 and 11 minutes to assemble a certain mechanical device.

(i) Construct a 0.95 confidence interval for the actual mean time it takes to assemble the device.

(ii) If the mean of this sample is used to estimate the true mean of the population sampled, what can we say with the probability 0.99 about the maximum size of error ?

It is given that $t_{0.05,5} = 2.015$, $t_{0.025,5} = 2.571$, $z_{0.05} = 1.645$, $z_{0.025,\,5} = 1.960$

10

7. An ambulance service claims that it takes it on an average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation 1.8 minutes. At a level of significance 0.05, does this constitute evidence that the figure claimed is too low ? It is given that $\Phi(Z_{0.05}) = 1.645$, $\Phi(Z_{0.025}) = 1.960$

Where $\Phi(Z_\alpha) = P(0 \leq Z \leq Z_\alpha)$.

10