

[This question paper contains 5 printed pages.]

5368

Your Roll No. ....

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

**B**

**APPLICATION COURSE  
BASIC STATISTICS**

*Time : 2 Hours*

*Maximum Marks : 55*

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

*Note :- The maximum marks printed on the question paper are applicable for the students of the Regular Colleges. 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.*

*Note :- (i) Question No. 1 is compulsory.*

*(ii) 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.*

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

*(iv) Use of simple 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. (3×5=15)

P.T.O.

- (i) Distinguish between :
- (a) Census and sample survey.
  - (b) Skewness and Kurtosis
  - (c) Type I and Type II errors
- (ii) From some financial statistics, it is found that the monthly average Electricity charges were Rs. 2460 and the standard deviation Rs. 120. The monthly average Direct wages were Rs. 42,000 and standard deviation Rs. 1200. Determine which is more consistent.
- (iii) In the opinion of a union wage negotiator, the probabilities that the union members will get a raise of Rs. 150, Rs. 100, Rs. 50 or no raise at all, are 0.40, 0.30, 0.20 and 0.10 respectively. What is their expected raise in wages ?
- (iv) If the probability is 0.15 that a set of tennis match between two given professional players will go into a tie breaker, what is the probability that two of three sets between these two players will go into tie breakers ?
- (v) A study of the annual growth of certain cacti showed that 64 of them, selected at random in a desert region, grew on the average 52.80 mm with a standard deviation of 4.5 mm. Construct a 99% confidence interval for the true average annual growth of the given kind of cactus.

## SECTION I

2. In preparing for an examination, some students in a class studied more than others. Each student's grade on the 10-point exam and the number of hours studied were as follows:

Hours Studied	Exam Grade
4	5
1	2
3	1
5	5
8	9
2	7

Calculate a Pearson's correlation coefficient and interpret the result. (10)

3. In a state where cars have to be tested for the emission of pollutants, 25 percent of all cars emit excessive amounts of pollutants. When tested, 99 percent of all cars that emit excessive amounts of pollutants will fail, but 17 percent of the cars that do not emit excessive amounts of pollutants will also fail. What is the probability that a car which fails the test actually emit excessive amounts of pollutants? (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 the standard normal variate. (10)

5. (a) It is known from experience that 1.4 percent of the calls received at a switchboard are wrong numbers. Use the Poisson approximation to the binomial distribution to determine the probability that among 200 calls received at the switchboard, three are wrong numbers. It is given that  $e^{-2.8} = 0.061$ ;  $e^{-1.4} = .2466$ ;  $e^{-0.4} = 0.670$ . (8)
- (b) State the central limit theorem. (2)

## SECTION III

6. To test the durability of a new paint for white center lines, a highway department painted test strips across

heavily traveled roads in eight different locations, and electronic counters showed that they deteriorated after being crossed by (to the nearest hundred) 142,600, 167,800, 136,500, 108,300, 126,400, 133,700, 162,000 and 149,400 cars. Find the 95% confidence interval for the average amount of traffic (car crossing) this paint can withstand before it deteriorates. It is given that  $t_{0.025,7} = 2.365$ ,  $t_{0.05,7} = 1.895$ ,  $t_{0.025,8} = 2.306$ ,  $t_{0.05,8} = 1.860$ . (10)

7. An ambulance service claims that it takes it on the 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 of 1.8 minutes. At a level of significance 0.05, does this constitutes 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)