This question paper contains **4** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **5457**

Unique Paper Code : **290662** **D**

Name of the Paper : **Basic Mathematical Statistics-II**

Name of the Course : **B.A. (Prog.) Application Course**

Semester : **VI**

Duration : **2 Hours** Maximum Marks : **55**

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

Instructions for Candidates :

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

(2) Attempt any *four* questions from Question Nos. **2** to **7** selecting at least *one* from each of the Sections I, II and III.

(3) Give full explanation for each question.

(4) Marks are indicated against each question.

(5) Use of simple calculator is allowed.

(6) 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 3 marks : 3×5=15

(*i*) State the Central Limit Theorem

(*ii*) Find the mean and variance of Uniform distribution

(*iii*) Find E(X) and $E(X^2)$ for the probability distribution :

X	**P(X)**
0	3/8
1	3/8
2	1/8
3	1/8

(*iv*) If X and Y are independent random variable, show that :

$$E(XY) = E(X)E(Y).$$

(*v*) A random variable X has the following probability distribution :

Value of X	***p*(*x*)**
–2	0.1
–1	k
0	0.2
1	$2k$
2	0.3
3	k

Find the value of k.

Section I

2. If 5% of the electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs : 10

   (*i*) None of the bulbs is defective.

   (*ii*) Exactly 5 bulbs are defective (Given : $e^{-5} = 0.007$).

3. The monthly wages of 1000 women workers (in Rupees) in a factory is found to be normally distributed with mean 7500 and standard deviation 500. Find how many women are there whose daily wages are : 10

   (*i*) More than Rs. 6,680

   (*ii*) Less than Rs. 8,500

   (*iii*) Between Rs. 5,000 to Rs. 9,000.

Section II

4. Show that S^2 is an unbiased estimator of the parameter σ^2. 10

5. The contents of 7 similar containers of sulphuric acid are 9.8, 10.2, 10.4, 9.8, 10.0, 10.2 and 9.6 litres. Find a 95% confidence interval for the means of all such containers assuming an approximate normal distribution $t_{0.025,6} = 2.477$. 10

Section III

6. 200 digits were chosen at random from a set of tables. The frequencies of the digits are : 10

Digits	Frequencies
0	18
1	19
2	23
3	21
4	16
5	25
6	22
7	20
8	21
9	15

Use Chi-square test to check that digits were uniformly distributed in the tables from which they were chosen.

7. A random sample of 150 tins of vanaspati oil gave an average weight of 4.925 kgs with standard deviation of 0.2 kgs. Based on these values can we accept the hypothesis of net weight 5 kgs per tin at 5% level of significance ? Given : $Z_{0.05} = 1.64$, $Z_{0.025} = 1.96$. 10