This question paper contains **7** printed pages]

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M.A./M.Sc. (Fourth Semester)

Examination, 2020

MATHEMATICS

Paper MATH-4 O(iii)

Mathematical Statistics–II

Time Allowed : Three Hours

Maximum Marks : 70

Min. Pass Marks : 28

Note : – Non-Programmable Scientific Calculator is allowed in this paper.

This question paper will be divided into **three** *sections as under :*

Section-A   Max. Marks-10

This section contains 1 compulsory question comprising **10** *short answer type questions (maximum 20 words answer) taking two questions from each unit. Each question shall be of one mark.*

Section-B   Max. Marks-25

This section contains **10** *questions, 2 questions from each unit (answer about in 250 words). Students are instructed to attempt* **five** *questions by selecting* **one** *question from each unit. Each question shall be of five marks.*

Section-C   Max. Marks-35

This section contains five long answer type questions comprising one compulsory question (Question No. 7) of **15** *marks and four questions of 10 marks each. Students are instructed to attempt total* **three** *questions with* **one** *compulsory question (answer about in* **500** *words) and any* **two** *more questions (answer about in 400 words) out of remaining four questions.* https://www.uokonline.com

Section A

1. (i)   Define the sampling distribution.

   (ii) Explain the standard errors.

(iii) What is estimation ? Explain it.

(iv) Write the principle of Least Square Method.

(v) Discuss the efficiency.

(vi) Briefly explain the statistical method.

(vii) Write the two line of regression, y on x and x on y and also write the angle between them.

(viii) Define the multiple correlation coefficient.

(ix) Write a short note on Analysis of Variance.

(x) Discuss sign test.

Section B

UNIT-I

2. Write a short note on t-Distribution.

Or

Explain the importance of chi-square distribution over the other distribution and describe its application.

UNIT-II

3. Write the property of Maximum Likelihood Estimation. Also find the MLE for the parameter λ of Poisson distribution.

Or

Explain the method of minimum chi-square in estimation with a suitable example.

UNIT-III

4. Show that in a random sampling from a Normal Population, Sample Mean is a consistent estimator of Population Mean.

Or

State and prove the Cramer Rao Inequality.

UNIT-IV

5. Three variables have in pairs simple correlation coefficient given by :

$$r_{12} = 0.8, \quad r_{13} = -0.7, \quad r_{23} = -0.9.$$

Find the multiple correlation coefficient $R_{1.23}$ of x_1 on x_2 and x_3.

Or

Calculate the Karl Pearson's coefficient of correlation between x and y from the following data :

x	y
17	12
18	16
19	14
19	11
20	15
20	19
21	22
21	16
22	15
23	20

6. A set of 5 coins is tossed 3200 times and the number of Heads appear in each test is noted. The test is as follows :

No. of Heads	Frequency
0	80
1	570
2	1100
3	900
4	500
5	50

Test the Hypothesis that coins are unbiased.

Or

Write a short note on Non-Parametric tests.

Section C

7. (a) Define the following :

(i) Confidence or fiducial limit

(ii) Distribution of order statistics.

(b) Write a short note on Method of Moments.

5 [Contd....

6 [Contd....

8. (a) Show that the sampling mean is a sufficient for estimating the parameter λ in the Poisson distribution.

(b) Write the test of significant of single Mean $(n > 30)$ in Normal distribution.

9. Show that :

$$r_{23.1} = \frac{r_{23} - r_{21} r_{31}}{\sqrt{(1 - r_{21}^2)(1 - r_{31}^2)}} \cdot$$

10. Prove that for a 2×2 contingency table :

$$x^2 = \frac{N(ad - bc)^2}{(a + c)(b + d)(a + b)(c + d)}$$

where $N = a + b + c + d$ and a, b, c, d are all cell entries.

11. (a) Write a short note on Median Test.

(b) Define the Distribution of order statistics.