2021

MATHEMATICS — HONOURS — PRACTICAL

Paper : CC-14P

(Numerical Methods)

Full Marks : 30

Time : 4 hours

The questions are of equal value.

Candidates are required to give their answers in their own words as far as practicable.

Distribution of Marks :

Two Questions : $10 \times 2 = 20$

Internal Assessment :   5

Attendance :   5

Answer *any two* questions using either calculator or C programming / C++ programming / FORTRAN 90 programming language.

Throughout the question paper, the symbol R represents the last digit of the University Roll no. of the candidate.

1. Compute the value of $f(x)$ at $x = 0.24 - \dfrac{R-5}{100}$ and at $x = 0.475 + \dfrac{R-5}{100}$ by suitable interpolation formula from the following table :

x	0.10	0.14	0.20	0.27	0.32	0.40	0.47	0.51
$f(x)$	0.19752	0.21146	0.21849	0.22961	0.23775	0.24905	0.25730	0.26977

2. Compute the value of the integral correct to 5D by Weddle's rule using 13 ordinates :

$$\int_{q}^{2.2} \frac{q + x^2 \cos(qx)}{\sqrt{1 + x + \sinh(x+1)}}\, dx \quad \text{where } q = \frac{6+R}{40}.$$

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3. Find the positive root of the following equation correct upto 5D by Regula falsi method

$$x^x + \left(\frac{R+1}{20}\right)\log_{10}(x^2+1) = 3\cdot4 \;.$$

4. Solve the following system of linear equations by LU decomposition method correct to 4D :

$$AX = B \text{ where } X = (X_1, X_2, X_3, X_4)^T \text{ and}$$
$$B = (15.655, 22.705, 23.480, 16.110)$$

$$A = \begin{pmatrix} 3.82 + \dfrac{R}{10} & 1.02 & 0.75 & 0.81 \\[2mm] 1.05 & 4.53 + \dfrac{R}{10} & 0.98 & 1.53 \\[2mm] 0.73 & 0.85 & 4.71 + \dfrac{R}{10} & 0.81 \\[2mm] 0.88 & 0.81 & 1.28 & 3.50 + \dfrac{R}{10} \end{pmatrix}$$

5. Fit a curve of the form $y = a + bx^2$ to the following data using least square method correct to 4D :

$x - \dfrac{R}{10}$	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
$y - \dfrac{3R}{10}$	6.25	8.98	11.63	15.83	19.30	22.53	27.81	31.27

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