## 2021

## MATHEMATICS - HONOURS - PRACTICAL

## Paper : CC-14P

(Numerical Methods)
Full Marks : 30
Time : $\mathbf{4}$ 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 $x=0.24-\frac{R-5}{100}$ and at $x=0.475+\frac{R-5}{100}$ 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 5 D by Weddle's rule using 13 ordinates:

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

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

$$
x^{x}+\left(\frac{R+1}{20}\right) \log _{10}\left(x^{2}+1\right)=3 \cdot 4
$$

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

$$
\begin{gathered}
A X=B \text { where } X=\left(X_{1}, X_{2}, X_{3}, X_{4}\right)^{T} \text { and } \\
B=(15.655,22.705,23.480,16.110) \\
A=\left(\begin{array}{cccc}
3.82+\frac{R}{10} & 1.02 & 0.75 & 0.81 \\
1.05 & 4.53+\frac{R}{10} & 0.98 & 1.53 \\
0.73 & 0.85 & 4.71+\frac{R}{10} & 0.81 \\
0.88 & 0.81 & 1.28 & 3.50+\frac{R}{10}
\end{array}\right)
\end{gathered}
$$

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

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

