

Con. 5294-07.

[REVISED COURSE]

CD-6666

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** out of remaining **six** questions.
 (3) Make **suitable** assumptions if **required** and **justify** the same.
 (4) Write programs in **C/C++**.

1. (a) Define Inherent, Truncation and Round off error and give an example for each. 5
 (b) Prove that, 5

$$(i) \mu = \frac{1}{2} [E^{1/2} + E^{-1/2}] \quad (ii) \mu^2 = 1 + \frac{\delta^2}{4}$$

- (c) Using Picard's method solve - 5

$$\frac{dy}{dx} = 1 + xy \text{ such that } y = 0 \text{ when } x = 0.$$

- (d) Derive Newton-Raphson formula. 5

2. (a) List the bracketing methods and open methods and find the real root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct to three decimal places. 10

- (b) Solve the following equations by Gauss-Seidal method. 10

$$27x + 6y - z = 85, \quad 6x + 15y + 2z = 72, \\ x + y + 54z = 110.$$

3. (a) From the following table find the number of students who obtained marks less than 45. 10

Marks	30-40	40-50	50-60	60-70
No. of Students	31	42	51	35

- (b) Using Newton's divided difference formula, find the value of f(g) from the following table :- 10

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

4. (a) Find roots of the equation $f(x) = \cos x - x \cdot e^x = 0$ using Secant method, correct up to 3 decimal places. 10

- (b) Develop a flow chart and write C-program for bisection method. 10

Con. 5294-CD-6666-07.

2

5. (a) The velocity of the train which starts from rest is given by the following table, the time 10 being reckoned in minutes from the start and speed in km/hr :-

Time	3	6	9	12	15	18
Velocity	22	29	31	20	4	0

Estimate approximately the distance covered in 18 minutes by Simpson's $\frac{3}{8}$ th rule.

- (b) Solve $\frac{dy}{dx} = x + 3y$ with $x_0 = 0, y_0 = 1$ by Euler's modified formula, find the value of 10 y when $x = 0.1$ taking $h = 0.005 = 0.05$.
6. (a) Solve $\frac{dy}{xy} = xy$ with initial conditions $y(1) = 2$ and find y at $x = 1.2, x = 1.4$ by 10 Runge-Kutta method of fourth order taking $h = 0.2$.
- (b) Using the following data, find x for which y is minimum and find this value of y - 10

x	3	4	5	6	7	8
y	0.205	0.240	0.259	0.262	0.250	0.224

7. (a) Explain the Propagation of Errors. 5
- (b) Derive Newton Cotes integration formula and also write a program for Simpson's 10 $\frac{1}{3}$ rd rule.
- (c) Write a short note on Golden Section Search. 5