

Code : 211404

B.Tech 4th Semester Examination, 2017

NMCT

Time : 3 hours

Full Marks : 70

Instructions :

- (i) There are **Nine** Questions in this Paper.
- (ii) Attempt **Five** questions in all.
- (iii) **Question No. 1 is Compulsory.**
- (iv) The marks are indicated in the right-hand margin.

1. Answer any Seven questions from this: 2×7

- (i) What do you mean by truncation error?
- (ii) What is curve fitting?
- (iii) When the method of moments in curve-fitting can be applied?
- (iv) What do you mean by pivot element?
- (v) In iterative methods how we obtain the solution of the system of a given equation?
- (vi) What is first order backward differences?
- (vii) What is interpolation?
- (viii) Where the divided differences method is used.
- (ix) What is the geometric significance of composite Simpson's one-third rule?
- (x) What is the use of Euler method?

P.T.O.

2. (a) Find the root of the equation $f(x) = 2 - x^2$, that lies between 0 and 2, correct to two places of decimals, using bisection method. 7

(b) Write a program using C++ for the above equation using bisection method. 7

3. (a) Solve $x^3 - 9x + 1$ by Regula Falsi method using $x_1 = 2$; and $x_2 = 4$;

(b) Write a program using C++ for the above equation using Regula Falsi method.

4. Solve the following system of equations by Gauss elimination method and Gauss-Jordan elimination method: 7

$$\begin{aligned} 5x_1 - x_2 &= 9 \\ -x_1 + 5x_2 - x_3 &= 4 \\ -x_2 + 5x_3 &= -6 \end{aligned}$$

5. Find the interpolating polynomial for y from the following data, using both Newton's forward and backward formulae: 14

x	4	6	8	10
y	1	3	8	16

6. Use Lagrange's interpolation formula to find the value of x when y = 20 and when y = 40 using the following data: 14

X	1	2	3	4
Y	1	8	27	64

7. Compute the value of π from the formula 14

$$\frac{\pi}{4} = \int_0^1 \frac{dx}{1+x^2} \text{ using trapezoidal rule with 10 sub-intervals.}$$

8. (a) Find the value of $y(0.2)$ and $y(0.4)$ using Runge-Kutta method of the fourth order with $h=0.2$ given that $dy/dx = \sqrt{x^2 + y}$; $y(0) = 0.8$. 7

(b) Write a computer program using C++ to solve the above differential equation at the specified pivotal points, using Runge-Kutta method of the fourth order. 7

9. Fit a second degree parabola of the form $y = a + bx + cx^2$ to the following data, by the method of least squares: 14

x	0.5	1	2	3	5
y	3.1	6.0	11.2	14.8	20
