1512E1528

Candidate's Seat No:____

IMSc CS Sem.-7 Examination
Computer Oriented Numerical Methods
December-2025

Time : 2.30 Hours] [Max.Marks : 70

Instructions:

- Write both the Sections in the separate answer book.
- Both Sections have equal weightage

SECTION - I

Q.1 Answer briefly any one: (7)

a) Explain the different stopping criteria for iterative methods.

b) Explain the different types of errors.

Q.2 Find a real root of the equation $x^3 - 5x + 3 = 0, \epsilon = 0.0001$ (14)

a) using Newton Raphson method, $x_0 = 1$

b) using Secant method starting with 0, 1

OR

Q.2 Find a real root of the equation $x^3 - x - 4 = 0, \epsilon = 0.0001$ (14)

a) using False Position method starting with 1.5 and 2.

b) Using Birge Vieta method starting with 1.5

Q. 3 Attempt any two (14)

a) Find the values of y when $x = 0.12$ using Forward Difference

X	0.1	0.15	0.2	0.25	0.3
Y	0.1003	0.1511	0.2027	0.2553	0.3093

b) Find the values of y when $x = 301$ using Lagrange's formula

X	300	304	305	307
Y	2.4771	2.4829	2.4843	2.4871

c) Evaluate the values of f (2) using Newton's Divided Difference interpolation formula for the table of values given below.

x	-1	0	3	6	7
f(x)	3	-6	39	822	1611

SECTION - II

Q. 4 Answer any one of the following: (7)

a) Determine the constants a and b, by the method of least squares, such that the curve $y = ae^{bx}$ fits the data. Find y at x = 10.5

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

b) Fit a straight line to the following data and compute y when x = 150

X	50	70	100	120
Y	12	15	21	25

P.T.O

E1528.2

Q.5 a) Evaluate the following integral by using the trapezoidal formula $\int_0^1 x^3 dx$ with 5 subintervals (7)

b) Evaluate the following integral by using the Simpson's 1/3 formula $\int_0^6 \frac{1}{1+x} dx$ with 6 subintervals (7)

OR

Q.5 a) Evaluate $\int_{-1}^1 \frac{1}{1+x^2} dx$ using Gauss formula for $n = 2$. (7)

Q.5 b) Evaluate the following integral using the Simpson's 3/8 $\int_0^6 \frac{1}{1+x^2} dx$ with 6 subintervals (7)

Q. 6 Attempt any two (14)

a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$
with initial condition y(0) = 1; find y for x = 0.1 by Euler's method using h = 0.02

b) Apply the Runge-Kutta method to find the approximate value of y for x = 0.2, in steps of 0.2, if $dy/dx = -2xy^2$, y = 1 where x = 0.

c) The differential equation $y' = y - x^2$, is satisfied by $y(0) = 1$, $y(0.2) = 1.12186$, $y(0.4) = 1.46820$, $y(0.6) = 1.7359$. Compute the value of $y(0.8)$ by Milne's predictor-corrector formula