Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune -16
(Autonomous)
Odd Semester Examination:Nov Dec 2023
Faculty: Science and Technology

Program:B.Sc.Comp05 **Semester:III** **SET: A**
Program (Specific): B.Sc.(Computer Science) **Course Type: Core**
Class:S.Y.B.Sc.(Comp.Sci) **Max.Marks 35**
Name of the Course: Numerical Techniques **Course Code: 23-MTC-232**
Paperno.: II **Time: 2Hrs**

Instructions to the candidate:
i)There are 3 sections in the question paper. Write each section on separate page.
ii)All the Sections are compulsory.
iii) Figures to the right indicate full marks.

Section A

Q.1) Attempt any 5 of the following: (10 marks)

1) Find the percentage error of the number 20/7 whose approximate value is 2.85714.
2) Evaluate $E^2(x^2)$ where h= 1.
3) Prove that $(1+\Delta)(1-\nabla)= 1$ by usual notation.
4) Given that $y' = \frac{y-x}{y+x}$ with y(0)=1. Find y(0.025) using Euler's method. Given h=0.025.
5) State Simpson's (3/8)th rule of numerical Integration.
6) Find an interval in which a root of the equation $f(x) = x^2+2x-5=0$ lies.
7) Find the divided difference f[a,b] and f[a,b,c] for f(x)= 1/x.

Section B

Q.2. Attempt any 3 of the following : (15 marks)

1) Find the real root correct upto 3 decimal places by False position method in the interval [0,1] of the equation $x^2-9x+1= 0$.

2) Find the missing term in the following table:

x	1	2	3	4	5	6	7
y	2	4	8	?	32	64	128

3) Find the polynomial f(x), fitting the following data using Lagrange's interpolation formula:

x	0	1	2	5
y	2	3	12	147

4) Given $\frac{dy}{dx} = \frac{-y}{1+x}$ with y (0.3)=2, find y(0.4) by modified Euler method.(Take h=0.1)

5) The population of a town is given below. Estimate the population for the year 1895 using Newton's forward difference formula.

Year (X)	1891	1901	1911	1921	1931
Population (Y)	46	66	81	93	101

Section C

Q.3) Attempt any 1 of the following: (10 marks)

1) Evaluate $\int_0^6 \frac{1}{1+x^2}$ dx with h=1, using

a) Trapezoidal rule b) Simpson's 1/3rd rule c) Simpson's 3/8th rule.

2) Solve the initial value problem $\frac{dy}{dx}$ = y-x with y(0)= 2, by Runge-kutta formula of order four with h=0.1 & compute y (0.1) and y(0.2) correct upto four decimal places.

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