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322451(14)

B. E. (Fourth Semester) Examination Nov.-Dec. 2021

(New Scheme)

(CSE Branch)

COMPUTATIONAL MATHEMATICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory. Attempt any* ***two*** *parts from (b), (c) and (d) of each question. The figures in the right-hand margin indicate marks.*

Unit - I

1. (a) State and explain Newton-Raphson Method. 2

(b) Find a real root of the equation $x \log_{10} x = 1 \cdot 2$ by regula-falsi method correct to four decimal place. 7

(c) Find by Newton's Method, the real root of the equation $3x = \cos x + 1$ correct to four decimal place. 7

(d) Find the roots of the equation 7

$$x^3 + 2x^2 + 10x - 20 = 0$$

that is near 1, using Birge-Vita Method correct to 4 decimal place.

Unit - II

2. (a) State and explain Gauss elimination method. 2

(b) Solve the Jacobi's iteration method, the equation

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$ 7

(c) Apply Gauss-Jordan method to solve the equation

$$x + y + z = 9$$

$$2x - 3y + 4z = 13$$

$$3x + 4y + 5z = 40$$ 7

(d) Solve by triangularization method, the following system.

$$x + 5y + z = 14$$

$$2x + y + 3z = 13$$

$$3x + y + 4z = 17$$ 7

Unit - III

3. (a) State and explain Forward and Backward difference. 2

(b) Find y (8) from the following table : 7

x :	0	5	10	15	20	25
y :	7	11	14	18	24	32

(c) Given the value : 7

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

evaluate $f(9)$ using Lagrange's formula.

(d) Using Newton's divide difference formula, evaluate $f(8)$ and $f(15)$ given 7

x	4	5	7	10	11	13
$y - f(x)$	48	100	294	900	1210	2028

Unit - IV

4. (a) State and explain trapozoidal rule for integration. 2

(b) Find the first and second derivative of $f(x)$ at $x = 1{\cdot}5$ if 7

x	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$	3·375	7·000	13·625	24·00	38·875	59·000

(c) The velocity v (km/mm) of a moped which starts from rest, is given at fixed intervals of time t (mm) as follows :

t :	2	4	6	8	10	12	14	16	18	20
v :	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes. 7

(d) Evaluate $\int_{-3}^{3} x^4 dx$ by using 7

(i) Trapezoidal Rule

(ii) Simpson's Rule

verify your results by actual integration.

Unit - V

5. (a) State and explain Picard's method. 2

(b) Using modified Euler's method, find an approximate value of y when $x = 0{\cdot}3$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. 7

(c) Find the Taylor's series method, the value of y at $x = 0{\cdot}1$ and $x = 0{\cdot}2$ to five place of decimals from $\frac{dy}{dx} = x^2 y - 1, \quad y(0) = 1$. 7

(d) Using Runge-Kutta method of fourth order solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0{\cdot}2, 0{\cdot}4$. 7