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Roll No. :

322451(14)

B. E. (Fourth Semester) Examination April-May 2021

(New Scheme)

(CSE Branch)

COMPUTATIONAL MATHEMATICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory and carries 2 marks. Attempt any two parts from (b), (c) and (d) which carry 7 marks each.

Unit - I

1. (a) Write the general formula for secant method.
- (b) Using Newton-Raphson method find the real root of the equation $x^2 - 5x + 2 = 0$ correct to four decimal places.

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(c) Find a real root of the equation $x^3 - 11x^2 + 32x - 22 = 0$ by Birge-Vieta method using the initial approximation $p = 0.5$.

(d) Find the real root of the equation $xe^x - 2 = 0$ by the method of Regula-Falsi.

Unit - II

2. (a) State the condition for convergence of Gauss-Seidel method.

(b) Apply Crout's triangularization method to solve the equations :

$$3x + 2y + 7z = 4;$$

$$2x + 3y + z = 5;$$

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

(c) Use relaxation method to solve the system of equations :

$$12x + y + z = 31$$

$$2x + 8y - z = 24$$

$$3x + 4y - 10z = 58$$

(d) Use Gauss Seidel iteration method to solve the

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system of equations.

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

$$27x + 6y + z = 85$$

Unit - III

3. (a) Write the Bessel's formula.

(b) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 52^\circ$, using Newton's interpolation formula.

(c) Given $\tan 0^\circ = 0$, $\tan 5^\circ = 0.0875$, $\tan 10^\circ = 0.1763$, $\tan 15^\circ = 0.2679$, $\tan 20^\circ = 0.3640$, $\tan 25^\circ = 0.4663$, $\tan 30^\circ = 0.5774$. Using Stirling's formula, show that $\tan 16^\circ = 0.2867$.

(d) Using Newton's divided difference formula, find the values of $f(8)$ and $f(15)$ given :

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

Unit - IV

4. (a) Define Quadrature formula.

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- (b) Find the first and second derivatives of the function tabulated below, at the point $x = 1.5$.

x	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$	3.375	7.000	13.625	24.000	38.875	59.006

- (c) A river is 80 meter wide. The depth ' d ' in metres at a distance x metres from one bank is given by the following table.

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

Find the approximate area of cross-section of the river.

- (d) Using Simpson's 1/3rd rule evaluate $\int_0^1 \frac{dx}{1+x^2}$ and also find the approximate value of π .

Unit - V

5. (a) Explain Picard's method.
- (b) Using Runge-Kutta method find the value of y at $x = 0.1$ given $\frac{dy}{dx} = 3x + y^2$ and $y(0) = 1$.
- (c) Using Adam-Bashforth formula determine $y(0.4)$.

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Given the differential equation $\frac{dy}{dx} = \frac{1}{2}xy$ and the

data :

x	0	0.1	0.2	0.3
y	1	1.01	1.022	1.023

- (d) Apply Euler's method to find $y(0.4)$ from the

differential equation $\frac{dy}{dx} = xy$, and $y(0) = 1$. Take

for each step $h = 0.1$.