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

(New Scheme)

(IT Engg. Branch)

COMPUTATIONAL MATHEMATICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory carries 2 marks. Answer any* ***two*** *question from (b), (c) and (d) from each unit carries 7 marks.*

Unit-I

1. (a) Bisection method is also known as 2

(b) Find the root of the equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position. 7

(c) Using Newton's iterative method, find the real root of $x \log_{10} x = 1 \cdot 2$ correct to five decimal places. 7

(d) Perform two iterations by Birge-Vieta method and find the smallest positive root of the equation, $x^4 - 3x^3 + 3x^2 - 3x + 2 = 0$, using initial approximation $P_0 = 0 \cdot 5$. 7

Unit-II

2. (a) Write about Gauss Elimination method. 2

(b) Apply Gauss-Jordan method and solve the system of equation : 7

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$x + y + 5z = 7$$

(c) Solve the following system of equations by the method of Crout's Triangularisation : 7

$$x + 5y + z = 14$$
$$2x + y + 3z = 13$$
$$3x + y + 4z = 17.$$

(d) Solve by using relaxation method the following systems : 7

$$9x - 2y + z = 50$$
$$x + 5y - 3z = 18$$
$$-2x - 2y + 7z = 19.$$

Unit-III

3. (a) Write the stirling's formula. 2

(b) Find the value of y at $x = 21$ and $x = 28$ from the following table using the Netwton's forward and Newton's backward formula : 7

x :	20	23	26	29
y :	0·3420	0·3907	0·4384	0·4848

(c) Given the values

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

Evaluate $f(9)$ using Lagrange's interpolation formula. 7

(d) Given the following table find $y(35)$ by using Bessel's formula : 7

x	:	20	30	40	50
y	:	512	439	346	243

Unit-IV

4. (a) Write the formula for Simpson's 3/8 Rule. 2

(b) Given that :

x	:	1·0	1·1	1·2	1·3	1·4	1·5	1·6
y	:	7·989	8·403	8·781	9·129	9·451	9·750	10·031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at (i) $x = 1·1$ (ii) $x = 1·6$. 7

(c) A slider in a machine moves along a fixed straight rod. Its distance x cm along the rod is given below for various values for the time t seconds. Find the velocity and acceleration of the slider, when $t = 0·3$ second. 7

x	:	0	1·0	0·2	0·3	0·4	0·5	0·6
y	:	30·13	31·62	32·87	33·64	33·95	33·81	33·24

(d) Calculate the approximate value of $\int_0^{\pi/2} \sin x \, dx$ by (i) Trapezoidal Rule (ii) Simpson's $\frac{1}{3}rd$ Rule; using 11 ordinates. 7

Unit-V

5. (a) Write the formula for Taylor's series method. 2

(b) Sole by Euler's method the following differential equation for $x = 0·1$ correct to four decimal places. $\frac{dy}{dx} = \frac{y - x}{y + x}$, with the initial condition $g(0) = 1$. 7

(c) Using Runge-Kutta method to find y when $x = 1·2$ in step of 0·1 given that

$$\frac{dy}{dx} = x^2 + y^2, \; y(1) = 1·5$$ 7

(d) Given $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$ and the starting values $y(0·1) = 0·90516$, $y(0·2) = 0·82127$, $y(0·3) = 0·74918$, evaluate $y(0·4)$ using Adams-Bash-forth method. 7