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322411(14)

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

(Old Scheme)

(CSE, IT Branch)

COMPUTATIONAL MATHEMATICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of each question is compulsory and carrying 2 marks. Solve any other* ***two*** *parts from each unit carrying 7 marks.*

Unit-I

1. (a) The order of convergence in Newton-Raphson method is :

(i) 2

(ii) 3

(iii) 0

(iv) None.

(b) Find a positive real root of $x \log_{10} x = 1 \cdot 2$ using the bisection method. 7

(c) Find a real root of the equation $x^2 - 2x - 5 = 0$ by the method of false position correct to three decimal places. 7

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

Unit-II

2. (a) By Gauss eliminition method, solve $x + y = 2$ and $2x + 3y = 5$. 2

(b) Apply Gauss-Jordan method to solve the equations :

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$ 7

(c) Apply Gauss-Seidal iteration method to solve the equations :

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$ 7

(d) Solve the equation :

$$10x - 2y - 3z = 205$$
$$-2x + 10y - 2z = 154$$
$$-2x - y + 10z = 120$$

by Relaxation method. 7

Unit-III

3. (a) Newton's backward interpolation formula is 2

(b) From the following table, estimate the number of students who obtained marks between 40 and 45 : 7

Marks :	30-40	40-50	50-60	60-70	70-80
No. of Students :	31	42	51	35	31

(c) Apply Bessel's formula to obtain y_{25}, given

$y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$ 7

(d) Given the values

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

evaluate $f(9)$, using Newton's divided difference formula. 7

Unit-IV

4. (a) Simpson's $\frac{3}{8}$ th rule states that 2

(b) The following data gives the velocity of a particle far 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data : 7

Time t (sec) :	0	5	10	15	20
Velocity v (m/sec) :	0	3	14	69	228

(c) Evaluate the integral $\int_0^1 \frac{x^2}{1+x^3}\,dx$ using Simpson's 1/3 rd rule. Compare the error with the exact value $\log 2^{1/3}$. 7

(d) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2}\,dx$ taking the number 10 intervals. 7

Unit-V

5. (a) Runge-Kutta method is a self-starting method. 2
(True or False)

(b) Find by Taylor's series method, the values of y at $x = 0{\cdot}1$ and $x = 0{\cdot}2$ to five places of decimals from $dy/dx = x^2y - 1,\ y(0) = 1$. 7

(c) Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0{\cdot}2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. 7

(d) Given

$\frac{dy}{dx} = x^2(1+y)$ and $y(1) = 1,\ y(1{\cdot}1) = 1{\cdot}233,$

$y(1{\cdot}2) = 1{\cdot}548,\ y(1{\cdot}3) = 1{\cdot}979,$

evaluate $y(1{\cdot}4)$ by Adams-Bashforth method. 7