(b) Solve

$$y' = y - x^2, \; y(0) = 1$$

by Picard's method upto third approximation. Hence, find y(0·1).

(10 + 10)

6. Apply the fourth order Runge - Kutta method to find y(0·1) and y(0·2) given that

$$y' = x + y, \; y(0) = 1. \qquad (20)$$

7. (a) Solve the difference equation

$$4y_{n+2} - 4y_{n+1} + y_n = 2^n + 2^{-n}.$$

(b) Fit a straight line to the data given below :

x :	0	5	10	15	20	25
y :	12	15	17	22	24	30

8. (a) Classify the equations

(i) $u_{xx} - 4u_{xy} + 4u_{yy} = 0.$

(ii) $u_{xx} + u_{yy} = 0.$

Register Number :

Name of the Candidate :

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B.Sc. DEGREE EXAMINATION, 2008

(COMPUTER SCIENCE)

(FIRST YEAR)

(PART - III)

(PAPER - II)

130 / 140 / 530 / 541. SCIENTIFIC COMPUTING

(Common to New and Revised Regulations B.Sc. Information Technology - New and Revised Regulations B.C.A. Revised Regulations)

December] [Time : 3 Hours

Maximum : 100 Marks

Answer any FIVE questions.
All questions carry equal marks.

1. (a) Find a root of the equation

$$x^3 - 9x + 1 = 0$$

by bisection method.

Turn over

(b) Find an approximate root of

$$x \log_{10} x = 1{\cdot}2$$

by false position method. (10 + 10)

2. (a) Find the root of the equation which lies between 0 and 1 of the equation

$$x^3 = 6x - 4$$

by Newton - Raphson method.

(b) Solve the system of equation by Gauss - elimination method

$$3x + 4y + 5z = 18$$

$$2x - y + 8z = 13$$

$$5x - 2y + 7z = 20 \qquad (10 + 10)$$

3. (a) Using Lagrange's formula of interpolation, find y(9·5) given :

x :	7	8	9	10
y :	3	1	1	9

(b) Evaluate

$$\int_0^1 \frac{dx}{1 + x^2}$$

using Simpson's rule. (10 + 10)

4. (a) Find f′(2) from the following table :

x :	2	4	6	8	10
f(x) :	105	42·7	25·3	16·7	13·0

(b) From the following table, find f(12) by using Stirling's formula :

x :	5	10	15	20
f(x) :	54·14	60·54	67·72	75·88

(10 + 10)

5. (a) Using Taylor series method, compute y(0·2) correct to 4 decimal places given that

$$\frac{dy}{dx} = 1 - 2xy \text{ and } y(0) = 0.$$

(b) Solve :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

in $0 \leq x \leq 4$; $0 \leq y \leq 4$,

given that

$u(0, y) = 0$,

$u(4, y) = 8 + 2y$,

$u(x, 0) = \frac{x^2}{2}$,

$u(x, 4) = x^2$

with $\Delta x = \Delta y = 1$. (5 + 15)

5

(b) Solve :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

in $0 \leq x \leq 4$; $0 \leq y \leq 4$,

given that

$u(0, y) = 0$,

$u(4, y) = 8 + 2y$,

$u(x, 0) = \frac{x^2}{2}$,

$u(x, 4) = x^2$

with $\Delta x = \Delta y = 1$. (5 + 15)

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