

Register Number :

Name of the Candidate :

1 2 6 9

B.Sc. DEGREE EXAMINATION, 2010

(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)]

May]

[Time : 3 Hours

Maximum : 100 Marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. (a) Solve the equation

$$x^3 + x^2 - 1 = 0$$

for the positive root by iteration method.

Turn over

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(b) Find an approximate root of

$$x \log_{10} x = 1.2.$$

by false position method. (10 + 10)

2. (a) Find the real positive root of

$$3x - \cos x - 1 = 0$$

by Newton - Raphson method correct to 6 decimal places.

(b) By Gauss - elimination method, solve the system

$$3.15x - 1.96y + 3.85z = 12.95$$

$$2.13x + 5.12y - 2.89z = -8.61$$

$$5.92x + 3.05y + 2.15z = 6.88.$$

(10 + 10)

3. (a) Evaluate

$$\int_0^{\pi/2} \sin x \, dx$$

by Simpson's $\frac{1}{3}$ rule dividing the range into six equal parts.

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8. (a) Classify the equations

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

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

(b) Solve :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 8x^2 y^2$$

in the square mesh given $u = 0$ on the four boundaries dividing the square into 16 sub-squares of length 1 unit.

(5 + 15)

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5. (a) Using Taylor series method, find $y(1.1)$ and $y(1.2)$ correct to four decimal places given.

$$\frac{dy}{dx} = xy^{1/3} \text{ and } y(1) = 1.$$

- (b) Find the value of $y(0.1)$ by Picard's method given

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

(10 + 10)

6. Apply the fourth order Runge - Kutta method to find $y(0.1)$ and $y(0.2)$ given that

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

7. (a) Solve:

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

- (b) Fit a curve of the form

$$y = ax^2 + bx + c$$

for the data given below :

x:	10	20	30	40	50	60
y:	4.5	7.1	10.5	15.5	20.5	27.1

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- (b) Construct Newton's forward interpolation polynomial for the following data :

x:	4	6	8	10
y:	1	3	8	16

use it to find the value of y for $x = 5$.
(10 + 10)

4. (a) Using Stirling's formula, compute y_{35} , given that

$$y_{10} = 600 ;$$

$$y_{20} = 512 ;$$

$$y_{30} = 439 ;$$

$$y_{40} = 346 ;$$

$$y_{50} = 243.$$

- (b) Find a polynomial of degree four which takes the values :

x:	2	4	6	8	10
y:	0	0	1	0	0

(10 + 10)

Turn over