Reg. No. : | | | | | | | | | | | |

Question Paper Code : Z 8427

B.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Third Semester

Computer Technology

BCS 232 — NUMERICAL METHODS

(Common to B.Sc. Information Technology)

(Regulation 2003)

Time : Three hours Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. State iterative formula for Regula Falsi method to solve $f(x) = 0$.

2. Find Newton Raphson formula to solve $\sqrt{N}$, where N is a positive integer.

3. State the condition for convergence of Gauss–Jacobi iteration method.

4. Solve : $x + y = 3$; $x - y = 1$ by Gauss Seidel method.

5. State Gregory – Newton backward formula for interpolation.

6. Find a polynomial for the following data using Newton's forward interpolation formula

x :	2	4	6
$f(x)$:	12	22	32

7. Form the divided difference table for the following data :

x :	0	1	2	4
$f(x)$:	443	384	397	467

8. In order to evaluate $\int_{x_0}^{x_n} y\,dx$ by Simpson's $\frac{1}{3}$ rule as well as $\frac{3}{8}$ rule, what is the restriction on the number of intervals?

9. Solve : $\frac{dy}{dx} = 1 - y$; $y(0) = 1$ to find $y(0.01)$ using Taylor's series method.

10. Write the Runge – Kutta fourth order algorithm to solve $\frac{dy}{dx} = f(x, y)$; with $y(x_0) = y_0$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the positive root of $x^3 - 9x + 1 = 0$, correct to four decimal places by Bisection method in the interval (2, 4). (8)

(ii) Solve the equation $x^3 - 4x + 1 = 0$, by Regula Falsi method for its positive root that lies between 0 and 1. (8)

Or

(b) (i) Using Newton's method find the root of $2x^3 - 3x - 6 = 0$ correct to 4 decimal places that lies between 1 and 2. (8)

(ii) Solve the equation $x^3 + x^2 - 1 = 0$ for positive root by iteration method. (8)

12. (a) (i) Using Gaussian method solve the following system of equations

$3x + 4y + 5z = 18$; $2x - y + 8z = 13$; $5x - 2y + 7z = 20$. (8)

(ii) Solve the following system of equations by Gauss Jacobi method

$x + y + 54z = 110$; $2x + 4y + z = 4$; $x + 3y + 3z = 5$. (8)

Or

(b) (i) Solve the following system of equations by triangularisation method

$x + 5y + z = 14$; $2x + 3y - z = 85$; $6x + 18y + 2z = 72$. (8)

(ii) Solve the following system of equations by Gauss Seidal method

$10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$; $x + 6y + 10z = -3$. (8)

13. (a) (i) Find the value of $y(21)$ from the following data (8)

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	.4848

(ii) Using Lagrange's formula for interpolation find $y(10)$ given : (8)

x :	5	6	9	11
y :	12	13	14	16

Or

(b) (i) From the following table of half yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 46 and 63. (8)

Age X :	45	50	55	60	65
Premium Y :	114.84	96.16	83.32	74.48	68.48

(ii) Using Stirling's Formula find $y(35)$ for the following data (8)

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

14. (a) (i) Given that (10)

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.437	9.750	[illegible]

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.6$.

(ii) Evaluate $\int_{-3}^{3} x^4 dx$, by using Trapezoidal rule taking $h = 1$. (6)

Or

(b) (i) The following data gives the velocity of the particle for 2 seconds at an interval of 5 seconds. Find the acceleration at 5 seconds. (8)

Time :	0	[illegible]	10	15	20
Velocity :	[illegible]	3	14	69	228

(ii) Compute $\int_{0}^{6} \frac{dx}{1+x^2}$ using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule. (8)

15. (a) (i) Solve the equation $y' = x + y$; $y(0) = 1$; for $x = 0.0$ to 1.0 with $h = 0.2$ using Euler method. (6)

(ii) Find the value of $y(0.3)$ corrected to 4 decimals using Runge–Kutta method of fourth order with $h = 0.1$ given that $\frac{dy}{dx} + y + xy^2 = 0$; $y(0) = 1$. (10)

Or

(b) (i) Using Taylor series method find (8)

$y(1.1)$ and $y(1.2)$ given $\frac{dy}{dx} = xy^{\frac{1}{3}}$; $y(1) = 1$ correct to four decimal places.

(ii) Using finite difference method solve

$y'' = y$ in $(0, 2)$ given $y(0) = 0$; $y(2) = 3.63$ by subdividing the range of x in to 4 equal parts. (8)
