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Question Paper Code : 95389

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Computer Technology

XCS 232/10677 SW 302 — NUMERICAL METHODS

(Common to 5 Year M.Sc. Information Tech. & 5 Year M.Sc. Software Engineering)

(Regulations 2003/2007/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the basic principle of bisection method.

2. State the order of convergence of an iterative process.

3. By Gauss-Elimination method, solve $x + y = 2$, $2x + 3y = 5$.

4. Compare Gauss Jacobi and Gauss-Seidal methods.

5. Can you use Lagrange's interpolation formula when the intervals are equal?

6. State Stirling's formula for interpolation.

7. State the Newton's Backward difference formula to compute $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at the tabulated value $x = x_n$.

8. State the formula for numerical integration by Simpson's $\frac{3}{8}$ th rule.

9. Derive Taylor's series formula in solving $\frac{dy}{dx} = f(x, y)$ with the initial condition $y(x_0) = y_0$.

10. Compare Taylor's series method and Runge-Kutta method.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Find a real root of the equation $\cos x = 3x - 1$ correct to 3 decimal places by using iteration method. (8)

(ii) Find cube root of 24, by Newton's method. (8)

Or

(b) (i) Find a root of the equation $x^3 - 4x - 9 = 0$ correct to 3 decimal places by using the bisection method. (8)

(ii) Solve the equation $2x - 3\sin x = 5$ for a positive root by the method of false position. (8)

12. (a) By the method of transularization solve $5x - 2y + z = 4$, $7x + y - 5z = 8$ and $3x + 7y + 4z = 10$. (16)

Or

(b) (i) By Gauss-Jordan method, find the solution of $10x + y + z = 12$, $2x + 10 + z = 13$, $x + y + 5z = 7$. (8)

(ii) Using Gauss-Seidal method, solve $4x + 2y + z = 14$, $x + 5y - z = 10$ and $x + y + 8z = 20$. (8)

13. (a) (i) Find the values of y at $x = 21$ and $x = 28$ from the following data using Newton's formula. (8)

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	0.4848

(ii) Using Newton's divided difference formula, find the value of $f(8)$ from the following table : (8)

x :	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028

Or

(b) (i) Using Lagrange's method, find $f(6)$ given (8)

x :	2	5	7	10	12
$f(x)$:	18	180	448	1210	2028

(ii) Find $y(1.22)$ from the following table, using Stirling's formula. (8)

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
y :	0.8415	0.8912	0.9320	0.9636	0.9855	0.9975	0.9996	0.9939	0.9739

14. (a) (i) Given the following data, find $y'(6)$ (8)

x :	0	2	3	4	7	9
y :	4	26	58	112	466	922

(ii) By dividing the range into ten equal parts, evaluate $\int_0^{\pi} \sin x \, dx$ by Trapezoidal and Simpson's rule. (8)

Or

(b) (i) The table given below reveals the velocity v of a body during the time t specified. Find its acceleration at $t = 1.1$ (8)

t :	1.0	1.1	1.2	1.3	1.4
v :	43.1	47.7	52.1	56.4	60.8

(ii) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Trapezoidal rule and Simpson's 1/3 rule, by dividing into 6 equal parts. (8)

15. (a) (i) Using Taylor series method, find y at $x = 0.1$ if $y' = 2y + 3e^x$, $y(0) = 0$. (8)

(ii) Solve $y' = \frac{y-x}{y+x}$, $y(0) = 1$ at $x = 0.1$ by Runge Kutta method. (8)

Or

(b) (i) Using Euler's method, find $y(0.2)$, $y(0.4)$, $y(0.6)$, $y(0.8)$ and $y(1)$ if $y' = x + y$, $y(0) = 0$. (8)

(ii) Solve $y'' = xy$, $y(0) = -1$, $y(1) = 2$, by finite difference method, dividing the interval into four equal parts. (8)
