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Question Paper Code : 45879

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Third Semester

Software Engineering

XCS 232/10677 SW 302 — NUMERICAL METHODS

(Common to 5 Year M.Sc. Information Technology and M.Sc. Computer Technology)

(Regulation 2003/2010)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. State both the condition and order of convergence of fixed point iterative method.

2. Find a formula for $\sqrt{N}$ using Newton's method.

3. Write a short note on triangularisation method.

4. Distinguish between direct and iterative methods.

5. Compare Newton's and Lagrange's formulae.

6. Write down Stirling's formula.

7. Specify the condition of using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules.

8. Find the area of the curve passing through the points (0,0), (1,2), (2,2.5), (3,2.3), (4,2), (5,1.7), (6,1.5) and bounded by X-axis.

9. List the merits of Taylor series method.

10. Using Euler's method find $y(0.1)$, if $y' = x^2 + y^2, y(0) = 1$.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Find the least positive real root of $x^3 - 2x - 5 = 0$, using the method of bisection. (8)

(ii) Find the least positive real root of $3x - \cos x = 1$, using Newton's method. (8)

Or

(b) (i) Find the least positive real root of $x.\log x = 1.2$, using the method of false position. (8)

(ii) Find the least positive real root of $x^3 + x^2 - 100 = 0$, using fixed point iterative method. (8)

12. (a) (i) Using Gauss elimination method, solve : (8)

$2x + y + 4z = 12$, $8x - 3y + 2z = 20$, $4x + 11y - z = 33$.

(ii) Solve the following equations by Gauss – Jacobi method : (8)

$30x - 2y + 3z = 75$, $x + y + 9z = 15$, $x + 17y - 2z = 48$.

Or

(b) (i) By Gauss–Jordan method, solve : (8)

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

(ii) Solve the following equations by Gauss–Seidal method : (8)

$x + y + 54z = 110$, $6x + 15y + 2z = 72$, $27x + 6y - z = 85$.

13. (a) (i) Find $y(22)$ using Newton's forward difference method given that (8)

x :	20	25	30	35	40	45
$y(x)$	354	332	291	260	231	204

(ii) Interpolate $y(10)$, if $y(5) = 12$, $y(6) = 13$, $y(9) = 14$ and $y(11) = 16$, Using Lagrange's method. (8)

Or

(b) (i) Compute $y(38)$ from

x :	0	10	20	30	40
$y(x)$	0	0.1736	0.3420	0.5	0.6428

Using Newton's backward difference method. (8)

(ii) Interpolate $y(8)$ from

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

Using Newton's divided difference method. (8)

14. (a) (i) Find $y'(5)$ and $y''(5)$ from

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

Using Lagrange's method. (8)

(ii) Evaluate $\int_0^{\pi} \sin x dx$, using trapezoidal and Simpson's $\frac{1}{3}$ rules dividing the range into 10 equal parts. (8)

Or

(b) (i) Find $y'(1.5)$ and $y''(1.5)$ if

x:	1.5	2	2.5	3	3.5	4
$y(x)$	3.75	7	13.625	24	38.875	59

Using Newton's forward difference method. (8)

(ii) Evaluate $\int_{-3}^{3} x^4 dx$, using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules.

15. (a) (i) By Taylor series method, find y at $x = 0.1$, 0.2 and 0.3, if $y' = x^2 + y^2$, $y(0) = 1$.

(ii) Solve $y'' + y + 1 = 0$, $y(0) = 0 = y(1)$, by finite difference method for $h = 0.25$.

Or

(b) (i) By Runge-Kutta method find y at $x = 0.1$, 0.2 and 0.3 if $y' = x + y$, $y(0) = 1$

(ii) Solve $y'' - 64y + 10 = 0$, $y(0) = 0 = y(1)$, by finite difference method for $h = 0.25$.