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

Question Paper Code : 75468

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Third Semester

Software Engineering

EMA 004 – NUMERICAL METHODS

(Regulation 2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the fundamental theorem to locate the real root of an equation.
2. What is the demerits of Bisection method?
3. Write the condition for applying Gauss Seidel method to solve the system of linear equations.
4. What is partial pivoting?
5. What is interpolation?
6. Write the properties of divided difference.
7. Write the Newton's forward difference formula for $\frac{dy}{dx}$ at $x = x_0$.
8. State Simpson's 3/8 rule for numerical integration.
9. Write the disadvantage of Taylor's method.
10. Using Euler'e method, solve the equation $\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}, y(1) = 1$ at $x = 1.1$.

PART B — (5 × 16 = 80 marks)

11. (a) Determine the root of the equation $xe^x = 3$ using method of False position correct to four decimal places. (16)

Or

(b) Find the root of the equation $\sin x = 1 + x^3$ between (–2, –1) by Newton's method correct to 4 decimal places. (16)

12. (a) Solve the system by Gauss Jordan method (16)

$2x + y + 4z = 12$

$8x - 3y + 2z = 20$

$4x + 11y - z = 33$

Or

(b) Using Gauss-Jacobi method, solve the system correct to three decimal places

$x + 17y - 2z = 48$

$30x - 2y + 3z = 75$ (16)

$x + y + 9z = 15$

13. (a) Apply Lagrange's interpolation formula to find $f(5)$ and $f(6)$ given that $f(1) = 2,\ f(2) = 4,\ f(3) = 8,\ f(4) = 16,\ f(5) = 128$. (16)

Or

(b) From the following table, determine the value of $f(x)$ at $x = 0.23, 0.29$ (16)

x:	0.20	0.22	0.24	0.26	0.28	0.30
$f(x)$:	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

14. (a) From the table, find the value of $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x = 0.8$. (16)

x:	0	0.2	0.4	0.6	0.8	1.0
y:	0	0.12	0.49	1.12	2.02	3.20

Or

(b) Evaluate $\int_0^1 e^{-x^2} dx$ by dividing the range of integration into 10 equal parts using Trapezoidal rule and Simpson's rule. (16)

15. (a) Apply Runge-Kutta method of fourth order to find the value of y at $x = 0.1$ given that $\frac{dy}{dx} = 3x + \frac{y}{2},\ y(0) = 1$. (16)

Or

(b) Solve the equation $y'' + y + 1 = 0$ with $y(0) = 0,\ y(1) = 0$ using Finite difference method by dividing the interval into four sub intervals. (16)
