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

Question Paper Code : 65109

5 Year M.Sc. DEGREE EXAMINATION, MAY/JUNE 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. Write the formula for bisection method.

2. What is the criterion for the convergence in Newton – Raphson method?

3. What is basic principle involved in triangularisation method?

4. By Gauss elimination method solve : $x + y = 2$; $2x + 3y = 5$.

5. State Lagrange's formula to find $y(x)$ if three sets of values (x_0, y_0), (x_1, x_2) are given.

6. State any two properties of divided differences.

7. What is the order of error in Simpson's rule?

8. State Trapezoidal rule to evaluate $\int_{x_0}^{x_n} f(x)dx$.

9. Find $y(0.1)$ by Euler's method, given $\frac{dy}{dx} = 1 - y$ $y(0) = 0$.

10. Define Initial and boundary value problem.

PART B — (5 × 16 = 80 marks)

11. (a) Find a real root of the equation $x^3 - 3x + 1 = 0$ lying between 1 and 2 correct to three places of decimals by using bisection method.

Or

(b) Find a root of the equation $x^3 - 3x - 5 = 0$ by the method of false position.

12. (a) Solve the following system of equation by Gauss Jordan method :

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

Or

(b) Solve the following system of equations using Gauss Seidel iteration method :

$$10x + 2y + z = 9$$
$$x + 10y - z = -22$$
$$-2x + 3y + 10z = 22$$

13. (a) Using Newton's divided difference formula evaluate $f(8)$ given that

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

Or

(b) Use Lagrange's formula to find the value of y at $x = 6$ from the data :

x :	3	7	9	10
y :	168	120	72	63

14. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$. Hence determine the value of π.

Or

(b) Evaluate $\int_0^1 \frac{dx}{1+x}$, using Simpson's $\frac{1}{3}$ and $\frac{3^{th}}{8}$ rule.

15. (a) Using Taylor's method, find $y(0.1)$ correct to 3 decimal places from $\frac{dy}{dx} + 2xy = 1$, $y_0 = 0$.

Or

(b) Use Runge-Kutta method of fourth order find $y(0.1)$, $y(0.2)$ and $y(0.3)$, given that $\frac{dy}{dx} = 1 + xy$; $y(0) = 2$.
