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B – 3438

Reg. No. : ....

Name : ....

Seventh Semester B.Tech. Degree Examination, December 2016
(2013 Scheme)
13.705.8 : ADVANCED COMPUTATIONAL METHODS (C) (Elective – II)

Time : 3 Hours | Max. Marks : 100

Instruction : *Answer **all** questions in Part **A** and **any one** question from **each** Module in Part **B**.*

PART – A

1. Describe the methodology adopted in Cholesky's factorization.

2. Discuss spline interpolation and its merits.

3. Explain Taylor series method.

4. Write short note on Milne's predictor-corrector method.

5. List out the various weighted residual methods and explain any one method in detail. **(5×4=20 Marks)**

PART – B

Module – I

6. Solve by Gauss Elimination method :

$x_1 + 4x_2 - 3x_3 + x_4 = 7$

$5x_1 - 2x_2 + x_3 - x_4 = 5$

$x_1 - 3x_4 = -10$

$x_1 + x_2 + 7x_3 - 2x_4 = 2$ **20**

OR

7. Solve by Newton-Raphson method :

$x^3 - 3xy^2 + 3 = 100$

$3x^2y - y^3 = 0$

Given $(x_0, y_0) = (1, 1)$. **20**

P.T.O.

Module – II

8. A simply supported beam carries concentrated load P at its midpoint. Corresponding to various values of P the maximum deflection Y is measured and the data are given below :

P :	100	120	140	160	180	200
Y :	0.45	0.55	0.60	0.70	0.80	0.85

Find the equation of the form Y = a + bP. **20**

OR

9. Use Langrange's interpolation formula to calculate Y(3) from the following table.

X :	0	1	2	4	5	6
Y :	1	14	15	5	6	19

20

Module – III

10. Find y(0.1), y(0.2) given dy/dx = x – 2y, y(0) = 1 taking h = 0.1 using 4th order Runge-Kutta method. **20**

OR

11. Solve the boundary value problem :

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{3x},\ y(0) = 0,\ y(1) = -2,\ \text{Take } h = 1/4.$$ **20**

Module – IV

12. Solve the elliptic equation $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units satisfying the following boundary conditions u (0, y) = 0 for $0 \le y \le 4$, u (4, y) = 12 + y for $0 \le y \le 4$; u (x, 0) = 3x for $0 \le x \le 4$, u (x, 4) = x^2 for $0 \le x \le 4$. **20**

OR

13. Solve $u_t = u_{xx}$ in $0 \le x \le 4$, $t \ge 0$ given that u (x, 0) = 20, u(0, t) = 0,

u (5, t) = 100. Compute u for the time step with h = 1 by Crank-Nicholson method. **20**
