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D – 1513

Reg. No. : ....

Name : ....

Seventh Semester B.Tech. Degree Examination, November 2017
(2013 Scheme)
13.705.8 : ADVANCED COMPUTATIONAL METHODS (C) (Elective – II)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions.

1. Explain with example ill conditioned system of equations.
2. Explain a numerical method to evaluate all eigen values and eigen vectors of a given matrix.
3. Explain Hermitian interpolation.
4. Explain Milne's predictor corrector method.
5. Explain the principle of weighted residual methods. **(5×4=20 Marks)**

PART – B

Answer **one full** question from **each** Module.

Module – 1

6. Solve by Choleski's method $\begin{bmatrix} 1 & -1 & 1 & -2 \\ 2 & -1 & 2 & 1 \\ -1 & 1 & 2 & -1 \\ 1 & 2 & 4 & 1 \end{bmatrix} \begin{Bmatrix} x \\ y \\ z \\ w \end{Bmatrix} = \begin{Bmatrix} 8 \\ 5 \\ 4 \\ 5 \end{Bmatrix}$. **20**

7. Find the largest eigen value and eigen vector of the given matrix using power method.

$$[A] = \begin{bmatrix} 2 & 2 & -1 & 1 \\ 4 & 3 & -1 & 2 \\ 8 & 5 & -3 & 4 \\ 3 & 3 & -2 & 2 \end{bmatrix}.$$ **20**

P.T.O.

Module – 2

8. a) Fit a curve of the form $y = ae^{bx}$ to the following data : **10**

x :	0.4	0.8	1.2	1.6	2.0	2.4
y :	75	100	140	200	270	375

b) Using Lagrange interpolation, find the value of f(0.25). **10**

x :	0.20	0.22	0.24	0.26	0.28
y :	1.66	1.67	1.68	1.69	1.70

9. Obtain the cubic spline approximation to the given data and hence find y (1.5) and $y''(3)$. **20**

x	1	2	3	4
y	1	2	5	11

Module – 3

10. Solve : **20**

$\frac{dy}{dx} = \frac{y-x}{y+x}$; y (0) = 1. Use Modified Euler method and find y (1) with h = 0.5.

11. Solve $y'' = 9x + 8y$, for $0 < x < 1$;

y (0) = 1, y (1) = 2; h = 0.20; use finite difference method. **20**

Module – 4

12. Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$ using Crank Nicolson method, with $\Delta x = 0.25$, for two steps $\Delta t = 0.01$ and 0.02. Given, u(0, t) = u(1, t) = 200 t; u(x, 0) = 0. **20**

13. Using Galerkine's method solve the boundary value problem **20**

$u'' + (1 + x^2)\, u + 1 = 0;\ u(\pm 1) = 0$

Determine the coefficients of the approximate solution function.

$u(x) = a_1 (1 - x^2) + a_2 x^2 (1 - x^2)$.
