

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2018
Branch: Civil Engineering

Stream: Structural Engineering

01CE6101 Advanced Numerical Methods

Answer *any two full* questions from *each part*

Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

PART A

1. a. Discuss the significance of pivoting in the solution of systems of linear algebraic equations 2

- b. Solve the following system of equations by Gauss elimination 7

$$\begin{aligned} 2x + y + z &= 10 \\ 3x + 2y + 3z &= 18 \\ x + 4y + 9z &= 16 \end{aligned}$$

2. a. Explain one method for solution of non linear equations 2

- b. Solve using Gauss Seidel iteration method 7

$$\begin{aligned} 10x + y + 2z &= 44 \\ 2x + 10y + z &= 51 \\ x + 2y + 10z &= 61 \end{aligned}$$

3. a. Find all eigen values of the matrix by Jacobi's method 9

$$\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & 1 \\ 1 & -1 & 3 \end{bmatrix}$$

PART B

4. a. Fit a curve of the form $y = ae^{bx}$

9

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

5. a. Fit a quadratic spline to the given data

9

x	1	2	3
y	1	1	2

9

6. a. If $dy/dx = xy + y^2$, $y(0) = 1$, find $y(0.3)$ using R-K method, $h=0.1$

PART C

7. a. Explain different approaches of weighted residual method

3

b. $x(d^2y/dx^2) + y = 0$, $y(1) = 1$, $y(2) = 2$, find $y(1.75)$

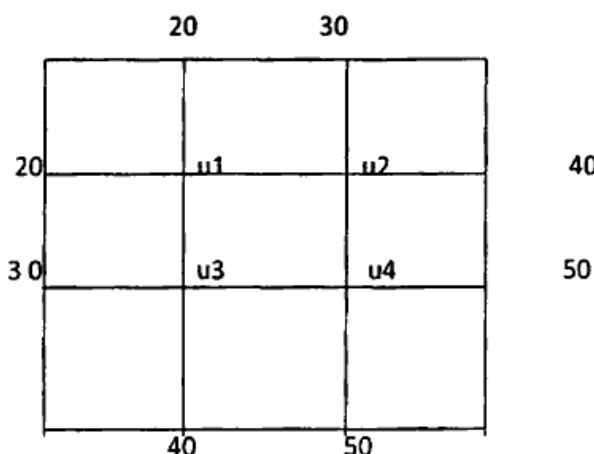
9

8. a. What is a boundary value problem? How is it different from initial value problem

3

b. Solve $u_{xx} + u_{yy} = 0$ for the square mesh with boundary values as shown

9



9. a. Explain the classification of partial differential equations

3

- b. Solve $u_t = u_{xx}$; $u(x, 0) = \sin \pi x$, $u(0, t) = 0$ using C-N method for two time steps. $h = 1/3$, $\alpha = 1/4$

9