MANAV RACHNA vidyanatariksha
MANAV RACHNA UNIVERSITY
(FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING NAAC ACCREDITED 'A' GRADE INSTITUTION)
Declared as State Private University under section 2f of the UGC act, 1956

DEPARTMENT OF MATHEMATICS

"T3 Examination, May 2017-18"

Semester:4th
Subject:ANTC
Branch: ME
Course Type: Core
Time: 3 Hours
Max.Marks: 80

Date of Exam:15/05/2018
Subject Code:MAH309-T
Session: II
Course Nature: Hard
Program: B.Tech
Signature: HOD/Associate HOD:

Note: All questions are compulsory from part A (2*10 = 20 Marks). Attempt any two questions from Part B (15 Marks each). Attempt any two Questions from Part -C (15 Marks each).

PART -A

Q.1 (a) Write steps for the solution of linear equation by Gauss – Elimination method.

(b) Name two methods which falls in the category of Iterative method. Solve $3x + y = 7, x - 2y = 0$ by any one of it.

(c) What is principal of LU Decomposition method.

(d) Jacobi's method is based on the fact that a matrix B is ……………then the eigen value of BAB^T are the……………..same as those of matrix A.

(e) State the difference between Jacobi's method and Given's Method.

(f) Using Euler's method, find approximate value of y when x=0.4 for $\frac{dy}{dx} = 1 - 2xy$ given that y(0) = 0 and h = 0.2.

(g) Formulate classical Runge- Kutta method of order four for the initial value problem

$$\frac{dy}{dx} = f(x, y), y(x_0) = y_0$$

(h) Write any two methods which falls in the category of multiple step for solving an initial value problem of ordinary differential equation.

(i) Classify the partial differential equation: $y^2 \frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial y^2} + 4u = 0$.

(j) The one-dimensional heat conduction equation is……………………….

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PART - B

Q.2 (a) Using LU decomposition, solve the given equations- (10)

$2x - 6y + 8z = 24,\ 5x + 4y - 3z = 2,\ 3x + y + 2z = 16$

(b) Solve the Gauss Elimination method to solve: (5)

$2x + 4y + z = 3,\ 3x + 2y - 2z = -2,\ x - y + z = 6$

Q.3 (a) Solve the following equations by Gauss –Seidal Method: (10)

$10x + y + z = 12,\ 2x + 10y + z = 13,\ 2x + 2y + 10z = 14$

(b) Find the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{matrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{matrix}$ by Power method. (5)

Q.4Define tridiagonal matrix with example. Transform the matrix $A = \begin{matrix} 1 & 2 & 4 \\ 2 & 1 & 2 \\ 4 & 2 & 1 \end{matrix}$ to tridiagonal form by Given's method. (15)

PART -C

Q.5 (a) Solve $\frac{dy}{dx} = (x + y)$ having boundary condition $y(0) = 1$ by using Euler's method at x=1 (in five steps). (10)

(b) Obtain Taylor series for y(x) where $\frac{dy}{dx} = x - y^2, y(0) = 1$. Use it to compute y(0.1) correct to four decimal places. (5)

Q.6 (a) Use Runge-Kutte Method of order 4 to compute y(0.2) & y(0.4) if $\frac{dy}{dx} = \frac{x^2 + y^2}{10}$, h = 0.1 and y(0) = 1 (10)

(b) Solve the Initial value problem $\frac{dy}{dx} = 1 + xy^2, y(0) = 1$ for x=0.4 by using Milne's method, when it is given that (5)

x	0.1	0.2	0.3
y	1.105	1.223	1.355

Q.7. Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides x = 0 = y, x = 3= y with u=0 on the boundary and the mesh length =1. (15)

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