M.Sc. MATHEMATICS
FIRST SEMESTER
NUMERICAL ANALYSIS
MSM – 104 IDMn

SET B

[USE OMR SHEET FOR OBJECTIVE PART]

Duration : 1.30 hrs.   Full Marks : 35

$\boxed{\underline{\textbf{Objective}}}$

Time: 15 min.   Marks: 10

Choose the correct answer from the following: *1X10=10*

1. The Eigen values of a triangular matrix are…..

   a.   0   b.   1

   c.   0 *or* 1   d.   None of these

2. Order of the convergence in Newton-Rephson method is

   a.   2   b.   3

   c.   0   d.   None

3. The pair of equations $3x - 5y = 7$ and $-6x + 10y = 7$ have

   a. a unique solution   b. infinitely many solutions

   c. no solution   d. two solutions

4. Inverse of $\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$ is ………

   a. $\begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$ b. $\begin{bmatrix} 3 & 3 \\ 2 & 2 \end{bmatrix}$

   c. $\begin{bmatrix} 5 & 3 \\ 3 & 5 \end{bmatrix}$ d. None of these

5. The disadvantage of Picard's method is

   a. That can be applied to those equations only in which successive integrations can be performed easily.

   b. That can be applied to those equations only in which successive differentiation can be performed easily.

   c. That can be applied to those equations only in which successively differentials and integrations can be performed easily

   d. None of these

6. The Newton Raphson's fails when

   a. $f'(x)$ is negative   b. $f'(x)$ is too large

   c. $f'(x)$ is zero   d. None

[1]

7. The Crammer's rule fails if
   a. $\Delta = 1$
   b. $\Delta \neq 1$
   c. $\Delta = 0$
   d. None

8. As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called
   a. Gauss- Jordon method
   b. Gauss- Saidal method
   c. Jacobi's methods
   d. None of these

9. The graph of $x = -2$ is a line parallel to the
   a. X-axis
   b. Y- axis
   c. Both axis
   d. None of these

10. The convergence in Gauss -Saidal method is ......than that in Jocobi's method
    a. More Fast
    b. More slow
    c. Slow
    d. Equal

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[2]

Time : 1 hrs. 15 mins.   **Marks : 25**

[Answer question no.1 & any two (2) from the rest]

1. Solve the linear equations by Gauss elimination method   5
$$3x - y + 2z = 12$$
$$x + 2y + 3z = 11$$
$$2x - 2y - z = 2$$

2. a. Solve the linear equations by Gauss –Jordan method   5+5=10
$$2x + 5y + 7z = 52$$
$$2x + y - z = 0$$
$$x + y + z = 9$$
    b. Solve the linear equations by LU method
$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

3. Evaluate the followings by NRM   3+3+4

    a. Calculate the formula to find the real root in the form $\frac{1}{31}$
    b. Calculate the the the formula to find the real root in the form $\sqrt{5}$ is
    c. Calculate the the the formula to find the real root in the form $\frac{1}{\sqrt{14}}$ is

4. a. Using Picard's process of successive approximations, obtain a solution   7+3=10
        up to the 5th approximation of the equation $\frac{dy}{dx} = y + x$, such that $y = 1$
        when $x = 0$. Check your answer by finding the exact particular solution.
    b. Solve $\frac{dy}{dx} = y$, $y(0) = 1$ by Taylors series method. Hence find the values
        of y at x=0.1 and x=0.2

5. a. Solve the difference equation $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$ 4+6=10
    b. Using Euler's method, find an approximate value of y corresponding to
        $x = 1$, given that $\frac{dy}{dx} = y$ and $y = 1$ when $x = 0$

$$= = *** = =$$