ANNAI VIOLET ARTS AND SCIENCE COLLEGE
DEPARTMENT OF PHYSICS

CONTINUOUS INTERNAL ASSESSMENT-I (ODD SEM)

Subject: Numerical Methods

Class: III B.Sc., Physics **Date: 07.09.2022-FN**
Max. Marks: 25 **Sub.Code:-**

PART A (5 × 2 = 10 Marks)
Answer any FIVE questions

1. Define Gauss-Jordan elimination method.
2. Find the inverse of the following matrix $\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$.
3. Define Bisection method.
4. List the two conditions to find the root of a polynomial in Bisection method .
5. Define Regula Falsi method.
6. Derive the equation of first approximation to find a root in Regula Falsi method.
7. Derive Newton- Raphson formula.

PART B – (2× 5 = 10 Marks)
Answer any TWO questions

8. Solve the following system of equations using Gauss Elimination method.
   x+y+z=9; 2x-3y+4z=13; 3x+4y+5z=40
9. Find the inverse of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ using Gauss – Jordan method.
10. Solve for a positive root of $x^3 - 4x + 1 = 0$ by Regula Falsi method.

PART C – (3 × 10 = 30 Marks)
Answer ALL questions

11. Solve the equations 2x+3y+z=9, x+2y+3z=6, 3x+y+2z=8 by the method of triangularisation.
12. Assuming that a root of $x^3 - 9x + 1 = 0$ lies in the interval (2, 4), find that root by Bisection method.
13. Using Newton's method, find the root between 0 & 1 of $x^3 = 6x - 1$ correct to 5 decimal places.

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PART A (5 × 2 = 10 Marks)
Answer any FIVE questions

1. AX=B is brought to a diagonal matrix- **1 mark**

   Making all elements above the diagonal of A as zeros- **1 mark**

2. $|A| = 1$- **1 mark**

   $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$- **1 mark**

3. Intermediate theorem of continuous function – **1 mark**

   It works by narrowing the gap between the positive and negative until it closes in on the correct answer - **1 mark**

4. f(x) is continuous and it can be algebraic or tracendental- **1 mark**

   If f(a) & f(b) are of opposite sign, then atleast one real root between a and b should exist - **1mark.**

5. The Trial and error approach of Using **"False" or "test**" values for the variable and then alternating the test value according to the result. -**2 marks.**

6. Equation of chord - **1 mark**

   $x_1 = \frac{af(b)-bf(a)}{f(b)-f(a)}$ - **1 mark**

7. Expantion of $f(\alpha_0 + h) = 0$ using Tailor's theorem. -**1 mark**

   $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ -**1 mark**

PART B – (2× 5 = 10 Marks)
Answer any TWO questions

8. AX=B -**1mark**

   Steps to make all elements above the diagonal of A as zeros-**3 marks**

x =1, y=3, z=5 - **1 mark**

9. AX=I- **1 mark**

   7 steps- **3 marks**

   Inverse of the matrix- $\begin{bmatrix} 3 & 1 & 3/2 \\ -5/4 & -1/4 & -3/4 \\ -1/4 & -1/4 & -1/4 \end{bmatrix}$ - **1 mark**

10. The root lies between 0 and 1 & another root lies between 1&2 **-0.5 mark**

    $x_1 = \frac{af(b)-bf(a)}{f(b)-f(a)}$ – **0.5 mark**

    5 approximations- **3 marks**

    The root is 0.25410-**1 mark**

PART C – (3 × 10 = 30 Marks)
Answer ALL questions

11. AX=B - **2 marks**

    Back substitution – **6 marks**

    z = 1/2, y = 1/2, x = 7/2 – **2 marks**

12. The root lies between 2 and 4 **-1 mark**

    $x_1 = \frac{x_0+b}{2}$ – **1 mark**

    13 approximations- **6 marks**

    The Approximated root is 2.9429 **-2 marks**

13. $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ **-2 marks**

    4 approximations- **6 marks**

    The root correct to 5 decimal places is 0.73205 – **2 marks**