PG – 143

III Semester M.Sc. Degree Examination, December 2014
(Semester Scheme) (N.S.)
MATHEMATICS
M 302 : Numerical Analysis and Matlab Programming – I

Time : 3 Hours Max. Marks : 60

Instructions : *1) Answer **any five** questions choosing atleast **one** question from **each** Part.*
*2) **All** questions carry **equal** marks.*

PART – A

1. a) Using an appropriate example to show how the Aitken's Δ^2 method can be used to accelerate the convergence of the linear iteration method. **6**

   b) Find a real root of the equation $xe^x = 1$ by using five steps of the Ramanujan method. **6**

2. a) Using Bairstow method obtain the quadratic factor $x^2 + px + q$ of the equation $x^3 - 3.7x^2 + 6.25x - 4.068 = 0$ with $(-2.5, 3)$ as the initial value for (p, q). **6**

   b) Obtain a real root of the equations $x^2 + y^2 = 4$ and $x^2 + y^2 = 16$ by using Newton-Raphson method. Perform 3 iterations. **6**

3. a) Using Gauss Jordan method with partial pivoting find the inverse of the coefficient matrix of the system **6**

$$\begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 6 \\ 4 \end{bmatrix}$$

   and hence solve the system.

   b) Solve the following tri-diagonal system of equations.

$$2x_1 + x_2 = 1$$

$$2x_1 + 3x_2 + x_3 = 2$$

$$x_2 + 4x_3 + 2x_4 = 3$$

$$x_3 + 3x_4 = 4$$

   by Thomas algorithm. **6**

PART – B

4. a) Derive Newton's bivariate interpolation formula. **6**

   b) Obtain the rational approximation $R_{3,2}$ for e^{-x}. **6**

5. a) Fit a Hermite interpolation polynomial satisfying $p(x_i) = f(x_i)$ and $p'(x_i) = f'(x_i), i = 0, 1, 2, 3..., n$. **6**

   b) Derive the Newton-Cotes quadrature formula and hence obtain the Simpson's $1/3^{rd}$ rule. **6**

6. Derive the Gauss-Legendre integration formulae of two and three points. Using one of the methods evaluate $\int_0^{\pi/2} \sin x \, dx$. **12**

PART – C

7. a) Explain the for, while and do-while loops with suitable examples. **6**

   b) Write a C program for Simpson's $1/3^{rd}$ rule. **6**

8. a) Using an appropriate C program illustrate the concept of recursion. **6**

   b) Write a C program to check whether a given number is a palindrome or not. **6**