* S B - 2 7 3 6 / 2 0 0 *

SB-2736

M. Sc. (Sem. II) Examination

March / April – 2011

Paper - 505 : Numerical Analysis

Time : Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :
☛ **M. Sc. (Sem. II)**

Name of the Subject :
☛ **Peper - 505 : Numerical Analysis**

☛ Subject Code No. : **2 7 3 6** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Figures to the right indicate marks of the questions.
(4) Follow usual notations.

1 Attempt any two : **14**

(a) Find all roots of the equation $\cos x - x^2 - x = 0$ by using newton-Raphson method, correct up to five decimal places.

(b) Solve the equation $x^3 - x^2 - 1 = 0$ by using false position method correct up to 4-decimal places.

(c) Perform four iterations of secant method of find real root of an equation $f(x) = x^3 - 2x - 5$.

2 Attempt any two : **14**

(a) Perform three iterations of Muller method to find the root of an equation $f(x) = x^3 - 5x + 1$ with $x_o = 0$, $x_1 = 0.5$, $x_2 = 1$.

(b) Compute the smallest root of the equation $x - 5\log_e x = 0$ with an error less than 0.5×10^{-4} starting with $x_o = 1.3$ by using Resula-Falsi method.

(c) Perform three iterations of the multipoint iteration method to find the root of the equation $\cos x - x.e^{x} = 0$.

3 Attempt any two : **14**

(a) Show that the matrix

$$\begin{bmatrix} 12 & 4 & -1 \\ 4 & 7 & 1 \\ -1 & 1 & 6 \end{bmatrix}$$ is positive definite.

(b) Find the inverse of the matrix

$$\begin{bmatrix} 2 & -1 & 2 \\ -1 & 1 & 1 \\ 2 & -1 & 3 \end{bmatrix}$$ by the square root method.

(c) Find inverse of the following matrix by using Gauss-Jordan ellimination method :

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

4 Attempt any two : **14**

(a) Solve the system of linear equations by the LU decomposition method :

$$x_1 + x_2 - x_3 = 2$$

$$2x_1 + 3x_2 + 5x_3 = -3$$

$$3x_1 + 2x_2 - 3x_3 = 6.$$

(b) Find the inverse of the matrix :

$$\begin{bmatrix} 2 & 1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$ by the partition method.

(c) Find the approximate value of $I = \int_0^1 \frac{\sin x}{x}\, dx$ by using mid-point and two point one type method.

5 Attempt any two : **14**

(a) The equation $x^4 + x = \in$, where $\in$ is a small number, has a root which is close to $\in$. Find an iterative formula $x_{n+1} = F(x_n)$; $x_o = 0$ for the computation after 3-iterations when neselecting terms of higher order > 7.

(b) Solve :

$$4x_1 + x_2 + x_3 = 4$$

$$x_1 + 4x_2 = -2x_3 = 4$$

$$3x_1 + 2x_2 - 4x_3 = 6$$

by the Gauss elimination method with partial pivoting.

(c) Explain how should the constant α be chosen to ensure the fastest possible convergence with the iteration formula :

$$x_{n+1} = \frac{\alpha x_n + x_{n+1}^{-2}}{\alpha + 1}.$$