Roll No. .....

Total No. of Questions : 13] **[Total No. of Pages : 02**

J-3189[S-1045] **[2037]**

B.Sc. (BI) (Semester - 6th)

NUMERICAL ANALYSIS (B.Sc. (BI) - 602)

Time : 03 Hours **Maximum Marks : 75**

Instruction to Candidates:

1) Section - A is **compulsory.**

2) Attempt any **Nine** questions from Section - B.

Section - A

Q1) ***(15 x 2 = 30)***

a) Define inherent and rounding errors with example.

b) An approximate value of π is given by 3.1428571 and its true value is 3.1415926. Find absolute and relative errors.

c) Define Newtion Raphson Method.

d) Define Hermitian and skew Hermitian matrix with example.

e) Find the rank of the matrix $\begin{bmatrix} 2 & 7 & 9 & 0 \\ 0 & 5 & -2 & -1 \end{bmatrix}$

f) State Crammer's Rule.

g) State Triangular factorization method.

h) Solve the equations by matrix inversion method

$2x_1 + x_2 = 1,\ 2x_1 + 3x_2 = 2.$

i) Define Jacobi lteration method.

j) Define interpolation with example.

k) Prove $\Delta = E-1$ and $\nabla = 1-E^{-1}$

l) Prove $\Delta = E\nabla = \nabla E = \delta E^{1/2}$

m) State Simpson's One-Third Rule.

n) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal Rule.

o) State Newtion's forward difference interpolation formula.

P.T.O.

Section - B

(9 x 5 = 45)

Q2) Solve $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$. by Newtion Raphson Method. Given that all the roots of given equation are complex.

Q3) Using Muller's method find the roots of equation $y(x) = x^3 - 2x - 5 = 0$, which lies between 2 and 3.

Q4) Solve by Crammer's Rule. $x + 2y + 3z = 6, 2x + 4y + z = 7, 3x + 3y + 9z = 15$.

Q5) Find the characteristic equation of the matrix $A=\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A.

Q6) If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$. Express $A^6 - 4A^5 + 8A^4 - 12A^3 + 14A^2$ as 9 Linear polynomial in A.

Q7) Solve the system of equations by Gauss Elimination method,
$2x_1 + 4x_2 + x_3 = 3, 3x_1 + 2x_2 - 2x_3 = 2, x_1 - x_2 + x_3 = 6$.

Q8) Solve the following system of equations by matrix inversion method.
$x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6$.

Q9) Solve the system of equations by factorization method,
$x_1 + 2x_2 + 3x_3 = 14, 2x_1 + 5x_2 + 2x_3 = 18, 3x_1 + x_2 + 5x_3 = 20$.

Q10) Sum the series $1^3 + 2^3 + 3^3 + ...+ n^3$ using the calculus of finite differences.

Q11) The population of town was as given below. Using Newtion backward difference formula. Estimate the population for the year 1925

Year	x :	1891	1901	1911	1921	1931
Population (in thousands)	y :	46	66	81	93	101

Q12) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3 rule taking $h = \frac{1}{4}$

Q13) If $r = 3h(h^6 - 2)$. Find percentage error in r at $h = 1$, if percentage error in h is 5.

❁❁❁❁❁