

NUMERICAL METHODS

Paper-IV : Semester-IV

Time Allowed : Three Hours

Maximum Marks : 36

Note : The candidates are required to attempt five questions in all selecting two questions from each Sections A, B and the entire Section C.

SECTION-A

1. Find a real root of the equations $x^2 - y^2 = 4$, $x^2 + y^2 = 16$ by Newton Raphson method. 5½
2. (a) Explain Bisection method. 3
(b) Write a short note on pivoting strategies. 2½
3. Solve the following systems $5x - 2y + z = 4$, $7x + y - 5z = 8$, $3x + 7y + 4z = 10$ by Jacobi method. 5½
4. Use Gaussian elimination with partial pivoting to solve the system $2x + y - z = -1$, $x - 2y + 3z = 9$, $3x - y + 5z = 14$. Check your answer by putting into original equations. 5½

SECTION-B

5. Using Gauss's backward formula, find the value of $\sqrt{2516}$ given that $\sqrt{12500} = 111.803399$, $\sqrt{12510} = 111.848111$, $\sqrt{12520} = 111.892806$, $\sqrt{12530} = 111.937483$. 5½
6. Establish Newton's divided-difference formula and give an estimate of the remainder term in terms of the appropriate derivative. Deduce Newton's forward and backward interpolation formula as particular cases. 5½
7. Given the table of values :

x	;	150	152	154	156
$y = \sqrt{x}$;	12.247	12.329	12.410	12.490

 Find $\sqrt{155}$ using Lagrange's interpolation formula. 5½
8. Using Stirling's formula to find u_{35} from the following table :
 $u_{20} = 14.035$, $u_{25} = 13.674$, $u_{30} = 13.257$, $u_{35} = 12.734$, $u_{40} = 12.089$, $u_{45} = 11.309$.

SECTION-C

9. (a) State Triangularisation method.
(b) Find $\Delta(\tan^{-1} x)$.
(c) Show that $\nabla = \partial E^{-1/2}$.
(d) Find the converges order of Newton Raphson method.
(e) State Gauss-Seidal method.
(f) What is difference between Bessel's and Everett's formula ?
(g) Find a root, correct to three decimal places using the bisection method $x^3 - x - 4 = 4$.
(h) Find the missing term in the following table :

X	:	0	1	2	3	4
Y	:	1	3	9	?	81

 Explain why the result differs from $3^3 = 27$?
 (i) State and prove Gauss forward formula.
 (j) Explain error in quadratic interpolatin. 1.4 × 10 = 14