## 8674/МН

## AS-2057

## NUMERICAL METHODS-IV

## (Semester-IV)

## Time Allowed : 3 Hours]

Note :- Candidates are required to attempt five questions in all, selecting two questions from each Section $A, B$ and the entire Section C.

## SECTION-A

I. Find a real root of the equations $x^{2}-y^{2}=3$ and
$x^{2}+y^{2}=13$ by Newton Raphson method.
II. (a) Explain Bisection method. 3
(b) Write a short note on pivoting strategies.
III. Solve the following systems $10 x+2 y+z=9$, $2 x+20 y-2 z=-44,-2 x+3 y+10 z=22$ By Jacobi method.
IV. Use Gaussian elimination with partial pivoting to solve the system $2 x+y-z=-1, x-2 y+3 z=9,3 x-y+5 z=14$ Check your answer by putting into original equations.

## SECTION-B

V. Using Everett's formula, find $f(25)$ from the following table :

| $X:$ | 20 | 24 | 28 | 32 |
| :---: | :---: | :---: | :---: | :---: |
| $F(X):$ | 2854.0 | 3162.0 | 3544.0 | 3992.0 |

VI. 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.
VII. Give the table of values :

| $x$ | $:$ | 150 | 152 | 154 |
| :--- | :---: | :---: | :---: | :---: |
| $y=\sqrt{x}:$ | 12.247 | 12.329 | 12.410 | 12.490 |

Find $\sqrt{155}$ using Lagrange's interpolation formula.
VIII. Tabulate the function $y=\sin x$ for $x=0$ to 1.0 in steps of $h=0.01$. Find the error of linear interpolation in this table. Also write a short error in quadratic interpolation.

## SECTION-C

IX. (a) State the converges order of Secant method.
(b) Show that $\mathrm{E}=1+\Delta$ and $\Delta=\nabla(1-\nabla)^{-1}$.
(c) Show that $\nabla=\partial E^{2}$.
(d) State Regula-falsi method.
(e) State Gauss-seidel method.
(f) What is difference between Bessel's and Everett's formula.
(g) Find a root, correct to three decimal places using the Secant method $x^{3}-x-4=0$.
(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 Lagrange's formula.
(j) State Stirling formula.
$(1.4 \times 10=14)$

