Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5152]-149

S.E. (Electrical) (II Sem.) EXAMINATION, 2017

NUMERICAL METHODS AND COMPUTER PROGRAMMING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** and Q. **7** or Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) What do you understand by entry controlled loop and exit controlled loop ? Draw flow chart. Give egs of both the types of loops. [6]

(*b*) Determine the number of possible roots by Descarte's rule of sign for the given example : [6]

$$f(x) = x^4 - 5x^3 - x^2 + 15x - 5 = 0 .$$

P.T.O.

Or

2. (*a*) What are different types of data types in C language ? Explain each with their ranges. [6]

(*b*) Using normalized floating point perform : [6]

(*i*) (100.312 E 25) + (81.813 E 27)

(*ii*) (100.312 E 25) × (81.813 E 27)

(*iii*) (0.4546 E 3) × (0.5454 E 8).

3. (*a*) Explain bisection method to find root of transcendental equation. [6]

(*b*) Apply Newton's forward formula to find $f(2.5)$: [7]

x	$f(x)$
0	0
5	0.0875
10	0.1763
15	0.2679
20	0.3640
25	0.4663
30	0.5574

Or

4. (*a*) Find the root of equation $x^2 + 12x + 7$ between (–2, –3) correct upto 4 decimal places using Newton-Raphson method. [6]

(*b*) Fit a straight line to the following data by the principle of least squares for the following pts : [7]

x	***y***
1	0.5
2	2.3
3	2.1
4	4.2
5	3.6
6	5.8
7	5.5

5. (*a*) Solve the given set of equations by Gauss Seidel method :

$$4x + y + z = 5$$
$$x + 6y + 2z = 19$$
$$-x - 2y + 5z = 10$$

Take $x^0 = y^0 = z^0 = 0$. Show 4 iterations. [7]

(*b*) Find inverse of the given matrix A by Gauss-Jordan method : [6]

$$A = \begin{bmatrix} 2 & 6 & 6 \\ 2 & 8 & 6 \\ 6 & 2 & 8 \end{bmatrix}.$$

Or

6. (*a*) Explain how to obtain solution of linear algebraic simultaneous equation by Jacobi method. [6]

(*b*) Find numerically the largest eigen value by power method. Show 5 iterations. [7]

$$A = \begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 3 & 5 \end{bmatrix} \qquad X_0 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

7. (*a*) Derive Euler's formula to solve $\frac{dy}{dx} = f(x, y)$. Also show graphically the effect of reduction of step size in the Euler's method. [6]

(*b*) Evaluate the double integral by Simpson's rule : [6]

$$\int_0^1 \int_0^1 e^{x+y}\, dx\, dy$$

Take $h = k = 0.5$.

Or

8. (*a*) Compute the integral by trapezoidal rule : [6]

$$\int_0^5 e^{-x^2}\, dx$$

Take $h = 0.5$.

(*b*) Using modified Euler's method, solve : [6]

$$\frac{dy}{dx} = y - x^2 + 1$$

Given $y_0 = 0.5$, $x_0 = 0$. Find $y(0.4)$. Take $h = 0.4$.