Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5559]-158

S.E. (Electrical) (Second Semester) EXAMINATION, 2019
NUMERICAL METHODS AND COMPUTER PROGRAMMING
(2015 PATTERN)

Time : 2 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) Write short note on decision making statements and loops in 'C' language? **[6]**

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

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

OR

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

b) Using Birge-Vieta method find root of $x^3 - x^2 - x + 1 = 0$ at the end of two iterations with initial value $X_0 = 0.5$ **[6]**

3 a) Solve the following equation $f(x) = x^2 - 3$ using bisection method. Show 6 iterations. Take a=1 , b=2 **[6]**

b) Using Newton's backward interpolation technique find y at $x = 4.5$ **[7]**

x	1	2	3	4	5
Y	2.38	3.65	5.85	9.95	14.85

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4 a) Using Lagrange's formula find y at x=10 from the following data [6]

x	5	6	9	11
y	12	13	14	16

b) Fit a straight line to the following data considering y as a dependent variable. [7]

x	1	3	5	7	9
y	1.5	2.8	4.0	4.7	6.0

5 a) Find the value of y at $x = 0.1$ for the equation $dy/dx = 1 + xy$ and $y(0) = 1$. Take step size h = 0.1 by Taylor series method. [7]

b) Integrate using Simpson's 3/8 rule, taking $h = 1$: [6]

$$\int_0^4 e^x \, dx$$

OR

6a) Use 4th order RK method to estimate $y(0.2)$ when $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 0$. Take step size h=0.2. [7]

b) Using Newton Cote's formula, derive trapezoidal rule for numerical integration [6]

7a) Find $[A]^{-1}$ using Gauss-Jordan method [6]

$$A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

b) Explain Gauss elimination method to solve linear simultaneous equations. [6]

OR

8a) Use Gauss Seidel method to solve the following system of equations at the end of 3rd iterations. Use initial values as $x = 0$, $y = 0$ and $z = 0$. **[6]**

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

b) Find numerically the largest eigen value by power method. Show 5 iterations **[6]**

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