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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OR

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 terations. 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]**

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