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

Seat No.	

[5352]-549

S.E. (Electrical) EXAMINATION, 2018

NUMERICAL METHODS AND COMPUTER PROGRAMMING

(2015 PATTERN)

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

N.B. :— (*i*) Attempt Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **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*) List different types of operators used in 'C'. Give 2-3 examples of each type. [6]

(*b*) State the rules for identifying significant digits in a number and determine the same for : [6]

(*i*) 124.06

(*ii*) 0.02406

Or

2. (*a*) Explain the following terms with suitable example : [6]

(*i*) Truncation error

(*ii*) Round off error

(*iii*) Chopping error

(*iv*) Relative error.

P.T.O.

(*b*) Using Birge Vieta method find the root of the equation $x^4 - 2x^3 - 4x + 4 = 0$ with initial approximation 0.5. Perform two iterations. [6]

3. (*a*) Using N-R method find the real root of the equation $x^3 - \sin x + 1$ with $x_0 = -2$. Perform 4 iterations. [6]

(*b*) The following table gives the population of a town during last 6 census. Using Newton's backward interpolation formula determine the population in the area 1954 : [7]

Year	**Population in Thousands**
1911	12
1921	15
1931	20
1941	27
1951	39
1961	52

Or

4. (*a*) Explain with neat figure Regula Falsi method for solution of transcendental equation. [6]

(*b*) Find equation of a straight line to be fit into the following data using least square approximation : [7]

x	*y*
0	10
2	12
4	18
6	22
8	20
12	30
20	30

5. (*a*) Explain modified Euler's method for solution of ordinary differential equation. Draw suitable diagram. [6]

(*b*) Evaluate $\int_{1}^{1.8} \frac{e^x + e^{-x}}{2} dx$ using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule taking $h = 0.2$. [7]

Or

6. (*a*) Using 4th order RK method solve $\frac{dy}{dx} = \sqrt{x^2 + y}$ at $x = 0.2$ with $x(0) = 0.8$ and $h = 0.2$. [7]

(*b*) Derive Trapezoidal rule for numerical integration as a special case of Newton's Cote formula. [6]

7. (*a*) Using Jacobi iterative method, obtain solution of the following system. Perform 5 iterations : [6]

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110$$

take

$$X^{(0)} = Y^{(0)} = Z^{(0)} = 0.$$

(*b*) Explain Gauss Seidal iterative method of solution of system of linear simultaneous equation. [6]

Or

8. (*a*) Solve the following system of equation using Gauss elimination method : [6]

$$\begin{bmatrix} 8 & -4 & 0 \\ -4 & 8 & -4 \\ 0 & -4 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \\ 4 \end{bmatrix}.$$

(*b*) Explain Gauss Jordan method to solve the system to linear simultaneous equation. [6]