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

Seat No.	

[5459]-158

S.E. (Electrical) (II Semester) EXAMINATION, 2018
NUMERICAL METHODS AND COMPUTER PROGRAMMING
(2015 PATTERN)

Time : 2 Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and 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*) Give the syntax of 'for loop', 'while loop' and 'do-while-loop' used in C language. [6]

(*b*) The measured length of bridge and river are 9999 cm and 9 cm respectively but the true values are 10,000 cm and 10 cm respectively. Compute and comment on :
(*i*) Absolute error
(*ii*) Percentage Relative error.

Or

2. (*a*) Explain the following instructions used in C language. [6]
(1) printf
(2) scanf
(3) getch

(*b*) (*i*) Add the following floating point numbers : 243.31947E17 and 32.1698E14.

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(*ii*) Subtract the following floating point numbers : 37.9314E19 from 416.21943E18.

(*iii*) Divide 317.23E33 by 32.17E18. [6]

3. (*a*) Solve the following equation $f(x) = e^{-x} - x = 0$ using Secant method. Show 4 iterations. Take $x_0 = 0$, $x_1 = 1$. [6]

(*b*) Find $f(3)$ using Newton's Divided difference technique : [7]

X	**Y**
0	1
1	4
2	15
4	85

Or

4. (*a*) The following is data from steam table, using Newton's forward interpolation, find pressure of steam for a temp of 142° : [6]

Temp	**Pressure**
140	3.685
150	4.854
160	6.302
170	8.076
180	10.225

(*b*) Fit a straight line to the following data by method of least squares considering y as a dependent variable : [7]

X	**Y**
5	16
10	19
15	23
20	26
25	30

5. (*a*) Solve $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$ to get y at $x = 0.1$ using RK 4th order method. Take $h = 0.1$. [6]

(*b*) Compute the value of : [7]

$$\int_1^2 \frac{dx}{x}$$

using Simpson's 1/3 rule and trapezoidal rule, taking $h = 0.25$.

Or

6. (*a*) Using Simpson's rule integrate : [7]

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

Take $h = k = 0.5$.

(*b*) Apply modified Euler's method to find $y(0.1)$. Given $\frac{dy}{dx} = xy$, $y(0) = 1$. Show 3 iterations. [6]

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

$$A = \begin{bmatrix} -1 & 3 & 5 \\ -3 & 1 & 7 \\ 7 & -5 & -11 \end{bmatrix}$$

(*b*) Use Jacobi method to solve the following system of equations at the end of 5th iterations. Use initial values as $x = 0$, $y = 0$ and $z = 0$. [6]

$$8x - 3y + 2z = 20$$
$$4x + 11y - z = 33$$
$$6x + 3y + 12z = 35$$

Or

8. (*a*) Explain Gauss Elimination method for solution of linear simultaneous equations. [6]

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

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \quad X_0 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$