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

Seat No.	

[4657]-539

S.E. (Electrical) (Second Semester) EXAMINATION, 2014

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*) List various types of operators used in C. Give examples of each type. [6]

(*b*) What is an error in computation ? Define absolute and relative error. [6]

Or

2. (*a*) What is user defined function in C ? Explain with example. [6]

(*b*) Using Birge Vieta method, find the real root of the equation :

$$x^3 + 2x^2 - 5x - 6 = 0.$$

Perform two iterations. Take $P_0 = 1.3$. [6]

P.T.O.

3. (*a*) Explain with neat diagram Bisection method of solution of transcendental equations. [6]

(*b*) Using Lagrange's interpolation, find $f(27)$ given that : [7]

x	$y = f(x)$
14	68.7
17	64.0
31	44.0
35	39.1

Or

4. (*a*) Fit a straight line by method of least squares to the given data : [7]

x	y
1	14
2	27
3	40
4	55
5	68

(*b*) Derive formula for Newton's Forward Difference Interpolation method. [6]

5. (*a*) Explain Gauss Jordan method for solution of system of linear simultaneous equations. [6]

(*b*) Using Jacobi iterative method solve the following system of linear simultaneous equations.

Take :

$$x^{(0)} = y^{(0)} = z^{(0)} = 0.$$

Perform 5 iterations :

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110.$$ [7]

Or

6. (*a*) Explain Gauss Seidel iterative method of solution of system of linear simultaneous equations. [6]

(*b*) Using power method, find the largest eigenvalue correct upto 2 decimal places. Given that :

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \text{ and } X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}.$$ [7]

7. (*a*) Using Taylor's Series method, solve the following ordinary differential equation to obtain $y(0.1)$ and $y(0.2)$.

Given that :

$$\frac{dy}{dx} = x^2 y - 1 \quad \text{and} \quad y(0) = 1.$$

Truncate the series after first five terms. [6]

(*b*) Derive Simpson's 3/8th formula as a special case of Newton Cote's quadrature formula for numerical integration. [6]

Or

8. (*a*) Explain with neat diagram, Modified Euler's method of solution of ordinary differential equation. [6]

(*b*) Evaluate the given integral using Simpson's 1/3rd rule. Take $h = k = 0.2$,

$$I = \int_2^{2.4} \int_4^{4.4} xy \; dx \; dy \; . \qquad [6]$$