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

Seat No.	

[4957]-1039

S.E. (Electrical) (II Sem.) EXAMINATION, 2016
NUMERICAL METHODS & COMPUTER PROGRAMMING
(2012 Pattern)

Time : Three 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*) Explain different types of operators used in C. [6]

(*b*) Explain in detail Sturm's Theorem. [6]

Or

2. (*a*) Explain absolute, relative and percentage error with suitable example. [6]

(*b*) Using Birge Vieta method, find the real root of the equation $x^4 - 2x^3 - 4x + 4 = 0$. Take Po= 0.5. Perform 2 iterations. [6]

3. (*a*) Find a real root of $x^3 - 2x - 5 = 0$ using Regula-Falsi method in the interval [2, 3]. Perform 4 iterations. [6]

(*b*) Using Lagrange's interpolation, find y at $x = 2.3$. Given that [7]

x	–1	0	2	3
y	–8	3	4	12

P.T.O.

Or

4. (*a*) Fit a curve of type $y = mx + c$ for the following data using least square approximation : [6]

x :	0	10	20	30	40
y :	53.5	59.5	65.2	70.6	75.5

(*b*) Solve $x^2 + xy - 10 = 0$, and $y + 3xy^2 - 57 = 0$ using N–R method for two variables. Perform one iteration. Take $x_0 = 1.5$ and $y_o = 3.5$. [7]

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

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72 \qquad X^{(0)} = Y^{(0)} = Z^{(0)} = 0$$
$$x + y + 54z = 110$$

(*b*) Using Gauss elimination method solve the following system : [7]

$$3x - y + 2z = 12$$
$$x + 2y + 3z = 11$$
$$2x - 2y - z = 2$$

Or

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

(*b*) Using power method, find the largest eigenvalue for the following matrix : [7]

$$A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}. \text{ Take } X_0 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

Perform 5 iterations.

7. (*a*) Using Simpson's 1/3rd rule, evaluate $\int_0^{\pi/3} \tan x \, dx.$ Take 8 subintervals. [6]

(*b*) Using 4th order R-K method find y (0.4) given that $\frac{dy}{dx} = y - x^2 + 1$ and $y(0) = 0.5$. [6]

Or

8. (*a*) Using trapezoidal rule, evaluate $\int_0^1 \int_0^1 \frac{1}{1+x+y} \, dxdy.$.

Take $h = k = 0.5$. [6]

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