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

Seat No.	

[5057]-239

S.E. (Electrical) (Second Semester) EXAMINATION, 2016

NUMERICAL METHODS AND COMPUTER PROGRAMMING

(2012 PATTERN)

Time : Two 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,** 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, slides rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Explain various loops used in 'C'. Give syntax of each loop. [6]

(*b*) Explain with suitable example Descartes' Rule of Signs. [6]

Or

2. (*a*) Explain various errors with respect to numerical computation. [6]

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

$$x^4 - 3x^2 + 2x - 7 = 0$$

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

P.T.O.

3. (*a*) Using N-R method, obtain the real root of the equation :

$$\cos x - xe^x = 0.$$

Take $x_0 = 1$. Perform 4 iterations. [6]

(*b*) Using Newton Backward Difference interpolation, find y at $x = 12$, given that : [7]

x	y
2	94.8
5	87.9
8	81.3
11	75.1
14	82.5

Or

4. (*a*) Explain Regula Falsi method with suitable diagram. [6]

(*b*) Fit a curve of type

$$y = mx + c,$$

for the following data using Least Square approximation method. [7]

x	y
0.2	0.447
0.4	0.632
0.6	0.775
0.8	0.894
1	1

5. (*a*) Using Gauss Jacobi iterative method, obtain solution of system of linear simultaneous equations given below. Perform 5 iterations. [6]

$$4x + y - z = 4$$
$$2x + 3y + z = 4$$
$$x + y + 5z = 16.$$

Take $x_0 = y_0 = z_0 = 0$.

(*b*) Using Gauss elimination method solve the following system of linear simultaneous equations : [6]

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

Or

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

(*b*) Using power method, find the largest eigenvalue for the following matrix : [6]

$$A = \begin{bmatrix} 4 & 1 \\ 1 & 3 \end{bmatrix}$$

Take $[0 \ 1]^T$. Perform 5 iterations.

7. (*a*) Evaluate :

$$\int_{0.2}^{1} \left(1 + x^3\right) dx$$

using Simpson's (3/8)th rule with step size 0.1. [6]

(*b*) Using 4th order R-K method find $y(0.1)$ given that :

$y(0) = 1$ and $y'(0) = 0$ and

$$\frac{d^2y}{dx^2} = -x\frac{dy}{dx} - y.$$

Take $h = 0.1$. [7]

Or

8. (*a*) Find the first derivative of $f(x)$ at $x = 1.5$ from the following data : [6]

x	y
1.5	3.375
2.0	7.0
2.5	13.625
3.0	24
3.5	38.875
4.0	59

(*b*) Evaluate the given integral using Trapezoidal rule. Take $h = 0.2$, $k = 0.2$. [7]

$$\int_{1}^{1.4} \int_{2}^{2.4} \frac{1}{xy}\, dx\, dy .$$