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

| **Seat No.** | |
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# [4757]-1039

## S.E. (Electrical) (Second Semester) EXAMINATION, 2015

## 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**, 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*) Give the syntax of 'for loop', 'while loop' and 'do-while loop' in C language. [6]

(*b*) State Descartes' Rule of sign and apply it to : [7]

$$x^4 + 2x^3 + 10x - 20 = 0.$$

P.T.O.

*Or*

**2.** (*a*) What are different data types in 'C' language ? Give their ranges. [6]

(*b*) Explain Birge Vieta method to find the root of polynomial equations. [7]

**3.** (*a*) Explain Newton-Raphson method to find the root of equation with its pitfalls. [6]

(*b*) Use Lagrange's interpolation to find polynomial equation to fit the following data points : [6]

(0, 2), (1, 3), (2, 12) and (5, 147)

Hence find $y(3)$.

*Or*

**4.** (*a*) Derive formula of Newton's Backward interpolation for equally spaced data points. [6]

(*b*) Find the root of $x^2 - 49 = 0$ using bisection method at the end of sixth iteration in interval [5, 8]. [6]

**5.** (*a*) Explain Gauss-Jordan method to solve the system of linear simultaneous equations. [6]

(*b*) Solve the following system of equations using Gauss Elimination method : [6]

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

*Or*

**6.** (*a*) Explain Gauss-Jacobi method to solve the system of linear simultaneous equations. [6]

(*b*) Solve the following system of equations using Gauss-Seidel method. Initial values $[0,\ 0,\ 0]^{T}$. Show 3 iterations : [6]

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

**7.** (*a*) Explain Modified Euler's method to solve ordinary differential equations. [6]

(*b*) Solve : [7]

$$\int_{1}^{2} \int_{1}^{2} (x^2 + y^2)\, dx\, dy$$

using Trapezoidal rule. Take $h = k = ½$.

*Or*

**8.** (*a*) Derive formula for Simpson's (3/8)th rule using Newton-Cote's formula for numerical integration. [6]

(*b*) Solve :

$$\frac{dy}{dx} = x + y$$

for $x = 0.2, 0.4$ by using Taylor series method. Given $x_0 = 0$, $y_0 = 1$, $h = 0.2$. [7]