

Seat No.
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**S.E. (Electrical) (II Semester) EXAMINATION, 2019**  
**NUMERICAL METHODS AND COMPUTER PROGRAMMING**  
**(2015 PATTERN)**

**Time : Two Hours** **Maximum Marks : 50**

**N.B. :—** (i) Solve 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 calculator is allowed.

(v) Assume suitable data, if necessary.

1. (A) State the following statements are correct or incorrect. Justify your answer : [6]

(i) In 'C' language, variable declaration can be started with number.

(ii) In 'C' language, while loop is exit-controlled loop.

(iii) In array declaration with **int A[3][3]**, eighteen number data can be stored.

(B) State the following theorems [7]

(i) Intermediate value theorem

(ii) Descartes' rule of sign.

P.T.O.

Or

2. (A) Write meaning of the following instruction in 'C' language (if  $i$  is a variable) : [6]

(i)  $i++$  and  $++i$

(ii)  $i+=2$  and  $i*=2$

(iii)  $i\%2$  and  $2\%i$ .

(B) For the polynomial  $f(x) = 5x^3 + 2x^2 - 6x + 13$ , find  $f(2)$ ,  $f'(2)$ ,  $f''(2)$  and  $f'''(2)$ . [7]

3. (A) Derive the formula for Newton forward interpolation formula. [6]

(B) Use Regula-Falsi method to obtain  $\sqrt{12}$ . Use initial guess 3 and 4. Perform three iterations. [6]

Or

4. (A) Find root of equation  $f(x) = x^3 - x - 1 = 0$  using Bisection method for six iterations with initial approximation [1, 2]. [6]

(B) Find polynomial fitting the following data using Lagrange interpolation : [6]

$x$	1	2	3	4
$y$	1	8	27	64

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5. (A) A river is 80 m wide. The depth  $d$  in meters at a distance  $x$  meters from one bank is given in the following table : [7]

$x(m)$	0	10	20	30	40	50	60	70	80
$d(m)$	0	4	7	9	12	15	14	8	3

Find approximately the area of cross section by :

- (i) Trapezoidal Rule  
(ii) Simpson's  $\left(\frac{1}{3}\right)$ rd rule.
- (B) Derive the formula of modified Euler's method for solution of ordinary differential equation. [6]
- Or
6. (A) Derive the formula for trapezoidal rule for numerical integration using Newton Cote's formula. [6]  
(B) Using fourth order RK method, find (0.1). [7]

$$\frac{dy}{dx} = \frac{1}{x+y} \text{ with } y(0) = 1. \text{ Take } h = 0.1.$$

7. (A) Find the values of  $x_1, x_2, x_3$ , using Gauss elimination method : [6]

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & -3 & 4 \\ 3 & 4 & 5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 9 \\ 13 \\ 40 \end{bmatrix}$$

- (B) Explain Gauss-Jordan method for solution of linear simultaneous equation. [6]

- Or
8. (A) Solve the following system of equations using Gauss-Jacobi method. Initial values  $\begin{bmatrix} 0 & 0 & 0 \end{bmatrix}^T$ . Show three iterations : [6]

$$\begin{bmatrix} 8 & -4 & 0 \\ -4 & 8 & -4 \\ 0 & -4 & 8 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \\ 4 \end{bmatrix}$$

- (B) Explain Gauss-Seidal method for solution of linear simultaneous equation. (Numerical is not expected) [6]