

B.E. Fourth Semester (Elect. Engg. (Elect. & Power Elect.)) (CGS)  
**10546 : Numerical Methods & Computer Programming :**  
**4 EP 05 / 4 EX 05 / 4 EL 05 / 4 EE 05**

P. Pages : 2

Time : Three Hours



AU - 2584

Max. Marks : 80

Notes : 1. Assume suitable data wherever necessary.

1. a) Find the root of the equation  $f(x) = x^3 + x^2 + x + 7 = 0$  using Bisection method correct up-to three decimal places. 6
- b) Find the root of the equation  $f(x) = \cos x - xe^x = 0$  correct upto three decimal places using secant method. 7

OR

2. a) Find the smallest positive root of  $x^3 - 5x + 3 = 0$  using Newton - Raphson method using & iterations. 6
- b) Write a 'C' program to solve algebraic equation using Bisection method. 7
3. a) Solve following system of equations using matrix inversion method. 6
- $3x + y + 2z = 3$   
 $2x - 3y - z = -3$   
 $x + 2y + z = 4$
- b) Solve following simultaneous equations using Gauss elimination method. 7
- $-12x_1 + x_2 - 8x_3 = -80$   
 $x_1 - 6x_2 + 4x_3 = 13$   
 $-2x_1 - x_2 + 10x_3 = 90$

OR

4. a) Find the values of  $x, y, z$  by Gauss Jordan elimination method. 6
- $x + y + z = 1$   
 $4x + 3y - z = 6$   
 $3x + 5y + 3z = 4$
- b) Solve the following simultaneous equation by Triangularization method. 7
- $2x + 3y + z = 9$   
 $x + 2y + 3z = 6$   
 $3x + y + 2z = 8$

5. a) Construct the difference table from following data and obtain  $f(50.5)$  using Newton's forward difference formula. 7

|          |         |         |         |         |         |
|----------|---------|---------|---------|---------|---------|
| x        | 50      | 51      | 52      | 53      | 54      |
| y = f(x) | 39.1961 | 39.7981 | 40.3942 | 40.9843 | 41.5687 |

- b) Construct the backward difference table for following data and obtain the backward difference polynomial passing through all the points. 7

|          |      |      |      |      |      |
|----------|------|------|------|------|------|
| x        | 0.1  | 0.2  | 0.3  | 0.4  | 0.5  |
| y = f(x) | 1.40 | 1.56 | 1.76 | 2.00 | 2.28 |

OR

6. a) For the following data, find the polynomial  $f(x)$  which passes through all the points. 7

|      |    |    |    |     |      |
|------|----|----|----|-----|------|
| x    | -1 | 0  | 3  | 6   | 7    |
| f(x) | 3  | -6 | 39 | 822 | 1611 |

Using divided difference table.

- b)  $y = x^3$  is given for  $x = 1, 2, 3, 4, 5$ . use Lagrange's formula to obtain  $x$  at  $y = 3.375$

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**SECTION - B**

7. a) Write a program for finding value of function  $\int_0^6 \frac{1}{1+x^2} dx$  by trapezoidal rule.

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- b) Find the first and second derivative for function tabulated below at  $x = 3$ .

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|   |     |         |        |        |       |     |
|---|-----|---------|--------|--------|-------|-----|
| t | 3.0 | 3.2     | 3.4    | 3.6    | 3.8   | 4.0 |
| x | -14 | -10.032 | -5.296 | -0.256 | 6.672 | 14  |

**OR**

8. a) Evaluate  $\int_0^2 \frac{x}{\sqrt{2+x^2}} dx$ , use trapezoidal rule with four steps.

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- b) Evaluate  $\int_0^\pi (4 + 2 \sin x) dx$  using Simpson's  $\frac{3}{8}$  rule where  $n = 5$ .

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9. a) Using second order Runge - Kutta method solve  $f(x, y) = -2x^3 + 12x^2 - 20x + 8.5$  using step size of 0.5 and initial conditions of  $y = 1$  at  $x = 0$ ; Find value of  $y$  at  $x = 0.5$  (only one step).

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- b) Use modified Euler's method to solve  $\frac{dy}{dx} = x^2 + y$  with the condition  $y(0) = 1$ ; Find value of  $y$  at  $x = 0.1$

7

**OR**

10. a) Write a 'C' program for finding solution of differential equation using Runge - Kutta fourth order method.

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- b) Solve  $\frac{dy}{dx} = x - y^2$  by Taylor's series method to calculate  $y$  at  $x=0.4$  in two steps Initial values are  $x = 0$ ;  $y = 1$

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11. a) What are the benefits of object oriented programming.

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- b) Explain the following concepts in detail.

6

i) Objects

ii) Classes.

**OR**

12. a) Explain various control statements with suitable example.

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- b) What is object oriented Paradigm.

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