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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE/EEE) (Sem.–5)

**NUMERICAL ANALYSIS**

Subject Code : EE-311/AM-351

M.Code : 57027

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- a) State intermediate value property.
- b) State the condition where Newton's method fails.
- c) Using Euler's method, find  $y(1)$ , given that  $y' = x + y$  and  $y(0) = 1$  with  $h = 1$ .
- d) Write the normal equations for fitting a straight line to the data using a method of least squares.
- e) Show that Newton's method has quadratic rate of convergence.
- f) Use Picard's method to solve  $\frac{dy}{dx} = 2x + y^2$  upto third approximation where  $y(0) = 0$ .
- g) Write the iterative formula for method of false position.
- h) What is the condition of convergence of fixed point iteration method ?
- i) Write a short note on finite difference method.
- j) Use Taylor's series method to solve  $\frac{dy}{dx} = 2x - 3y$  at  $x = 0.1$ , given that  $y(0) = 1$ .

**SECTION-B**

2. Use iteration method to obtain the root of equation  $x^3 - 15x + 8 = 0$  correct to four decimal places.

3. Solve the following system of equation using the Gauss-elimination method :

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

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

$$2x - 2y - z = 2.$$

4. Fit a curve of the form  $y = ab^x$  to the given data :

$$y(2) = 144, y(3) = 172.8, y(4) = 207.4, y(5) = 248.8, y(6) = 298.5.$$

5. Using modified Euler's method, find an approximate value of  $y(0.3)$ , given that  $y(0) = 0$  and

$$\frac{dy}{dx} = 1 - y + e^x$$

with  $h = 0.1$

6. Find the value of  $\frac{dy}{dx}$  at  $x = 40$  from the following data :

$x :$	0	10	20	30	40
$y :$	1	0.984	0.939	0.866	0.766

### SECTION-C

7. Use the method of triangularization to solve the system of equations

$$x + 3y + z = 3$$

$$x + 4y + 2z = 3$$

$$x + 2y - 3z = 6$$

8. For the given initial value problem (IVP),  $\frac{dy}{dx} = x - y^2, y(0) = 1$ , estimate the value of  $y(0.2)$  using Runge-Kutta method of fourth order with step size  $h = 0.1$ .

9. The velocities of a car running on a straight road from rest position at intervals of 2 minutes are given below :

Times (in minutes) :    2        4        6        8        10        12

Velocity (in km/hr) :   22       30       27       18       7        0

Find the total distance covered by the car in 12 minutes.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**