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Roll No. : .....

**328312(14)**

**APR-MAY**

**B. E. (Third Semester) Examination, 2020**

**(Old Scheme)**

**(EEE, Et & T Branch)**

**NUMERICAL ANALYSIS**

***Time Allowed : Three hours***

***Maximum Marks : 80***

***Minimum Pass Marks : 28***

***Note : Part (a) of each question is compulsory having 2 marks and solve any two parts from remaining parts (b), (c) and (d) having 7 marks each.***

**Unit-I**

1. (a) Write the formula for secant method.

2

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**PTO**

(b) Apply Regula-falsi method to solve the equation 8

$$3x - \cos x - 1 = 0$$

(c) Perform two iteration of the Birge-Vieta method to find the smallest root of the equation

$$x^4 - 3x^3 + 3x^2 - 3x + 2 = 0 \text{ using the initial approximation } P_0 = 0.5. \quad 8$$

(d) Use Newton Raphson method to find a root of the equation  $\cos x - x^2 = x$ , correct to four decimal places. 8

**Unit-II**

2. (a) Gauss seidal method twice as fast as ..... 2

(b) Solve the following system of equations by the method of Crout's triangularisation 8

$$x + 5y + z = 14$$

$$2x + y + 3z = 13$$

$$3x + y + 4z = 17$$

(c) Solve : 8

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

by Jacobi's iteration method.

(d) Solve the equation : 8

$$10x - 2y - 3z = 205$$

$$-2x + 10y - 2z = 154$$

$$-2x - y + 10z = 120$$

by relaxation method.

**Unit-III**

3. (a) Write the formula for Simpson's  $\frac{1}{3}$  rd rule. 2

(b) From the following table : 8

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
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y :	7.989	8.403	8.781	9.129	9.451	9.750	10.031
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Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at (a)  $x=1.1$  (b)  $x=1.6$ .

[ 4 ]

(c) Given that  $y = \log x$  and

$x$	: 4.0	4.2	4.4	4.6	4.8	5.0	5.2
$y$	: 1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate  $I = \int_4^{5.2} \log x \, dx$  by :

(i) Trapezoidal rule

(ii) Simpson's 1/3rd rule

(iii) Simpson's 3/8 rule

(iv) Weddle's rule

8

(d) A river is 80 meters wide. The depth  $d$  (in meters) of the river at a distance  $x$  from the bank is given by the following table.

$x$	: 0	10	20	30	40	50	60	70	80
$y$	: 0	4	7	9	12	15	14	8	3

Find approximately the area of cross-section of the river.

8

#### Unit-IV

4. (a) Write the formula for Milne's predictor method.

2

[ 5 ]

(b) Use Runge-Kutta method to approximate the value of  $y$  when  $x = 0.1$  given that  $y(0) = 1$  and

$$\frac{dy}{dx} = 3x + y^2$$

8

(c) Use Adams-Bashforth's method to find  $y(0.4)$  given

that  $\frac{dy}{dx} = \frac{1}{2}xy$  and  $y(0) = 1, y(0.1) = 1.01,$

$y(0.2) = 1.022, y(0.3) = 1.023$

8

(d) Solve  $\frac{dy}{dx} = x + y^2, y(0) = 1$  using Taylor's series

method and compute  $y(0.1)$  and  $y(0.2)$ .

8

#### Unit-V

5. (a) Write the method of least square.

2

(b) Predict  $y$  at  $x = 3.75$  by fitting a power curve

$y = ax^b$  to the given data :

[ 6 ]

$x$	:	1	2	3	4	5	6
$y$	:	2.98	4.26	5.21	6.10	6.80	7.50

(c) Two quantities  $x$  and  $y$  were measured and the following results obtained. Use the given data to fit a parabola using the principle of least square : 8

$x$	:	20	40	60	80	100	120
$y$	:	5.5	9.1	14.9	22.8	33.3	46.0

(d) Fit a straight line parabola to the following data regarding  $x$  as an independent variable 8

$x$	:	0	1	2	3	4
$y$	:	1	1.8	3.3	4.5	6.3