



KERALA AGRICULTURAL UNIVERSITY  
B.Tech.(Food Engg) 2017 Admission  
IV Semester Final Examination- June 2019

Basc.2209

Numerical Methods for Engineering Application (1+1)

Marks: 50

Time: 2 hours

(10x1=10)

I Fill up the following blanks:

- 1 The  $n$ th difference of a polynomial of degree  $n$  is \_\_\_\_\_
- 2 In solving simultaneous equations by Gauss -Jordan method, the coefficient matrix is reduced to \_\_\_\_\_ matrix.
- 3 The order of the difference equation in  $u_n - 5u_{n-1} + 9u_{n-2} - 7u_{n-3} + 2u_{n-4} = 0$  is \_\_\_\_\_
- 4 The number of strips required in Simpsons  $3/8^{\text{th}}$  rule is a multiple of \_\_\_\_\_
- 5  $1 - E^{-1} =$  \_\_\_\_\_ where  $E^{-1}$  is inverse shift operator.

Define the following

- 6 Extrapolation
- 7 Numerical Integration
- 8 Solution of Difference equation
- 9 Numerical differentiation
- 10 Transcendental Equations

II Write Short notes on any FIVE of the following

(5x2=10)

- 1 Newton's backward interpolation formula
- 2 Bisection method
- 3 Trapezoidal rule
- 4 Given  $y_0 = 3, y_1 = 10, y_2 = 80, y_3 = 190, y_4 = 100, y_5 = 12$ , find  $\Delta^5 y_0$
- 5 Prove that  $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$
- 6 Solve  $2y_{n+2} - 5y_{n+1} + 2y_n = 0$
- 7 State Elliptic partial differential equation

III Answer any FIVE of the following.

(5x4=20)

- 1 The velocity of a train which starts from rest is given by the following table the time being reckoned in minutes from the start and speed in km/hour.

Time	2	4	6	8	10	12	14	16	18	20
Speed	10	18	25	29	32	30	11	5	2	0

Find the total distance run in 20 minutes.

- 2 The following data gives the melting point of an alloy of lead and Zinc

Percentage of lead in the alloy	50	60	70	80
Temperature	205	225	248	274

Find the melting point of the alloy containing 54% of lead, using appropriate interpolation formula.

- 3 Solve  $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$
- 4 Find the real root of the equation  $3x = \cos x + 1$  by Newton-Raphson method.
- 5 Apply Gauss-Jordan method to solve the equations  
 $x + y + z = 9, 2x - 3y + 4z = 13, 3x + 4y + 5z = 40$
- 6 Prove that  $e^x = \left(\frac{\Delta^2}{E}\right) \cdot e^x \frac{Ee^x}{\Delta^2 e^x}$ , the interval of differencing begin  $h$

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- 7 Using Lagrange's interpolation formula, find the distance travelled by particle at  $t=3.5$  sec from the table.

t	0	1	3	4
V	21	15	12	10

IV Solve any one of the following

(1x10=10)

1. Using Taylor's series method to solve  $\frac{dy}{dx} = -xy^2$  with  $y(0) = 2$ .
2. Apply Runge-Kutta method of fourth order to find an approximate value of  $y$  at  $x=0.2$  given that  $\frac{dy}{dx} = x + y$ , when  $y=1$  at  $x=0$ .

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