KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Food Engg) 2019 Admission
IV Semester Final Examination- -November 2021

Basc.2209 **Numerical Methods for Engineering Applications (1+1)**

Marks: 50
Time: 2 hours

I **Fill in the blanks** **(10x1=10)**

1. The positive root of $f(x) = x^4 - x = 10$ lies between _____
2. If $-\frac{1}{4} < u \leq \frac{1}{4}$ then the applicable formula is _____
3. The rate of convergence in N.R. method is of order_____
4. One dimensional wave equation is _____
5. In Gauss-jordan method the coefficient matrix is transformed into _____matrix.

State True or False

6. R.K methods require prior calculation of higher derivatives of y as the Taylor methods does.
7. Solution matrix of AX=B by Gauss-elimination method is diagonal matrix.
8. Modified Euler's method is based on the average of points.
9. The Lagrange's interpolation formula can be used whether the values of x, the independent variable are equally spaced or not.
10. The positive root of $x^3 = 6x - 4$ lies between 1 and 2.

II **Write short notes on ANY FIVE of the following** **(5x2=10)**

1. State Lagrange's interpolation formula.
2. Define Algebraic and Transcendental Equations with an example.
3. Find relation between E & Δ.
4. Classify the PDE $u_{xx} + 2u_{xy} + 4u_{yy} = 0$.
5. Solve the following system by Gauss-jordan method $5x + 4y = 15; 3x + 7y = 12$.
6. Write third order R.K. algorithm.
7. i) Write Simpson's one-third rule.
   ii) Write Simpson's three-eight rule.

III **Answer ANY FIVE of the following.** **(5x4=20)**

1. Using Lagrange's interpolation formula, find the value corresponding to $x = 10$ from the following table

x	5	6	9	11
y	12	13	14	16

2. Solve the system by Gauss-Elimination method $2x + 3y - z = 5$; $4x + 4y - 3z = 3$ and $2x - 3y + 2z = 2$.
3. Find the root of the equation $x^3 - 5x + 3 = 0$ by Newton Raphson method.
4. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using simpson's rule with h=1.
5. Solve the following equation by crout's method.
   $2x + y + 4z = 12; 8x - 3y + 2z = 20; 4x + 11y - z = 33$.
6. Explain briefly single step methods and Multi step methods.

7. Using Euler's method solve $y' = x + y + xy$, $y(0) = 1$ compute y at $x = 0.1$ by taking $h = 0.05$

IV **Write an essay on ANY ONE of the following** **(1x10=10)**

1. Explain briefly Gauss elimination and Gauss Jordan Methods.
2. The following are data from steam table.

Temp ^{o} C	140	150	160	170	180
Pressure Kg/cm^2	3.685	4.854	6.302	8.076	10.225

Using Newton's formula,find the pressure of the steam for a temperature of 142°C.

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