KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Engg) 2016 Admission
IV Semester Final Examination–July 2018

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

Marks: 50
Time:2hours

I   **Fill up the following blanks:**   (10x1=10)

1   In …………..method the values of $x_1, x_2, … … … .., x_n$ are obtained immediately without using back substitution.

2   Lagrange's interpolation formula is used only for -------- intervals.

3   One dimensional heat equation is …………………

4   The positive root of $f(x) = 2x^3 - 3x - 6 = 0$ lies between ………….

5   Iterative formula of Newton's Raphson method is …………………

State True or False

6   Newton-Raphson method is quadratically convergent.

7   Solution matrix of $AX=B$ by Gauss-elimination method is an upper triangular matrix.

8   Newton's forward interpolation formula is suitable to estimate the interpolations near the middle of the table value.

9   Modified Euler's method is the Runge-Kutta method of fourth order.

10   Error in the trapezoidal rule is of the order h^4.

II   **Write Short notes on any FIVE of the following**   (5x2=10)

1   Define interpolation and extrapolation.

2   i)   Write trapezoidal rule.
     ii)   Write Newton's backward difference interpolation formula.

3   Classify the   PDE $f_{xx} - 2 f_{xy} = 0$.

4   Using Gauss elimination method solve $2x + y = 3$
                                              $7x - 3y = 4$

5   Find relation between E and Δ

6   Form the divided difference table for the following data

x	1	2	4	7	12
f(x)	22	30	82	106	206

7   Evaluate $\int_0^1 \left(\frac{1}{1+x^2} \right) dx$ using Trapezoidal rule by taking interval $h = \frac{1}{2}$

P.T.O

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

1   Solve the equation $x^3 - 2x - 5 = 0$ by Newton Raphson method.

2   Using Newton's forward interpolation formula find y at $x = 8$ from the table:

x	0	5	10	15	20	25
y	7	11	14	18	24	32

3   Find the value of $\int_1^2 \left(\frac{1}{5+3x}\right) dx$ using Simpson's rule.

4   Obtain the values of y at $x = 0.1$, 0.2 using R.K method of second order.

5   Solve $\frac{dy}{dx} = x + y$, given $y(1) = 0$, and get $y(1.1)$ by Taylor series method.

6   Using Crank-Nicholson's method solve $u_{xx} = 16u_t, 0 < x < 1, t > 0$ given $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$ .Compute u for one step in t direction taking $h = \frac{1}{4}$.

7   Write short notes on classification of partial differential equation of second order.

IV   **Write Essay on ANY ONE**   (1x10=10)

1. Explain briefly Gauss elimination and Gauss Jordan Methods.

2. The following are data from steam table.

Temp$^{\circ}$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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