KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Engg. & Technology)
VIII Semester Final Re- Examination – August 2023
2019 Admission

Basc.2209 **Numerical Methods for Engineering Applications (1+1)** **Marks: 50**
Time: 2 hours

I State True or False **(10x1=10)**

1. The Runge-Kutta method is self – starting method.
2. The order of convergence in Newton-Raphson method is 2.

Fill in the blanks

3. Milne's predictor formula is ....
4. The bisection methods for finding the root of an equation f(x)=0 is ....
5. The order of the difference equation y_{n+2} -2y_{n+1} +y_n =0 is ....
6. In ....method, we approximate the curve of solution by the tangent in each interval.
7. Simpson's Rule is used for numerical ....
8. In the Gauss elimination method for solving a system of linear algebraic equations, triangularization leads to ....triangular matrix.
9. The number of significant digits in the number 204.020050 is ....
10. ....is used to denote the process of finding the values outside the interval (x_0, x_n).

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

1. If the temperature of a room is 25^{0}C $\pm$0.5^{0}C, find the percentage error.
2. Evaluate $\int_0^1 \frac{dx}{1+x}$ using Trapezoidal rule.
3. Find the value of $\int_1^2 \frac{dx}{5+3x}$ using Simpson's rule.
4. Find the P.I of y_{n+2} - 4yn+1+3y_n =5^n
5. Use Taylor's series method to $\frac{dy}{dx}$ = x^2+y^2, y(0)=1 for x$\in$ [0,0.4] with h=0.2
6. What are the classifications of the partial differential equations?
7. Write Lagrange's interpolation formula.

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

1. Find by Newton's method , the real root of the equation 3x=cos $x + 1$
2. Prove that $E\nabla = \Delta = \nabla E$
3. Given y_3=2, y_4=-6, y_5=8, y_6=9 and y_7=17, calculate $\Delta^4 y_3$
4. Find the polynomial f(x) by using Lagrange's formula and hence find f(3) for

x	0	1	2	5
y	2	3	12	147

5. Construct the backward difference table for the data

x	-1	0	1	2
f(x)	-8	3	1	12

6. Using Newton's divided difference formula, find the values of f(2), f(8) and f(15) given the following table.

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

7. Solve the difference equation y_{x+3} - 2y_{x+2} - y_{x+1} - 2y_x = 0

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

1. Using Taylor series method, find, correct to four decimal places, the value of $y(0.1)$, given $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$
2. Given $y' = x^3 + y$, $y(0) = 2$, compute $y(0.2)$, $y(0.4)$ and $y(0.6)$ using the Runge-Kutta method of fourth order.

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