KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission
IVth Semester One time Special Re-Examination-June -2016

Cat. No: Basc. 2209   Marks: 80.00

Title: Numerical Methods for Engineering Applications (1+1)   Time: 3 hours

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I   Answer the following   10 x 1 =10

1. Newton – Raphson method is also called as _____
2. Gauss – Jordan elimination method is _____ method
3. Jacobi method is used only for _____ matrices
4. The back-ward operator ∇y_n = _____
5. Stirling's formula is useful when _____
6. In Gauss elimination method, the coefficient matrix is transformed to _____ form.

7. Gauss backward interpolation formula is useful when $u = \dfrac{x - x_0}{h}$ lies between _____

8. The order of convergence in Newton- Raphson method is _____
9. If the eigen values of A are -2,1,0 then the determinant of A is _____
10. Simpson's rule will give exact result when we decrease the interval by _____

II   Write short notes on any <u>TEN</u> of the following   10 x 3 = 30

1. What is the order of convergence in Newton-Raphson method? Gauss – Seidal method is better than Gauss-Jacobi method why?
2. Write the Newton's backward interpolation formula.
3. State trapezoidal rule to evaluate $\displaystyle\int_{x_0}^{x_n} y(x)\,dx$

4. Form the divided difference table for the following data :

     x :   2   5   10
     y :   5   29   100

5. Explain Newton's divided difference.
6. Give Newton's divided difference formula
7. Evaluate $\Delta\left(\dfrac{u_k}{v_k}\right)$

8. Give the relation between forward and shift operator.
9. Give the complementary function for the different nature of roots
10. Explain Taylor series
11. Give Runge kutta method of fourth order
12. Find the nature of partial differential equation $x f_{xx} + f_{yy} = 0$.

[|]Answer any SIX of the following

1. Solve $\frac{dy}{dx} = -y$, $y(0)=1$ to find y (0.01) using Euler's method.

2. Differentiate interpolation and Extrapolation.

3. By applying the Fourth order Runge Kutta method find y(0.2) from $y' = y-x$, $y(0) = 2$ taking h =0.1

4. Write Trapezoidal rule for double integrals.

5. What is the advantage and disadvantage in Taylor series method ?

6. (i) Fit a polynomial to the following data

x :	2	4	6	8	10
y :	0	0	1	0	0

(ii) Use Lagrange's interpolation formula to find Y(9.5) from the following table.

x	7	8	9	10
y	3	1	1	9

7. Solve by Gauss-Jacobi method $20x + y - 2z = 17$; $3x + 20y - z \neq -18$; $2x - 3y + 20z = 25$

8. Evaluate $\int_0^1 e^{-x^2} \, dx$ by dividing the range of integration in to four equal parts Using (i) Trapezoidal rule (ii) Simpson's rule

IV Answer any ONE of the following

1. Solve $U_{xx} + U_{yy} = 0$ in $0 \le x \le 4, 0 \le y \le 4$, given that; $U(0,y) = 0$, $U(4,y) = 8 + 2y$,

   $U(x,0) = \frac{x^2}{2}$ and $U(x,4) = 2$, Taking h=k=1. obtain the result, correct to one decimal.

2. Use Gauss elimination method and Gauss Jordan method to solve
   $2x + 3y - z = 5$; $4x + 4y - 3z = 3$; $2x - 3y + 2z = 2$

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