

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg.) 2013 Admission
One Time Re- Examination-February-2017

Cat. No: Basc.2204.

Title: Numerical Methods for Engineering Applications (1+1)

Marks: 50.00

Time: 2 hours

I Answer all questions

(10x1=10)

1. If α, β, γ are the roots of $x^3 - 3x + 2 = 0$, then $\sum \alpha^2 = \dots\dots\dots$.
2. If a is a real root of $f(x) = 0$ lies in $[a, b]$, then the sign of $f(a) \cdot f(b)$ is $\dots\dots\dots$.
3. The order of convergence of Newton-Raphson method
 - a. 2
 - b. 1
 - c. 0
 - d. none
4. If c_1 and c_2 are two real and distinct roots of an auxiliary equation, then the complimentary function is $\dots\dots\dots$.
5. While solving the equation $AX=B$, by Gauss-Jordan method A is transformed into $\dots\dots\dots$ matrix.
 - a. An upper triangular
 - b. A lower triangular
 - c. A diagonal
 - d. A unit matrix
6. The n^{th} difference of n^{th} degree polynomial is $\dots\dots\dots$.
7. $E^n f(x) = \dots\dots\dots$.
8. By Euler's method, $y_n = \dots\dots\dots$.
9. How many positive roots are there for the equation $x^3 + x^2 + x - 100 = 0$.
10. Newton's forward difference formula is applicable for $\dots\dots\dots$ spaced points.

II Write short notes/answers on any FIVE of the following

(5x2=10)

1. State Lagrange's formula for interpolation.
2. Define the operators: E and δ .
3. The Laplace's equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ is $\dots\dots\dots$ equation.
4. Define particular solution.
5. Using Newton - Raphson method $x - \cos x = 0$.
6. Prove that $\mu = \frac{\delta^2}{4} + 1$
7. Obtain the interpolation polynomial for the given data by using Newton's backward formula
 - x : 4 6 8 10
 - y : 1 3 8 16

III Write short answers on any FIVE

(5x4=20)

1. Using bisection method find a real root of $xe^x - 3 = 0$
2. Determine a and b so that the equation $x^4 - 4x^3 + ax^2 + 4x + b = 0$ has two pairs of equal roots. Find the roots.
3. Find the missing term, given
x : 1 2 4 7
y : 4 7 - 30
4. Using Simpson's rule evaluate $\int_0^{\pi} \sin^3 x dx$ from the following data :
x : 0 $\frac{\pi}{4}$ $\frac{\pi}{2}$ $\frac{3\pi}{4}$ π
sinx : 0 0.7071 1 0.7071 0
5. Solve the difference equation $y_{n+3} - 5y_{n+2} + 8y_{n+1} - 4y_n = 0$
6. Using Taylor series method, find y at $x=0.1$, given $\frac{dy}{dx} = \frac{y}{2} + 3x, y(0) = 1$
7. Using Runge-Kutta method of order 2, find $y(1.2)$ for the equation
 $\frac{dy}{dx} = x^2 + y^2; y(1) = 1.5$

IV Write essay on any ONE

(1x10=10)

1. Evaluate $\int_1^2 xe^x dx$ using Trapezoidal and Simpson's rule.
2. Using Euler's method, find the value of $y(1)$ given $\frac{dy}{dx} = x + y; y(0) = 1$ by choosing $h = 0.1$.
