

KERALA AGRICULTURAL UNIVERSITY
B.Tech (Food . Engg) Degree Programme 2015 Admission
IInd Semester Final -Examination- June – July 2016

Cat. No: Basc .2209

Marks: 50.00

Title: Numerical methods for Engineering Application (1+1)

Time: 2 hours

I Answer all question

(10 x 1 =10)

1. If $f(x) = 0$ has no real root between a and b ($a < b$), then $f(a)$ and $f(b)$ are of same sign (True/ False).
2. If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0$, then $\sum \alpha\beta = \dots\dots\dots$
3. Write down the relation between ∇ and E .
4. The $(n + 1)^{\text{th}}$ difference of a polynomial of degree n is $\dots\dots\dots$
5. Define the first divided difference of $f(x)$ for the arguments x_0, x_1 .
6. The error in Simpson's one third rule is of order $\dots\dots\dots$
7. The auxiliary equation corresponding to $y_{n+2} - 4y_{n+1} + 4y_n = 0$ is $\dots\dots\dots$
8. $\nabla(y_n) = \dots\dots\dots$
9. In Euler's method, the actual curve is approximated by a sequence of short straight lines (Yes/ No).
10. The Laplace equation $u_{xx} + u_{yy} = 0$ is an example for parabolic equation (True/ False).

II Answer any FIVE

(5 x 2=10)

1. Solve $x^3 - 15x^2 + 71x - 105 = 0$ given that the roots of the equation are in A.P.
2. If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0$, find the condition if $\alpha + \beta = 0$.
3. Find the root of $4x - e^x = 0$ which lies between 2 and 3 by Newton-Raphson method.
4. Show that $\delta = E^{-1/2} \Delta$.
5. Find the sixth term of the sequence 8, 12, 19, 29, 42,
6. Obtain the divided difference table for

$x:$	0	1	2	4
$y:$	443	384	397	467

7. Use Lagrange's formula to fit a polynomial to the data

$x:$	-1	0	2	3
$y:$	-8	3	1	12

III Answer any FIVE

(5 x 4=20)

1. If α, β, γ are the roots of $x^3 - 14x + 8 = 0$, find $\sum \alpha^2$ and $\sum \alpha^3$.
2. Use bisection method to find a positive root which lies in the interval (1, 2) of the equation $x^3 - x = 1$, correct to two decimal places.
3. Solve the system of equation by Gauss-Jordan method

$$x + 2y + z = 3, \quad 2x + 3y + 3z = 10, \quad 3x - y + 2z = 13.$$

4. Estimate the population in the year 1946 if the population of a town is as follows:

Year x:	1941	1951	1961	1971	1981	1991
Population in lakhs y:	20	24	29	36	46	51

5. From the following table find $f(6)$ using Newton's divided difference formula:

x:	1	2	7	8
y:	1	5	5	4

6. Find the value of $f'(x)$ at $x = 56$ from the following;

x:	50	51	52	53	54	55	56
f(x):	3.684	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

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

IV Answer any ONE

(1 x 10=10)

1. By Crout's method, solve the system

$$x + y + z = 3, \quad 2x - y + 3z = 16, \quad 3x + y - z = -3.$$

2. Using Runge-Kutta method of fourth order find $y(0.2)$ given that $y' = -y; y(0) = 1$ (Take $h = 0.1$).