

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food .Engg) Degree Programme 2015 Admission

II<sup>nd</sup> 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  $\alpha, \beta, \gamma$  are the roots of  $x^3 + px^2 + qx + r = 0$ , then  $\sum \alpha\beta = \dots\dots\dots$
3. Write down the relation between  $\nabla$  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  $\alpha, \beta, \gamma$  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  $\alpha, \beta, \gamma$  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  
 $x + 2y + z = 3$ ,  $2x + 3y + 3z = 10$ ,  $3x - y + 2z = 13$ .
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  
 $x + y + z = 3$ ,  $2x - y + 3z = 16$ ,  $3x + y - z = -3$ .
2. Using Runge-Kutta method of fourth order find  $y(0.2)$  given that  $y' = -y$ ;  $y(0) = 1$  (Take  $h = 0.1$ ).