

# KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg.) 2015 Admission

III<sup>rd</sup> Semester Final Examination-January-2017

Cat. No: Math.2103.

Title: Engineering Mathematics-III(2+1)

Marks: 50.00

Time: 2 hours

## I Fill up the blanks/True or False

(10x1=10)

1. Newton's iterative formula to find the value of  $\sqrt{N}$  is -----
2. The value of  $\int_0^1 \frac{dx}{1+x}$  by Simpson's rule is -----
3. Jacobi's iteration method can be used to solve a system of non-linear equations. (T/F)
4. In terms of E,  $\delta =$  -----
5.  $\mu^2 = 1 - \frac{\delta^2}{4}$  (T/F)
6. Newton's divided difference formula is -----
7. Adams-Bashforth predictor formula to solve  $y' = f(x, y)$  given  $y_0 = y(x_0)$  is -----
8. The disadvantage of Picard's method is -----
9. Laplace transform of  $x$  is -----
10.  $L^{-1} \left[ \frac{1}{(s^2+a^2)^2} \right] =$  -----

## II Write short notes on any FIVE

(5x2=10)

1. Find a root of the equation  $x^3 - 4x - 9 = 0$  using bisection method in 3 stages.
2. Construct Newton's forward interpolation polynomial for the following data.

$x$	4	6	8	10
$y$	1	3	8	16

3. Using Taylor's series method compute the solution of  $\frac{dy}{dx} = x + y$ ,  $y(0) = 1$  at the point  $x = 0.2$  correct to 3 decimal places.
4. Using Euler's method solve for  $y$  at  $x = 0.1$  from  $\frac{dy}{dx} = x + y + xy$ ,  $y(0) = 1$
5. Use Runge-Kutte method of 4<sup>th</sup> order to find  $y(0.1)$ , given  $\frac{dy}{dx} - y = -x$ ,  $y(0) = 2$
6. Find the Laplace Transform of  $te^{-t} \cos ht$
7. Find the Inverse Laplace Transform of  $\frac{(s+2)^2}{(s^2+4s+8)^2}$

## III Write short answers on any FIVE

(5x4=20)

1. Find a root of the equation  $xe^x = \cos x$  using Regula - falsi method correct to 4 decimal places.
2. From the following table find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 2.03$

$x$	1.96	1.98	2	2.02	2.04
$y$	0.7825	0.7739	0.7651	0.7563	0.7473

3. Calculate the value of  $\int_0^{\frac{\pi}{2}} \sin x dx$  by Simpson's rule, using 11 ordinates.
4. Solve the difference equation  $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

5. Given  $\frac{dy}{dx} = \frac{y-x}{y+x}$  with boundary conditions  $y=1$  at  $x=0$ . Find approximately  $y$  when  $x = 0.1$  by Euler's modified method. (4 steps)
6. Evaluate (i)  $\int_0^{\infty} te^{-3t} \sin 3t dt$  (ii)  $L^{-1} [\cot^{-1}(s)]$
7. Using convolution theorem evaluate  $L^{-1} \left[ \frac{s^2}{(s^2+4)^2} \right]$

**IV Write essay on any ONE**

**(1x10=10)**

1. Solve the differential equation  $y' = x^2 + y^2 - 2$  using Milne's predictor-corrector method for  $x=0.3$ , given the initial value  $x=0, y=1$ . The values for  $x = -0.1, 0.1$  and  $0.2$  should be computed by Taylor's series expansion.
2. Use Laplace transform method to solve  $\frac{d^2x}{dt^2} + 9x = \cos 2t$ , if  $x(0)=1, x\left(\frac{\pi}{2}\right) = -1$

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