



## GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester - Regular) Examinations, December – 2022

### 21BBSBS230A1– Engineering Mathematics-III (AGE)

Time: 3 hrs

Maximum: 70 Marks

**Answer ALL questions**  
(The figures in the right hand margin indicate marks)

**PART – A****(2 x 5 = 10 Marks)**Q.1. Answer *ALL* questionsCO #    Blooms  
Level

a. Find the forward difference table for following data:

CO1    K1

x	0	1	2	3	4
y	8	11	9	15	6

b. Prove  $\nabla = 1 - E^{-1}$ .

CO1    K2

c. Write down the Newton's backward interpolation formula.

CO1    K1

d. Find the Laplace transform of  $e^{2t} \cos 3t$ .

CO2    K1

e. Define unit step function. Write the Laplace transform of unit step function.

CO1    K1

**PART – B****(15 x 4 = 60 Marks)**Answer ALL the questionsMarks    CO #    Blooms  
Level2. a. Find the second difference of the polynomial  $f(x) = x^4 - 12x^3 + 42x^2 - 30x + 9$  with  $h = 2$ . (Show details)

8    CO2    K2

b. Find the function whose first difference is  $\Delta y = x^3 + 3x^2 + 5x + 12$ .

7    CO2    K3

(OR)

c. Let  $y = f(x)$  is given by the following table. Find  $f(0.2)$  by Newton's forward interpolation formula

8    CO2    K2

x	0	1	2	3	4	5	6
y	176	185	194	203	212	220	229

d. Apply Stirling formula to find  $y(25)$  for the following data

7    CO2    K2

x	20	24	28	32
y	2854	3162	3544	3992

3.a. Use Lagrange's formula to find the value of  $y$  at  $x = 6$  from the following data

8    CO3    K2

x	3	7	9	10
y	168	120	72	63

b. Using modified Euler's method find  $y(0.1), y(0.2)$  by solving

7    CO3    K2

$$\frac{dy}{dx} = 1 + xy; \quad y(0) = 2.$$

(OR)

- c. Using Newton's divided difference formula evaluate  $f(8)$  given that 8 CO3 K2

$x$	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

- d. Evaluate  $\int_0^5 \frac{dx}{4x+5}$  by Trapezoidal rule using 10 sub intervals. 7 CO3 K2
- 4.a. Solve  $4y'' - 4y' + 37y = 0$ ,  $y(0) = 3$ ,  $y'(0) = 10.5$  using Laplace Transformation. 8 CO3 K3
- b. Find Inverse Laplace Transformation of  $\frac{\omega}{s^2(s^2 + \omega^2)}$  using convolution. 7 CO3 K2

(OR)

- c. Solve the following system of equations by Laplace Transformation. 10 CO3 K3  
 $y_1' = -y_1 + y_2$ ;  $y_1(0) = 1$   
 $y_2' = -y_1 - y_2$ ;  $y_2(0) = 0$
- d. Solve the integral equation  $y(t) = 1 + \int_0^t y(\tau) d\tau$ . 5 CO3 K2
- 5.a. Solve the integral equation  $y(t) = \sin t + \int_0^t y(\tau) \cdot \cos(t - \tau) d\tau$ . 8 CO3 K2
- b. The 9<sup>th</sup> grade algebra scores in a school district have been normally distributed with a mean of 75 and standard deviation of 8.25. A new teaching system is introduced to a random sample of 25 students, and in the first year under the new system the average score is 78.2. What is the probability that an average this high would occur a random sample of 25 students in a given year under the old system? 7 CO4 K2

(OR)

- c. Find the correlation coefficient from the following data: 8 CO4 K2

$y$	35	49	27	33	60	21	45	51
$x$	8	9	7	6	13	7	11	12

- d. Find the regression line of  $y$  on  $x$  for the following data 7 CO4 K2

$x$	6	2	10	4	8
$y$	9	11	5	8	7

--- End of Paper ---