Cat. No: Math.2103   Marks: 50.00
Title: Engineering Mathematics III (2+1)   Time: 2 hours

I Answer the following   **(10 x 1=10)**

1. Express e^{hD} in terms of fundamental operator

2. State Simpson's one third formula for numerical integration

3. Order of the difference equation is _____

4. Write the general form of linear difference equation with constant coefficients

5. Adams- Bashforth predictor formula is _____

6. Laplace transformation of $e^{at} \sin bt$

7. One root of the equation $x^3 - 4x - 9 = 0$ lies between _____and _____

8. The disadvantage of Picard's method is _____

9. Laplace transform of x^2 is _____

10. $L^{-1}\left[\dfrac{1}{(s^2 + a^2)^2}\right] =$ _____

II Write the answers of any FIVE questions   **(5 x 2=10)**

1. Write the algorithm for solution of the equations in graphical method

2. Using Newton Raphson method find a root of the equation correct to 2 decimal places x^4 -12 x +7=0

3. Solve by Gauss elimination method the equations

   2x + 2y+z =12

   3x + 2y+2z =8

   5x+ 10y -8z =10

4. Using Taylor's series method compute the solution of $\dfrac{dy}{dx} = x + y$, $y(0) =1$ at the point x =0.2 correct to 3 decimal places

5. Given the following table of values of x and y

X:	0.35	0.40	0.45	0.50	0.55	0.60	0.65
Y:	1.521	1.506	1.488	1.467	1.444	1.418	1.389

find $\dfrac{dy}{dx}$ at x = 0.5

6. Find the cubic polynomial which takes the following values

X: 0   1   2   3

F(x): 1   2   1   10

7. Using convolution theorem evaluate $L^{-1}\left[\dfrac{1}{s\,(s^2-a^2)}\right]$

III Write the answers of any FIVE questions   (5 x 4=20)

1. Find a root of equation $x\,log\,x =1.2$ using Regula –falsi method

2. Apply Bessel's formula to obtain y_{25}, given $y_{20}= 2854$,$y_{24} =3162$, $y_{28} = 3544$, $y_{32} =3992$

3. Derive Trapizoidal rule from Newton Cote's quadrature formula

4. Solve the following by Gauss Seidel method Solve the difference equation

    $1.2x + 2.1y + 4.2\ z=9.9$, $5.3\ x + 6.1\ y+ 4.7z=21.6$, $9.2\ x +8.3y + z=15.2$

5. Given $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}$ with boundary conditions y =1 at x=0. Find approximately y when x=0.1 by Euler's modified method.(4 steps)

6. Find the Laplace transform of $(1-cost)/t^2$

7. Find the Laplace transform of the square wave function of period a defined as

$$f(t) = \begin{cases} 1, & 0 < t < \dfrac{a}{2} \\ -1, & \dfrac{a}{2} < t < a \end{cases}$$

IV Write the answers of any ONE   (1 x 10=10)

1. Using Runge –Kutta method of order 4 find y for y(0) =1 .Continue the solution at x=0.4 using Milne's method

2. Using unit step function find the Laplace of $f(t)=\begin{cases} sint, & 0 \le t \le \pi \\ sin\,2t, & \pi \le t \le 2\pi \\ sin3t, & t \ge 2\pi \end{cases}$