3RD SEM./ ELECTRICAL/ E &TC/ CSE/ IT/ AE&IE /AUTO/ DME/ ELECTRICAL & ETC /MECH(PROD.) /MECH / 2022(W)

BST-301 ENGINEERING MATHEMATICS - III

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Find C.F of $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$

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

c. Define periodic function with an example

d. Define Upper triangular matrices with an example

e. Find $L(cos^2 t)$

f. Define Numerical Integration and state Simpsons $\frac{1}{3}$ Rule

g. Form partial differential equation by eliminating arbitrary constants $z = ax + by + c$

h. Write down the Lagranges interpolation formula

i. Find PI of $\frac{xv}{F(D)}$ where v is the function of x

j. Find $L^{-1}\left\{\frac{s-2}{(s-2)^2-9}\right\}$

2. Answer **Any Six** Questions 6 x 5

a. Find Rank of matrices $\begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$

b. Find Particular Integral of $(D^2 - 4D + 3)y = e^x \cos 2x$

c. Find Laplace transform of $L(te^{-t} \sin 3t)$

d. Find root of equation $x^3 - x - 11 = 0$ using Bisection method correct upto two decimal places

e. Expand $f(x) = x^2$ as a Fourier series in the interval $(-\pi, \pi)$

f. Obtain function whose first difference is $2x^3 + 3x^2 - 5x + 4$

g Using Newton Forward interpolation formula , find the value of $\sin 52^0$ from the following data

$\sin 45$	$\sin 50$	$\sin 55$	$\sin 60$
0.7071	0.7660	0.8192	0.8660

3	a)	Integrate Numerically $\int_0^1 x^3\,dx$, considering five sub interval.	5
	b)	Find the inverse Laplace transform of $L^{-1}\left\{\frac{5s+3}{(s-1)(s-2)(s-3)}\right\}$	5
4	a)	Test the consistency if possible find solution $2x+3y+4z=11\,, x+5y+7z=15\ \,, 3x+11y+13z=2$	5
	b)	Find the missing term in the following table x 0 1 2 3 4 y 1 3 9 − 81	5
5	a)	Find particular Integral of($D^2+3D+2)y=e^{e^x}$	5
	b)	Expand $f(x)=\sin x$ as a Fourier Series in the interval $(-\pi,\pi)$	5
6		Solve $x(y^2-z^2)p+y(z^2-x^2)q=z(x^2-y^2)$	10
7		Use transform method to solve $\frac{d^2x}{dt^2}-2\frac{dx}{dt}+x=e^t\ with\ x=2, \frac{dx}{dt}=-1\ \ at\ t=0$	10