Silicon
beyond teaching

Silicon Institute of Technology
Silicon Hills, Bhubaneswar
| An Autonomous Institute |

2nd Semester B.Tech. Mid Term Examination 2019-2020
ENGINEERING MATHEMATICS-II(18BS1T02)

Duration: 01:30 Full Marks: 25

1 ***Answer All***

a Find $L^{-1}\left\{\frac{s^2+2}{s^2+9}\right\}$. 1

b State the existence theorem for Laplace transforms. 1

c Find L(e^{2t} u(t - 3). 1

d Find $L\{u(t-3)*\delta(t-4)\}$. 1

e Find L{ cosh at * sinh at} 1

2 ***Answer any Two***

a Find $L^{-1}\left\{\frac{3}{S^2+6s+18}\right\}$. 2

b Find L(f(t)) where $f\left(t\right)=\begin{cases} t^2, & 0\le t\le 1 \\ 2t, & 1\le t\le 3 \\ 0, & t>3 \end{cases}$. 2

c Find the inverse Laplace transform of $\frac{s^3+6s^2+14s}{(s+2)^4}$ 2

d Find L (t^2 sin wt). 2

3 ***Answer any Two***

a Solve $y''+y=t$, $y(0)= y'(0)=0$. 2

b Find $L^{-1}\left(\frac{5s}{(s^2+4)(s^2+25)}\right)$. 2

c Using Laplace transform solve $y''+4y=1$, $y(0)=0$, $y'(0)=0$. 2

d Find $L^{-1}\left\{\frac{1}{s^3(s-5)}\right\}$. 2

4 ***Answer any Two***

a Using Laplace transform solve $y'' - 8y' +15y=9+e^{2t}$, $y(0)=5$, $y'(0)= 10$. 3

b Prove that $\frac{1}{2w}L\{\sin wt + wt \cos wt\}= \frac{s^2}{(s^2+w^2)^2}$. 3

[P. T. O.]

c Using The Laplace Transform, find the current i(t) in the RL circuit with R=4 Ohms and L=2 Henry, Assuming 3

i(0)=0 and v(t)=t if $0<t<4\pi$ and 0 if $t>4\pi$

d Solve $y''+2y' - 3y=6e^{-2t}$, $y(0)=2$, $y'(0)= -14$. 3

5 ***Answer any Two***

a Find $L^{-1}\left\{\ln\left(1+\frac{1}{s^2}\right)\right\}$ 3

b Solve $y(t) = \sin 2t + \int_0^t y(\tau) \sin 2(t-\tau)\, d\tau$. 3

c Solve $y'' + y = 5\cos 2t,\ y(0) = 0,\ y'(0) = 0$. 3

d Solve the simultaneous differential equations using Laplace transform 3

$y_1'-y_2=0$, $y_1(0)=1$

$y_2'+y_1=2\cos t$, $y_2(0)=0$

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