MATHS-7B

SEMESTER-5

LONGS

short tricks 4u

PH: 9581234096

*UNIT-1 :-

① Find the Laplace transforms of the function

$$f(t) = \begin{cases} 2t ; & 0 \leq t \leq 5 \\ 1 ; & t > 5 \end{cases}$$

*② State and Prove first shifting theorem? Also find the Laplace transforms of $e^{-3t}(2\cos 5t - 3\sin 5t)$. (Pg.15)

*③ State and prove Second shifting theorem? Also find Laplace transforms of $G(t) = \begin{cases} \sin(t-\frac{\pi}{3}) ; & t > \frac{\pi}{3} \\ 0 ; & t < \frac{\pi}{3} \end{cases}$.

(Pg.19)

*④ State and Prove change of scale property? Applying the change of scale property if $L[f(t)] = \frac{p^2-p+1}{(2p+1)^2(p-1)}$ then S.T. $L[f(2t)] = \frac{p^2-2p+4}{4(p+1)^2(p-2)}$. (Pg.22)

* UNIT-2 :-

*① State and Prove Initial Value theorem? (Pg NO.16)

*② State and Prove final Value theorem? (Pg. NO.17)

③ State and prove Laplace transforms of integrals? (Pg.18)

④ Evaluate i, $\int_0^\infty t e^{-2t} \sin t \, dt$

ii, $\int_0^\infty t e^{-2t} \cos t \, dt$. (Pg. NO.7)

* UNIT-3 :-

① Find the inverse Laplace of i, $\frac{s^2}{(s-2)^3}$ (Pg.6)

ii, $\frac{6}{2s-3} - \frac{3+4s}{9s^2-16} + \frac{8-6s}{16s^2+9}$.

② Define Inverse Laplace Transforms? State and Prove First shifting on inverse Laplace transforms (Pg.13)

③ State and Prove Change of Scale property on Inverse Laplace transforms. (Pg.15)

④ State and Prove Second shifting theorem on inverse Laplace transforms? (Pg.16)

* UNIT-4 :-

① Solve $(D^2+D)x = 2$ if $x(0)=3$, $x'(0)=1$.

② Solve by Laplace transform $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 5y = e^{t}\sin t$, where $y(0)=0$, $y'(0)=1$.

③ Solve the integral equation $F(t) = 1 + \int_0^t F(u)\sin(t-u)\,du$ & Verify your Solution.

④ Solve the integral equation $\int_0^t \frac{F(u)\,du}{(t-u)^{1/3}} = t(1+t)$.

PH: 9581234096

Mahesh Sir: 958 1234 096

* UNIT-5 :-

① Find the fourier transform of $f(x) = \begin{cases} 1-x^2 ; & |x| \le 1 \\ 0 ; & |x| > 1 \end{cases}$

and Hence evaluate $\int_0^\infty \left(\frac{x\cos x - \sin x}{x^3}\right) \cos\frac{x}{2}\, dx.$

② Find fourier Sine transform of $\frac{e^{-ax}}{x}$ and deduce that $\int_0^\infty \frac{e^{-ax} - e^{-bx}}{x} \sin px\, dx = \tan^{-1}\frac{p}{a} - \tan^{-1}\frac{p}{b}.$

③ Find the finite Sine transform of $f(x)$ if

$$f(x) = \begin{cases} x & ; \ 0 \le x \le \pi/2 \\ \pi - x & ; \ \pi/2 \le x \le \pi. \end{cases}$$

④ Find the finite fourier Sine transform of

$f(x) = x^2 ; 0 \le x \le 4.$

SHORTS

9581234096

*UNIT-1 :-

1. Find Laplace transforms of
   i) $e^{2t} - 4t^3 - 2\sin 3t + 3\cos 3t$
   ii) $t^3 + 2t^2 - 4t + 6$ (Pg.NO.6)

2. Find $L(\cos(at+b))$ and $L(\sin t - \cos t)^2$ (Pg.NO.10)

3. Evaluate $L(e^{3t}\sin^2 t)$ and $L(e^{-2t}\sin 4t)$. (Pg.17)

4. Find $L[f(t)]$, where

$$f(t) = \begin{cases} 4 ; & 0<t<1 \\ 3 ; & t>1 \end{cases}$$ [Pg.NO.12]

* UNIT-2 :-

1. Find the Laplace transforms of i) $t\cos at$ ii) $t^2\sin at$ iii) $t^3 e^{-3t}$. (Pg.3)

2. P.T. $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{p}$. Hence find $L\left(\frac{\sin at}{t}\right)$. (Pg-5)

3. Evaluate i) $L\left(e^{-4t}\frac{\sin 3t}{t}\right)$ ii) $\int_p^\infty t \sin^{-3t}\sin t$ (Pg.9)

* UNIT-3 :-

1. Evaluate $L^{-1}\left[\frac{s+1}{s^2+6s+25}\right]$. (Pg.NO.5)

2. Evaluate $L^{-1}\left[\frac{s+3}{s^2-4s+13}\right]$ (Pg-6)

3. Evaluate $L^{-1}\left[\frac{3(s^2-2)^2}{2s^5}\right]$ (Pg.9)

4. Evaluate $L^{-1}\left[\frac{2s-5}{4s^2+25} + \frac{4s-18}{9-s^2}\right]$ (Pg.9)

UNIT-4 :-

1. Solve $(D^2-2D+2)y=0$, $y=Dy=1$, when $t=0$.
2. Show that $f(t)=\cos t+\int_0^t e^{-u} f(t-u)\, du$.
3. Solve the integral equation $F(t)=a\sin t-2\int_0^t F(u)\cdot \cos(t-u)\, du$.
4. Solve $(D^2+1)x=t\cos 2t$ given $x=0$, $\frac{dx}{dt}=0$, at $t=0$.

* Unit 5:

1. Define Fourier Sine and Cosine integrals.
2. Define shifting Property.
3. Find Fourier Sine & Cosine transform of $f(x)=x$.
4. Show that $\int_0^\infty \frac{\cos \lambda x}{\lambda^2+1}\, d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$
5. State and Prove Parseval's Identity.

9581234096