

Assignment
Engineering Mathematics - II
Sections: E & K

Laplace Transform

1. Find the Laplace transform of $\cos(\sqrt{t})$
2. Find the Laplace transform of $\frac{e^{at}-e^{bt}}{t^{\frac{3}{2}}}$
3. Prove that $\int_0^\infty \frac{e^{-\sqrt{2}t} \sinh t \sin t}{t} dt = \frac{\pi}{8}$
4. Find the Laplace transform of the periodic function $f(t) = \frac{at}{b}$ and $f(a+t) = f(t)$.
5. Find the Laplace transform of $e^t + \cos \pi t u(t-2)$

Inverse Laplace Transform

1. Find the inverse Laplace transform of $\frac{\sqrt{s+9}}{s^{\frac{3}{2}}}$
2. Find the inverse Laplace transform of $\frac{s^2}{(s-1)(s^2+1)}$
3. Find the inverse Laplace transform of $\sqrt{s-a} - \sqrt{s-b}$
4. Find the inverse Laplace transform of $\frac{1}{(s+1)(s^2+1)}$ using Convolution Theorem.
5. Solve by using Laplace transform $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = 0$, given that $y(0) = 0, y'(0) = 1$.

Fourier Series

1. Find the Fourier series of $x + x^2$ in $-\pi < x < \pi$.
2. Find the Fourier series to represent x^2 in the interval $(-l, l)$.
3. Expand $f(x) = x, 0 < x < 2$ in a half range sine and cosine series.
4. Find the complex form of the Fourier series expansion of $\sin t$ ($0 < t < \pi$), $f(t+\pi) = f(t)$.
5. The following values of x and y are given. Expand y in the form of a Fourier series upto the second harmonic.

x	0	2	4	6	8	10	12
y	9	18.2	24.4	27.8	27.5	22	9

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