

SARDAR VALLABHBHAI PATEL INSTITUTE OF TECHNOLOGY
VASAD

B. E. Third Semester (2017-18)

Subject: Advanced Engineering Mathematics (2130002)

Tutorial: 5

1 Find the Laplace Transform of the following.

(i) e^{-at}

(ii) t^n ; n is nonnegative integer

(iii) $\sinh kt$

(iv) $\sin 2t \cdot \cos 2t$

(v) $f(t) = \begin{cases} 0; 0 \leq t < 2 \\ 3; t \geq 2 \end{cases}$

(vi) $f(t) = \begin{cases} 0; 0 < t < \pi \\ \sin t; t > \pi \end{cases}$

(vii) $\cos^2 at$

(viii) $e^{2t} \sinh 2t \cdot \cos 3t$

(ix) $e^t (t+1)^2$

2 Find the Inverse Laplace Transform of the following.

(i) $\frac{6s}{s^2 - 16}$

(ii) $\frac{10}{(s-2)^4}$

(iii) $\frac{s^3 + 2s^2 + 2}{s^3(s^2 + 1)}$

(iv) $\frac{s^3}{s^4 - 81}$

(v) $\frac{3}{s^2 + 6s + 18}$

(vi) $\frac{s+10}{s^2 - s - 2}$

(vii) $\frac{5s+3}{(s^2 + 2s+5)(s-1)}$

(viii) $\frac{1}{(s+\sqrt{2})(s+\sqrt{3})}$

(ix) $\ln \frac{s^2 + 1}{(s-1)^2}$

(x) $\log \left(\frac{s+a}{s+b} \right)$

(xi) $\ln \left(1 + \frac{\omega^2}{s^2} \right)$

(xii) $\cot^{-1} \left(\frac{s+a}{b} \right)$

3 Find the Laplace Transform of the following.

(i) $t \sin \omega t$

(ii) $t^2 \sin \pi t$

(iii) $t^2 \sinh at$

(iv) $\frac{\sin 2t}{t}$

(v) $\int_0^t e^t t^2 \sin t \, dt$

(vi) $\int_0^t \frac{e^{-4t} \sin 3t}{t} \, dt$

(vii) $\int_0^t e^{-x} \cos x \, dx$

(viii) $\int_0^t \int_0^t \sin audu \, du$

(ix) $\int_0^t t e^{3t} \, dt$