Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)
Assignment 1 (Part 1: Laplace Transforms)

Course Instructor: Nishant Sutar. Last Date of Submission: 30th August 2024.

Instructions:

1. Value of a is the remainder +2 when your PRN is divided by 5.
2. Complete the assignment on A4 size paper.
3. Write your name, PR number, branch and the value of a at the start of the answer sheet.
4. You can submit the assignment before the last date. I would suggest to complete it in a week from the date of the assignment. Don't wait for the last date.
5. Note that this is simply a part of the assignment, so you will have next part as the next topics are covered.

Questions:

(Q.1) Find the Laplace transform of the following
(i) $sinh^3(at)$. (ii) $t^2e^{-2t}cos(at)$. (iii) $\int_0^t te^{at}sint\ dt$.

(Q.2) Find the inverse Laplace transform of the following
(i) $L^{-1}\left\{\frac{s^2}{(s^2+a^2)^2}\right\}$. (ii) $L^{-1}\left\{\frac{1}{s(s^2+a^2)}\right\}$. (iii) $L^{-1}\left\{\frac{a}{(s^2+1)^3}\right\}$.

(Q.3) Solve the following Linear Differential equations using Laplace transform
(i) $y''(t) + 25y = 10\ cos(5t)$, given that, $y(0) = 2$ and $y'(0) = 0$.
(ii) $(D^3 + D^2)x = 6t^2 + 4$, given that, $x''(0) = 0$, $x'(0) = 2$ and $x(0) = 0$.