Assignment # 3
Differential Equations (MT-224)
Date of Submission: 28th May, 2021
Total marks: 16, Total weightage: 8
(CLO-1)

Find Laplace by the definition $\mathcal{L}\{f(t)\}$ for the following: **[marks: 4, weightage: 2]**

1. $f(t) = \begin{cases} e^t & t \leq 2 \\ 3 & t > 2 \end{cases}$
2. $f(t) = 3 + 2t^2$
3. $f(t) = 5\sin 3t - 17e^{-2t}$
4. $f(t) = te^{4t}$

Find Laplace Inverse of the following: **[marks: 4, weightage: 2]**

1. $\mathcal{L}^{-1}\left\{\frac{1}{s(s^2+2s+5)}\right\}$
2. $\mathcal{L}^{-1}\left\{\frac{7s-1}{(s+1)(s+2)(s-3)}\right\}$
3. $\mathcal{L}^{-1}\left\{\frac{s^2+9s+2}{(s-1)^2(s+3)}\right\}$
4. $\mathcal{L}^{-1}\left\{\frac{2s^2+10s}{(s^2-2s+5)}(s+1)\right\}$

Solve the following differential equations by Laplace and then confirm the general solution by analytical method.

[marks: 8, weightage: 4]

1. $y' - 5y = e^{5x}$ $\quad y(0) = 0$
2. $y' + y = \sin x$ $\quad y(0) = 1$
3. $y'' - y' = 2x$ $\quad y(0) = 1, \quad y'(0) = -2$
4. $y'' - 2y' + 5y = -8e^{7-x}$ $\quad y(7) = 2, \quad y'(7) = 12$