1.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to controllable canonical form. $\dot{x} = \begin{bmatrix} -5 & 0 \\ 0 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u \quad y = [3 \quad 6]x + 10u$
2.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to diagonal canonical form. $\dot{x} = \begin{bmatrix} -5 & 2 \\ 3 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad y = [13 \quad 16]x$
3.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to observable canonical form. $\dot{x} = \begin{bmatrix} 10 & 8 \\ 3 & 6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 21 \end{bmatrix} u \quad y = [30 \quad 26]x + 100u$
4.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the step response of the system. Convert the model to controllable canonical form. $\dot{x} = \begin{bmatrix} -5 & 0 \\ 3 & -6 \end{bmatrix} x + \begin{bmatrix} 10 \\ 0 \end{bmatrix} u \quad y = [3 \quad 0]x + 20u$
5.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the step response of the system. Convert the model to diagonal canonical form. $\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u \quad y = [3 \quad 6 \quad 9]x + 10u$
6.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the ramp response of the system using work space in Simulink. $\dot{x} = \begin{bmatrix} -5 & 0 \\ -9 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 51 \end{bmatrix} u \quad y = [3 \quad 6]x + 160u$
7.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to controllable canonical form. $\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 9 & -2 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 5 \\ 1 \end{bmatrix} u \quad y = [3 \quad 0 \quad 9]x + 15u$
8.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to controllable canonical form. $= \begin{bmatrix} 0 & 0 & -3 \\ 1 & 0 & -5 \\ 0 & 1 & -8 \end{bmatrix} x + \begin{bmatrix} 15 \\ 21 \\ 31 \end{bmatrix} u \quad y = [0 \quad 0 \quad 1]x + 10u$
9.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the ramp response of the system. Convert the model to controllable and observable canonical form. $\dot{x} = \begin{bmatrix} -5 & 0 \\ 0 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u \quad y = [3 \quad 6]x + 10u$
10.	Develop the mathematical model of a system having state model given below. Also determine the transfer function. Observe the impulse response of the system. Convert the model to controllable and diagonal canonical form. $\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 9 & -2 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 5 \\ 1 \end{bmatrix} u \quad y = [3 \quad 0 \quad 9]x + 15u$
11.	Develop the mathematical model of a system having Transfer function $\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{5S+10})}{(\mathbf{S^2+5S+25})}$. Also determine the state model. Observe the ramp response of the system. Develop the model in controllable and diagonal canonical form.

12.	Develop the mathematical model of a system having Transfer function $$\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{10})}{(\mathbf{S^2+5S+25})}.$$ Also determine the state model. Observe the ramp response of the system. Develop the model in controllable and diagonal canonical form.
13.	Develop the mathematical model of a system having Transfer function $$\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{S^2+5S+10})}{(\mathbf{S^2+5S+25})}.$$ Also determine the state model. Observe the step response of the system. Develop the model in controllable and diagonal canonical form.
14.	Develop the mathematical model of a system having Transfer function $$\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{5S+10})}{(\mathbf{S^2+5S+25})}.$$ if the system is excited by a step input then observe the response using workspace.
15.	Develop the mathematical model of a system having Transfer function $$\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{10})}{(\mathbf{S^3+3S^2+5S+25})}.$$ Also determine the state model. Observe the step response of the system. Develop the model in controllable and diagonal canonical form.
16.	Write the polynomials $\mathbf{P(S) = S^6 + 9S^5 + 15S^3 + 3S^2 + 5S + 25)}$ $$\mathbf{G(S) = 9S^5 + 15S^3 + 3S^2 + 5S + 25)}$$ Determine the polynomial $\mathbf{P(S) + G(S), P(S) * G(S), P(S)/G(S).}$ And their roots. Proceed the same thing using symbolic math.
17.	Find the laplace of $\mathbf{f(t) = t^2} + \boldsymbol{sin5t * e^{-3t}}$. Plot the response of f(t) for the variation of t from 0 to10sec. Find the inverse laplace of $\mathbf{F(s)} = \frac{\mathbf{(5S+10)}}{\mathbf{(S^2+5S+25)}}$. And also find the residues.
18.	Enter the matrix A= $\begin{bmatrix} 0 & 1 & 0 \\ 9 & -2 & 1 \\ -2 & -6 & -8 \end{bmatrix}$. B= $\begin{bmatrix} 10 & 1 & 0 \\ 9 & -2 & 51 \\ -12 & -16 & -8 \end{bmatrix}$ Find the determinant, transpose, inverse, determinant, rank and Eigen values and vectors. Find the matrix which will be the multiplication of elements.
19.	Develop the mathematical model of a system having Transfer function $$\frac{\mathbf{Y}}{\mathbf{U}} = \frac{(\mathbf{5S+10})}{(\mathbf{S^2+5S+25})}.$$ if the system is excited by a step input then observe the response for a period of 10sec.