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.
	$\dot{x} = \begin{bmatrix} -5 & 0 \\ 0 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 3 & 6 \end{bmatrix} x + 10u$ Develop the mathematical model of a system having state model given below.
2.	Also determine the transfer function. Observe the impulse response of the system. Convert the model to diagonal canonical form.
	$\dot{x} = \begin{bmatrix} -5 & 2 \\ 3 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 13 & 16 \end{bmatrix} x$ Develop the mathematical model of a system having state model given below.
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. $\dot{x} = \begin{bmatrix} 10 & 8 \\ 3 & 6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 21 \end{bmatrix} u  y = \begin{bmatrix} 30 & 26 \end{bmatrix} x + 100u$ Develop the mathematical model of a system having state model given below.
	$\begin{bmatrix} x - 1 & 3 & 6 \end{bmatrix}^{x} + \begin{bmatrix} 21 \end{bmatrix}^{y} = \begin{bmatrix} 30 & 20 \end{bmatrix}^{x} + \begin{bmatrix} 30 & 2 \end{bmatrix}^{x} + $
4.	Also determine the transfer function. Observe the step response of the system.  Convert the model to controllable canonical form.
	$\begin{bmatrix} x - [3 -6]^{x+} [0]^{u-y-[3-0]x+20u} \end{bmatrix}$
5.	$\dot{x} = \begin{bmatrix} -5 & 0 \\ 3 & -6 \end{bmatrix} x + \begin{bmatrix} 10 \\ 0 \end{bmatrix} u  y = \begin{bmatrix} 3 & 0 \end{bmatrix} x + 20u$ 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. $\begin{bmatrix} 0 & 1 & 0 \end{bmatrix}  \begin{bmatrix} 0 \end{bmatrix}$
	$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 3 & 6 & 9 \end{bmatrix} x + 10u$ Develop the mathematical model of a system having state model given below.
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.
	$\dot{x} = \begin{bmatrix} -5 & 0 \\ -9 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 51 \end{bmatrix} u  y = \begin{bmatrix} 3 & 6 \end{bmatrix} x + 160u$ Develop the mathematical model of a system having state model given below.
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.
	$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 9 & -2 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 5 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 3 & 0 & 9 \end{bmatrix} x + 15u$
	$\begin{bmatrix} x & y & 2 & 1 &   x +   & 3 &   & 4 &   & 4 &   & 4 &   & & & & & &$
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{vmatrix} 0 & 0 & -3 \\ 1 & 0 & -5 \end{vmatrix} x + \begin{bmatrix} 15 \\ 21 \end{vmatrix} u  y = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix} x + 10u $
	Develop the mathematical model of a system having state model given below.
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.
	$\dot{x} = \begin{bmatrix} -5 & 0 \\ 0 & -6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 3 & 6 \end{bmatrix} x + 10u$ Develop the mathematical model of a system having state model given below.
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.
	[ 0 1 0] [0]
	$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 9 & -2 & 1 \\ -2 & -6 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 5 \\ 1 \end{bmatrix} u  y = \begin{bmatrix} 3 & 0 & 9 \end{bmatrix} x + 15u$
11.	Develop the mathematical model of a system having Transfer function
	$\frac{Y}{U} = \frac{(5S + 10)}{(S^2 + 5S + 25)}.$
	$(S^2 + 5S + 25)$ Also determine the state model. Observe the ramp response of the system.
	Develop the model in controllable and diagonal canonical form.
	2010204 0220 2220 0220 0220 0220 0220 02
	•

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