```
f = 60;
P = 8;
slip = 0.04;
n_sync = f*120/P;
w_sync = (n_sync/60)*2*pi;
n_m = (1 - slip)*n_sync;
w_m = (n_m/60)*2*pi;
```

The State Space model can be expressed as:

$$\begin{bmatrix} v_A \\ v_B \\ v_C \\ v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} r_s & 0 & 0 & 0 & 0 & 0 \\ 0 & r_s & 0 & 0 & 0 & 0 \\ 0 & 0 & r_s & 0 & 0 & 0 \\ 0 & 0 & 0 & r_r & 0 & 0 \\ 0 & 0 & 0 & 0 & r_r & 0 \\ 0 & 0 & 0 & 0 & 0 & r_r \end{bmatrix} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} + \left\{ \frac{d}{dt} \cdot \begin{bmatrix} 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \end{bmatrix} \right\} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} +$$

$$\begin{bmatrix} L_{ss} & L_{sm} & L_{sm} & L_{srm} & L_{srm} & L_{srm} \\ L_{sm} & L_{ss} & L_{sm} & L_{srm} & L_{srm} & L_{srm} \\ L_{sm} & L_{sm} & L_{ss} & L_{srm} & L_{srm} & L_{srm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rr} & L_{rm} & L_{rm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rm} & L_{rr} & L_{rm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rm} & L_{rm} & L_{rr} \end{bmatrix} \cdot \left\{ \frac{d}{dt} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} \right\}$$

State Space Model of the Three-Phase Induction Motor with stator / rotor self and mutual inductances that includes ohmic, rotational and transformer voltage expressions.

Here the SS Model Matrices are as follows:

$$R = \begin{bmatrix} r_s & 0 & 0 & 0 & 0 & 0 \\ 0 & r_s & 0 & 0 & 0 & 0 \\ 0 & 0 & r_s & 0 & 0 & 0 \\ 0 & 0 & 0 & r_r & 0 & 0 \\ 0 & 0 & 0 & 0 & r_r & 0 \\ 0 & 0 & 0 & 0 & 0 & r_r \end{bmatrix} = \begin{bmatrix} 0.52 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.52 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.52 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.634 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.634 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.634 \end{bmatrix}$$

Also, L is given as:

0.0738	-0.0354	-0.0354	LAa	LAb	LAc
-0.0354	0.0738	-0.0354	LBa	LBb	LBc
-0.0354	-0.0354	0.0738	LCa	LCb	LCc
LaA	LaB	LaC	0.0738	-0.0354	-0.0354
LbA	LbB	LbC	-0.0354	0.0738	-0.0354
LcA	LcB	LcC	-0.0354	-0.0354	0.0738

The expressions for the rest of inductances in the sub-matrices L_{sr} and its transpose are given in slides 8 to 10 of the lecture slides.