The state space model is given by,

$$z_t = A z_{t-1} + e_t \quad , e_t \sim N(0,R)$$
$$x_t = C z_t + v_t \quad ; v_t \sim N(0,Q)$$

To find the state space representation for ARIMA $(p,d,q) \times (P,D,Q)_s$,

$$\Phi^P(B^s)\phi^p(B)(1-B^s)^D(1-B)^d x_t = \Theta^Q(B^s)\theta^q(B) w_t$$
$$\Phi^P(B^s)\phi^p(B)(1-B^s)^D(1-B)^d \underbrace{[\Theta^Q(B^s)\theta^q(B)]^{-1} x_t}_{z_t} = w_t$$

$$\therefore \Phi^P(B^s)\phi^p(B)(1-B^s)^D(1-B)^d z_t = w_t \quad \longleftarrow AR$$

Matrix A will be,

$$A = \begin{bmatrix} \phi_1 & \phi_2 & \phi_3 & \cdots & \phi_r \\ 1 & 0 & \cdots & \cdots & 0 \\ \vdots & 1 & & & \vdots \\ \vdots & & \ddots & & \vdots \\ 0 & 0 & \cdots & \cdots & 1 \end{bmatrix}$$

where $r = \max(P + p + d + Ds, sQ + q + 1)$

$\therefore$ The AR equation can be written as,

$$\begin{bmatrix} z_t \\ z_{t-1} \\ \vdots \\ z_{t-r+1} \end{bmatrix} = \begin{bmatrix} \phi_1 & \phi_2 & \cdots & \phi_r \\ 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \vdots & & & \vdots \\ \cdot & \cdot & \cdots & 1 \end{bmatrix} \begin{bmatrix} z_{t-1} \\ \vdots \\ \vdots \\ z_{t-r} \end{bmatrix} + \begin{bmatrix} w_t \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

Matrix C will be,

$$C = [1 \quad \theta_1 \quad \theta_2 \quad \cdots \quad \theta_{r-1}]$$

~~where R = max(p, q+1)~~

$\therefore$ The MA equation can be written as,

$$x_t = [1 \quad \theta_1 \quad \theta_2 \quad \cdots \quad \theta_{r-1}] \begin{bmatrix} z_t \\ z_{t-1} \\ \vdots \\ z_{t-r+1} \end{bmatrix}$$

On substituting,

$p=3$, $d=2$, $q=1$, $P=2$, $D=1$, $Q=1$, $s=5$

$$r = \max(3+2+2 \quad +5,\ 5+2+1+1)$$
$$= \max(13, 9)$$
$$= 13$$

$$\begin{bmatrix} Z_t \\ Z_{t-1} \\ \vdots \\ Z_{t-14} \end{bmatrix} = \begin{bmatrix} \phi_1 & \phi_2 & \cdots & \phi_{13} \\ 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \vdots & & & \\ 0 & \cdots & \cdots & 1 \end{bmatrix} \begin{bmatrix} Z_{t-1} \\ Z_{t-2} \\ \vdots \\ Z_{t-13} \end{bmatrix} + \begin{bmatrix} w_t \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

And,

$$x_t = \begin{bmatrix} 1 & \theta_1 & \theta_2 & \cdots & \theta_{12} \end{bmatrix} \begin{bmatrix} Z_t \\ Z_{t-1} \\ \vdots \\ Z_{t-14} \end{bmatrix}$$