

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**  
**ELECTRICAL ENGINEERING DEPARTMENT**  
**Dr. Ibrahim O. Habiballah**  
**EE-463**

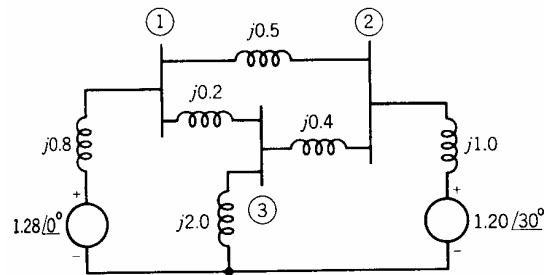
**Key Solution**

Quiz # 2    Serial #

Name:

I.D.#

Find  $Z_{bus}$  for the three-bus circuit shown below by the building algorithm method.



$$Z_{0.8} = j[0.8]$$

$$Z_{0.5} = j \begin{bmatrix} 0.8 & 0.8 \\ 0.8 & 1.3 \end{bmatrix}$$

$$Z_{0.2} = j \begin{bmatrix} 0.8 & 0.8 & 0.8 \\ 0.8 & 1.3 & 0.8 \\ 0.8 & 0.8 & 1.0 \end{bmatrix}$$

$$Z_{2.0i} = j \begin{bmatrix} 0.8 & 0.8 & 0.8 & 0.8 \\ 0.8 & 1.3 & 0.8 & 0.8 \\ 0.8 & 0.8 & 1.0 & 1.0 \\ 0.8 & 0.8 & 1.0 & 3.0 \end{bmatrix}$$

$$Z_{2.0} = j \begin{bmatrix} 0.586 & 0.586 & 0.533 \\ 0.586 & 1.086 & 0.533 \\ 0.533 & 0.533 & 0.667 \end{bmatrix}$$

$$Z_{1.0} = j \begin{bmatrix} 0.586 & 0.586 & 0.533 & 0.586 \\ 0.586 & 1.086 & 0.533 & 1.086 \\ 0.533 & 0.533 & 0.667 & 0.533 \\ 0.586 & 1.086 & 0.533 & 2.086 \end{bmatrix}$$

$$Z_{1.0} = j \begin{bmatrix} 0.421 & 0.281 & 0.382 \\ 0.281 & 0.521 & 0.255 \\ 0.382 & 0.255 & 0.531 \end{bmatrix}$$

$$Z_{0.4} = j \begin{bmatrix} 0.421 & 0.281 & 0.382 & -0.101 \\ 0.281 & 0.521 & 0.255 & 0.266 \\ 0.382 & 0.255 & 0.531 & -0.275 \\ -0.101 & 0.266 & -0.275 & 0.941 \end{bmatrix}$$

$$Z_{BUS} = j \begin{bmatrix} 0.411 & 0.310 & 0.354 \\ 0.310 & 0.446 & 0.333 \\ 0.354 & 0.333 & 0.450 \end{bmatrix}$$