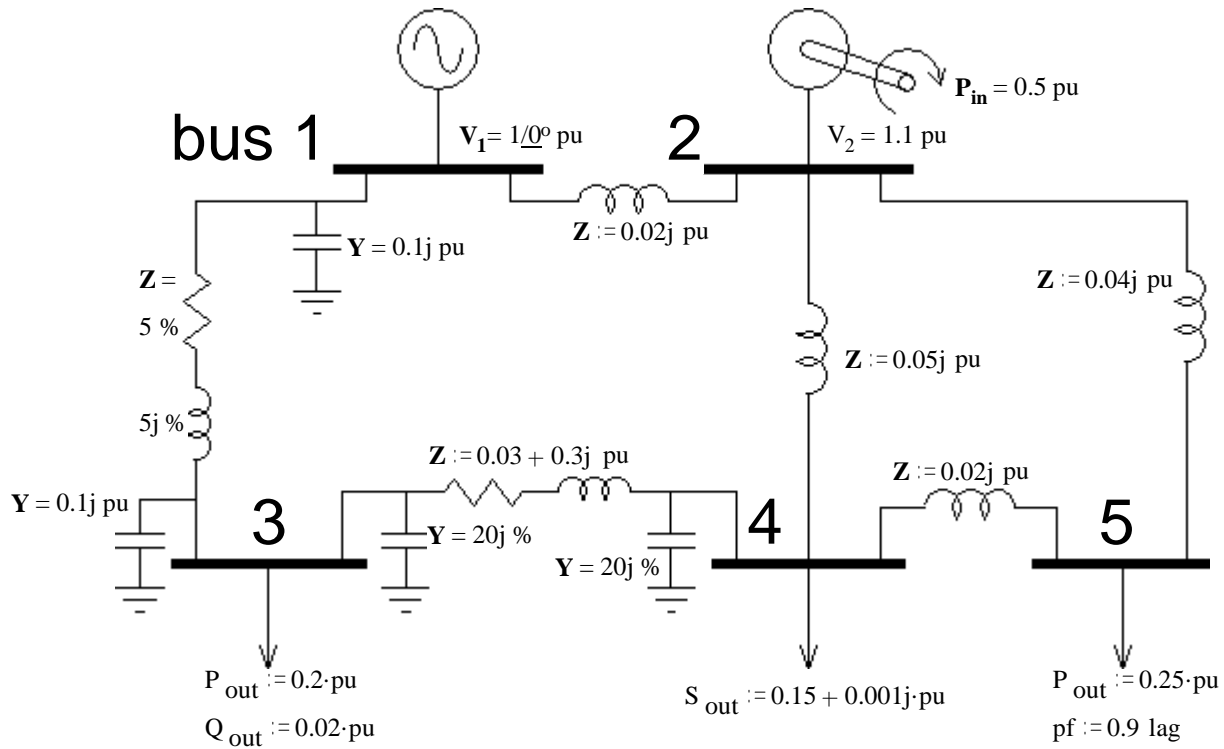


1. Consider the small power system shown below. Values shown are per-unit. (Note: % = 0.01pu)



a) Identify each bus as "slack", "load", or "generator".

bus 1. _____ 2. _____ 3. _____ 4. _____ 5. _____

b) Show V_2 , V_3 , V_4 and V_5 on the drawing (as letters, not values).

c) Show I_1 , I_2 , I_3 , I_4 and I_5 on the drawing and draw arrows to indicate the direction of each.

d) What is the 5x5 matrix shown below called? _____

$$\begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \\ I_5 \end{bmatrix} = \begin{bmatrix} _ & _ & _ & _ & _ \\ _ & _ & _ & _ & _ \\ _ & _ & \mathbf{A} & \mathbf{B} & _ \\ _ & _ & _ & _ & _ \\ _ & _ & _ & _ & _ \end{bmatrix} \cdot \begin{bmatrix} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \end{bmatrix}$$

e) A number of the elements of the matrix above are zero (0). Fill in all the zero elements.

f) Find elements **A** and **B** in the matrix above.

Answers

a) slack generator load load load

d) Admittance, Bus, or
Bus admittance matrix

e)
$$\begin{bmatrix} \text{---} & \text{---} & \text{---} & 0 & 0 \\ \text{---} & \text{---} & 0 & \text{---} & \text{---} \\ \text{---} & 0 & \mathbf{A} & \mathbf{B} & 0 \\ 0 & \text{---} & \text{---} & \text{---} & \text{---} \\ 0 & \text{---} & 0 & \text{---} & \text{---} \end{bmatrix}$$

f) $10.33 - 13j$ pu $-0.33 + 3.3j$ pu

b) c)

