EE 101: Electrical Sciences, Tutorial-6

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Name: Roll No.: Tutorial Group:

[Q-1 is for pre-tutorial. Solve it in the space provied and submit at beginning of tutorial]

Q-1. For the network shown in Fig.1, find:

a. The average power generated by the current source
b. The average power generated by the voltage source
c. The average power absorbed by the resistor
d. The average power absorbed by the inductor
e. The average power absorbed by the capacitor

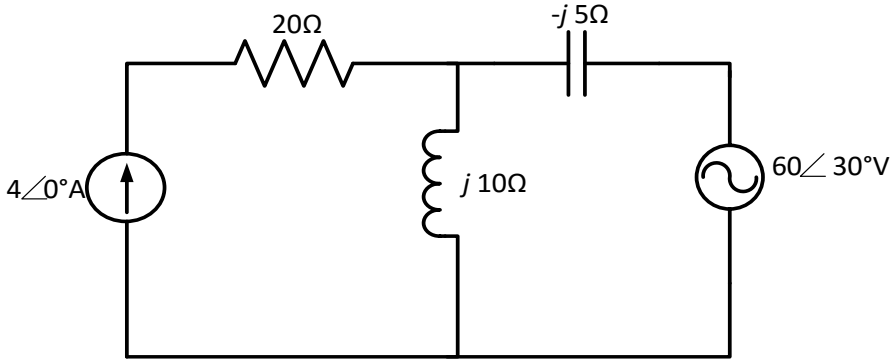

Fig.1: Figure for Q-1

Q-2. What impedance value of load will cause maximum power to be transferred to the load for the network shown in Fig.2.

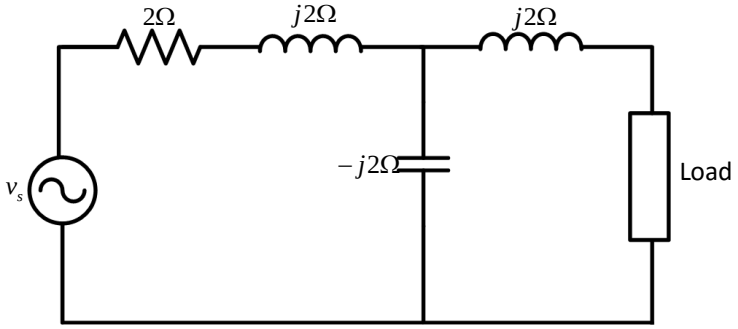

Fig.2: Figure for Q-2

Q-3. Find the Thevenin's equivalent of the network across terminals pair ab shown in Fig.3.

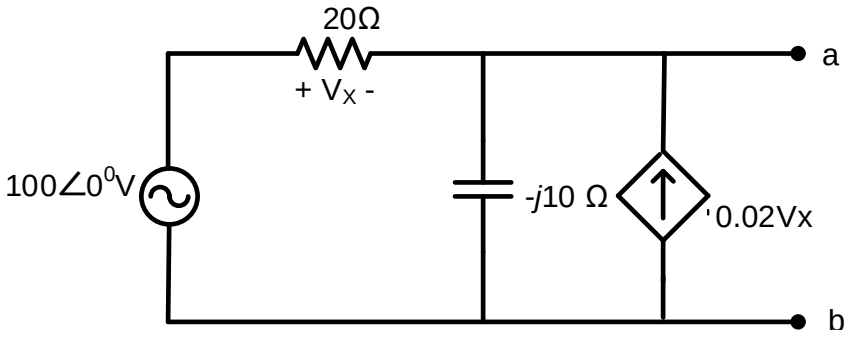

Fig.3: Figure for Q-3

Q-4. Construct a negative edge triggered JK Flip-flop using a positive edge triggered T Flip-flop and NAND Gates?

Q-5. Consider the state diagram below in Fig. 4. We need to build a sequential circuit out of 2 JK flip-flops with behaviour as described by the state diagram. The outputs of the flip-flops are denoted by variables A (inputs J_A and K_A) and B (inputs J_B and K_B). Let AB denote the state. Input of the sequential circuit is denoted by Y.

a) Write the state table.

b) Write the state equations (in the minimal SOP form) for the sequential circuit.

c) Express J_A, K_A, J_B, K_B in the minimal SOP form.

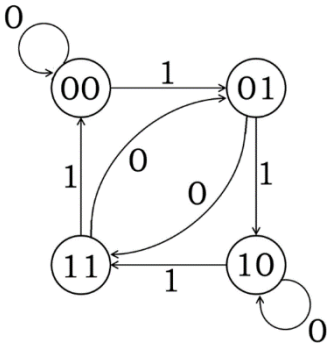

Fig.4: Figure for Q-5

Q-6. In an electronic equipment, the hexadecimal digits (0-9, A-F) are displayed on a seven-segment display unit as: A combinational logic circuit is required to be designed for activating each of the segments of the display unit.

Consider designing part of the circuit that activates the lower-right segment It takes 4-bit input word (X; Y; Z; P) with P as the least significant bit (LSB) and outputs '1' when the displayed equivalent hexadecimal digit involves the lower-right segment.

a) Give the truth table for the problem in the form of a duly labelled Karnaugh map.

b) Find the minimized SOP expression.

c) Find the minimized POS expression.