Indian Institute of Information Technology
Vadodara

Mid-Sem. Exam.: Basic Electrical Engineering (EE100)
Time Duration: 40 Minutes & Max. Marks: 60

---------- All The Best ----------

Q. 1: The RC circuit shown in Fig. 1 has a true power of 2.614 mW and an apparent power of 3.615 mVA. Answer the following questions for this simple RC circuit.

(i) Find the value of capacitor C in nF. (4)

(ii) Find the phase difference between the source voltage and current. (2)

(iii) Draw the phasor diagram for all the voltages (source voltage, voltage across 1 nF capacitor, voltage across 20 KΩ resistor, and voltage across capacitor C). (3)

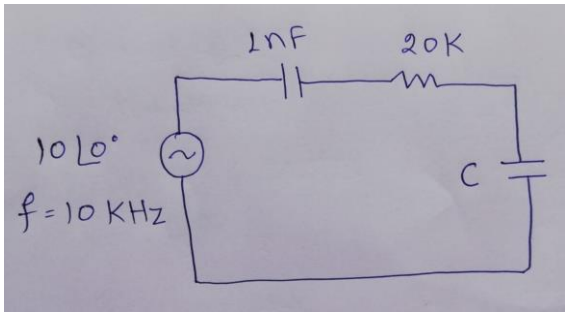

Fig. 1

Q. 2: A three-phase power system is shown in Fig. 2. It consists of a Wye-connected unbalanced three-phase generator supplying a Delta-connected unbalanced three-phase load through a non-ideal transmission line. Answer the following questions for this power system.

(i) Find the voltage across loads Z_a, Z_b, and Z_c. (2+2+2)

(ii) Find the load currents I_Za, I_Zb, and I_Zc. (1+1+1)

(iii) Find the line currents I_La, I_Lb, and I_Lc. (2+2+2)

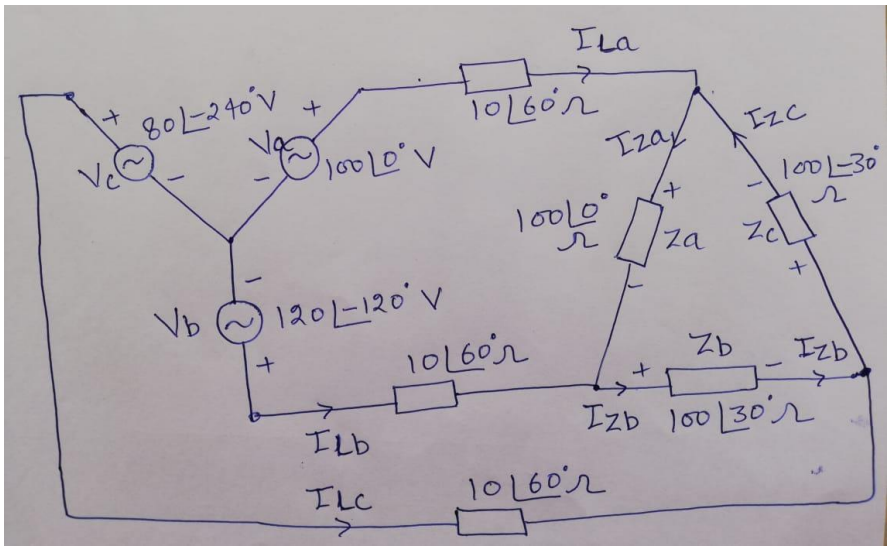

Fig. 2

Q. 3: Explain briefly the working principle of a transformer. Describe briefly the different types of losses that occur in transformers. Explain briefly how are they modelled in the equivalent circuit of the transformer? Finally, draw the equivalent circuit of the transformer. (2+2+3+1)

Q. 4: A single-phase power system, as shown in Fig. 3, consists of a generator supplying a load through a non-ideal transmission line. Answer the following questions for this simple power system. Assume the transformers (T_1 and T_2) shown in Fig. 3(b) are ideal.

(i) If the generator is directly connected to the load (as shown in Fig. 3(a)), then

(a) What will be the voltage at the load? (3)

(b) What will be the transmission line losses? (3)

(c) What will be the ratio of the load voltage to the generator voltage? (3)

(d) What percentage of the power supplied by the generator reaches the load? (3)

(ii) If a step-up transformer (T_1) is placed at the generator side and a step-down transformer (T_2) is placed at the load side (as shown in Fig. 3(b)), then

(a) What will be the voltage at the load? (4)

(b) What will be the transmission line losses? (4)

(c) What will be the ratio of the load voltage to the generator voltage? (4)

(d) What percentage of the power supplied by the generator reaches the load? (4)

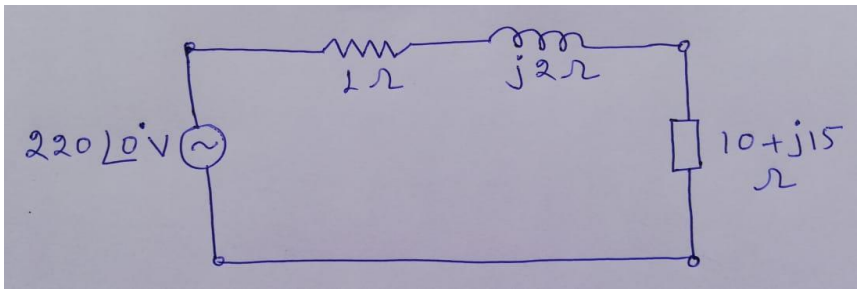

Fig. 3(a)

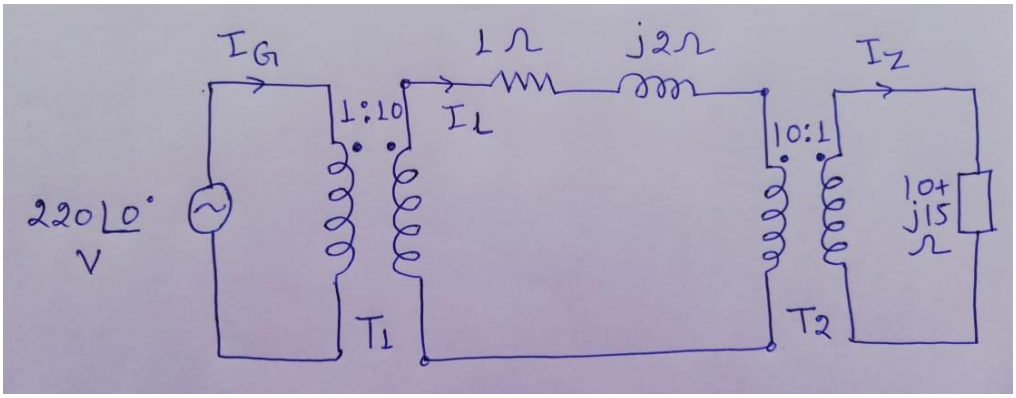

Fig. 3(b)

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