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B.Sc. Engg.(CSE), 2nd Sem.

Date: August 13, 2018 (Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Mid-Semester Examination
Course No.: Phy 4241
Course Title: Physics II

Summer Semester, A. Y. 2017-2018
Time: 90 Minutes
Full Marks: 75

There are **4 (four)** questions. Answer **any 3 (three)** questions. All questions carry equal marks. Marks in the margin indicate full marks. Programmable calculators are not allowed. Do not write on this question paper. All symbols bear their usual meanings.

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1. a) For the circuit shown in Fig. 1(a), find V_0 / V_s in terms of α, R_1, R_2, R_3, and R_4. 08
If $R_1 = R_2 = R_3 = R_4$, what value of α will produce $|V_0 / V_s| = 15$?

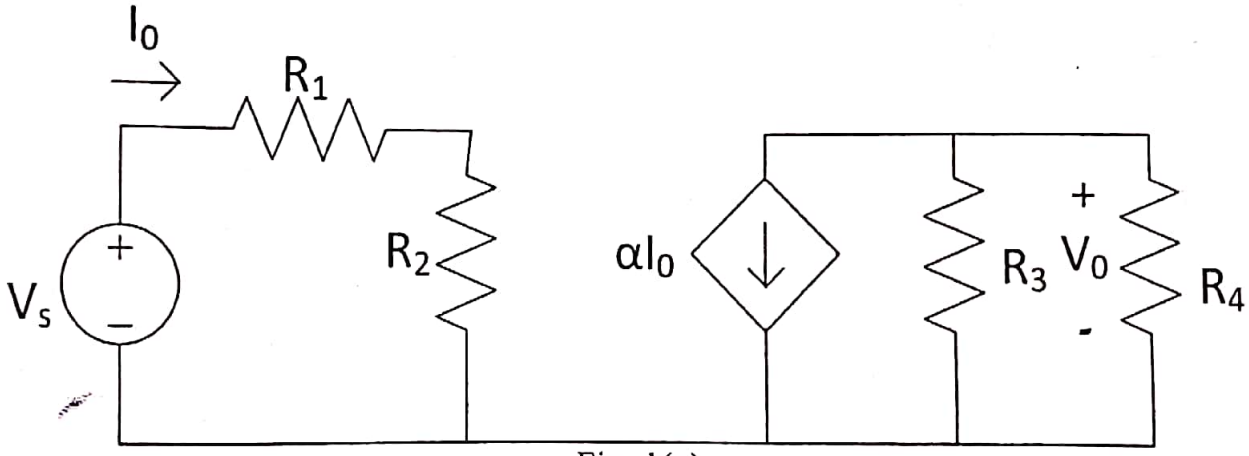

Fig. 1(a)

b) Obtain the equivalent resistance, R_{ab} in the circuit of Fig. 1(b). All the resistors have a value of 40 Ω. 13

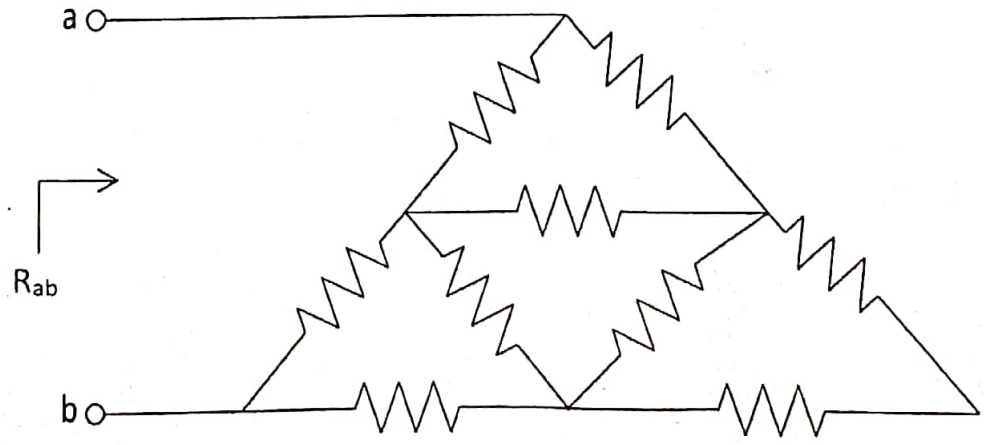

Fig. 1(b)

c) Define supermesh and supernode. 04

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2. a) Find the node voltages of the circuit shown in Fig. 2(a). 15

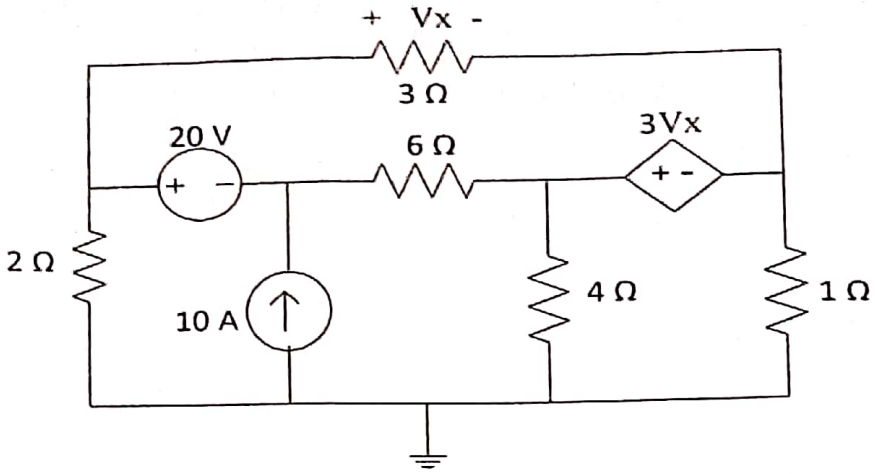

Fig. 2(a)

b) Write one use of Δ-Y transformation. Find the current delivered by the source in the circuit shown in Fig. 2(b). 10

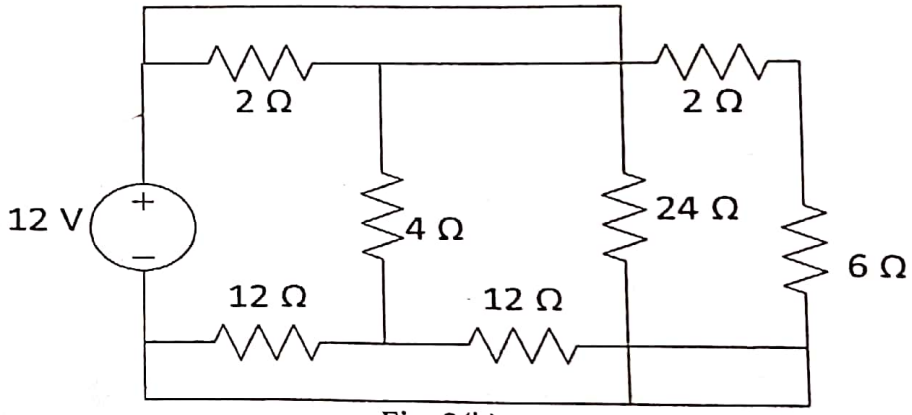

Fig. 2(b)

3. a) Use both resistance and source combinations, as well as, current division, in the circuit of Fig. 3(a) to find the power absorbed by the 1 Ω resistor. 15

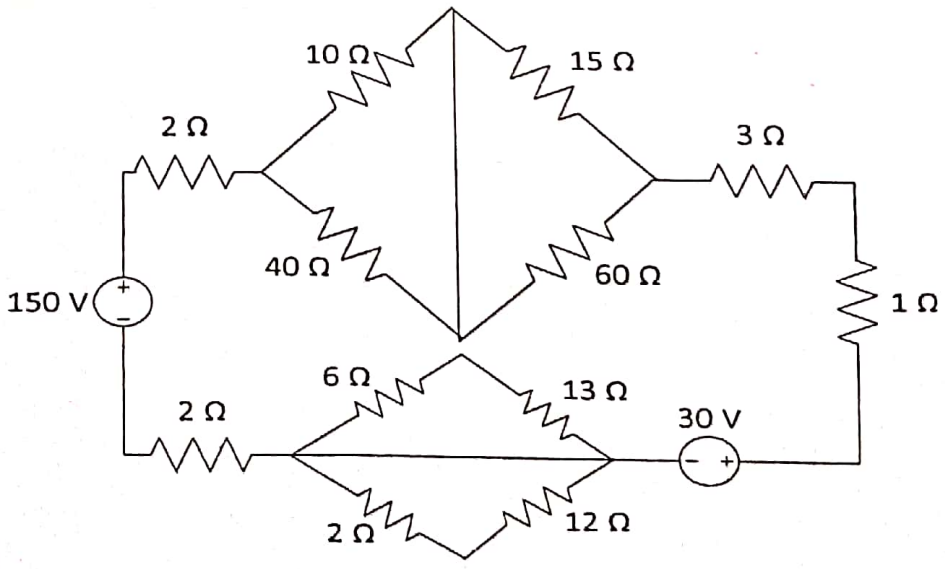

Fig. 3(a)

b) Find the values of R_1 and R_2 in the circuit of Fig. 3(b) if the voltmeter and ammeter read 6 V and 0.6 A, respectively. 10

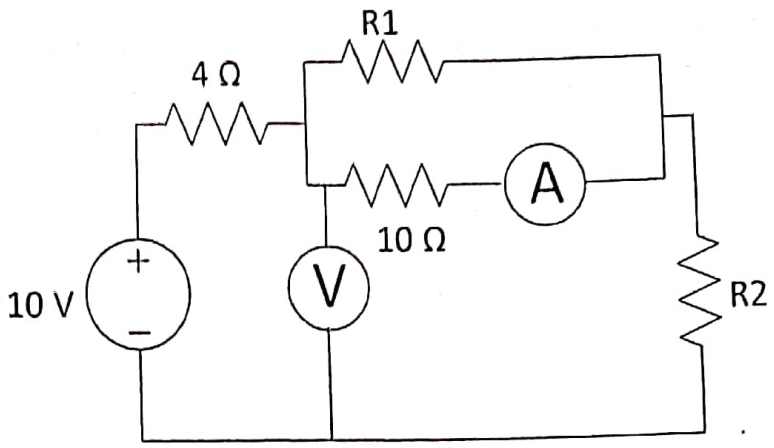

Fig. 3(b)

4. a) In the circuit shown in Fig. 4(a), find the terminal voltage, V_{ab} using superposition theorem. 12

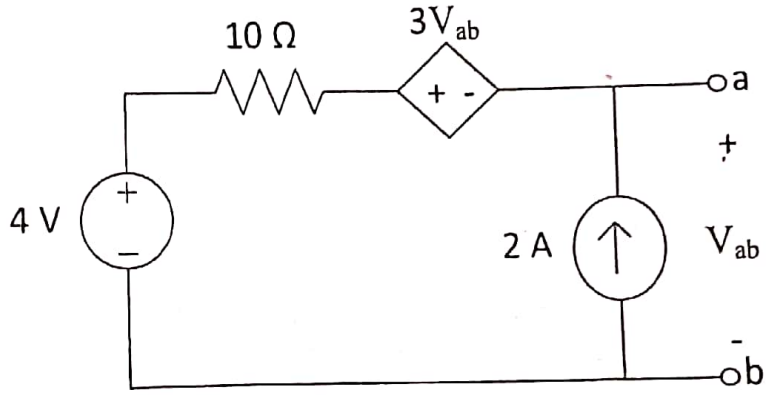

Fig. 4(a)

b) The variable resistor in the circuit shown in Fig. 4(b) is adjusted for maximum power transfer to R_L. Find the value of R_L. Also find the maximum power that can be delivered to R_L. 13

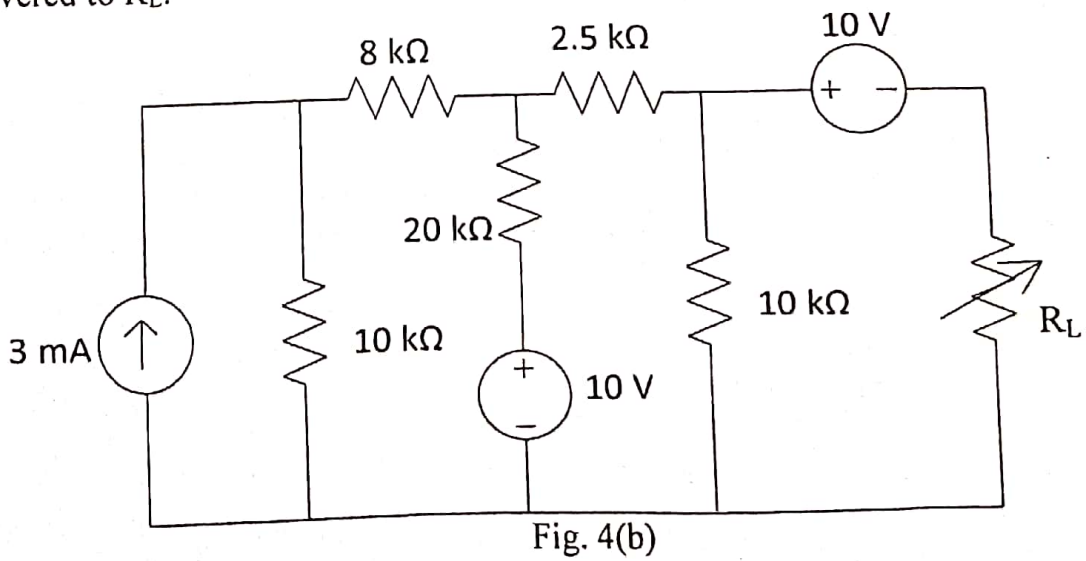

Fig. 4(b)

B.Sc. Engg.(CSE)/ HD CSE, 2nd Sem. Date: August 28, 2017 (Morning)

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1. a) Find the equivalent conductance for "s" number of resistors connected in parallel. 5

   b) Find V_1 and V_2 in the Fig. 1(b) using nodal analysis. 10

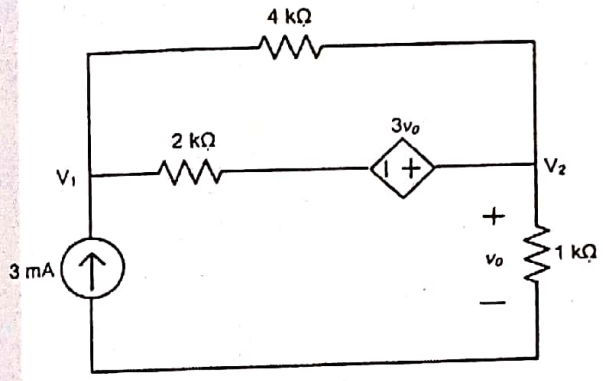

Fig. 1(b)

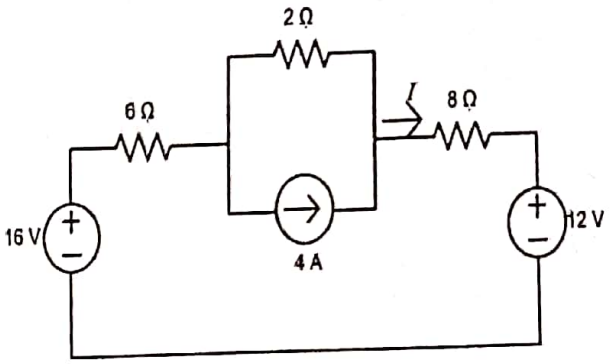

Fig. 1(c)

   c) By superposition principle find I in the circuit shown in Fig. 1(c). 10

2. a) Prove that each resistor in the Y network is the product of the resistors in the two adjacent Δ branches, divided by the sum of the three Δ resistors. 5

   b) Find V_o and I_o in the following circuit shown in Fig. 2(b). 10

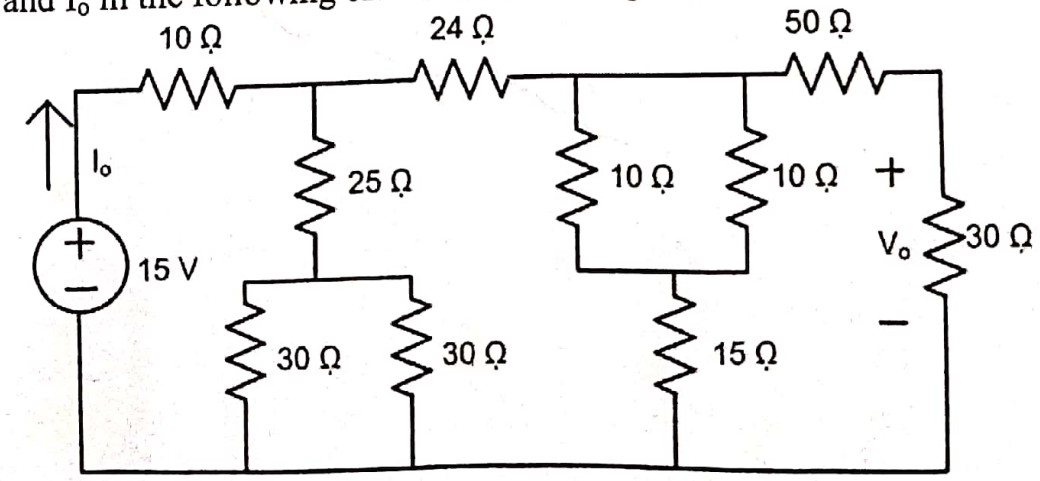

Fig. 2(b)

c) Find the Thevenin equivalent at terminals a-b in the Fig. 2(c). 10

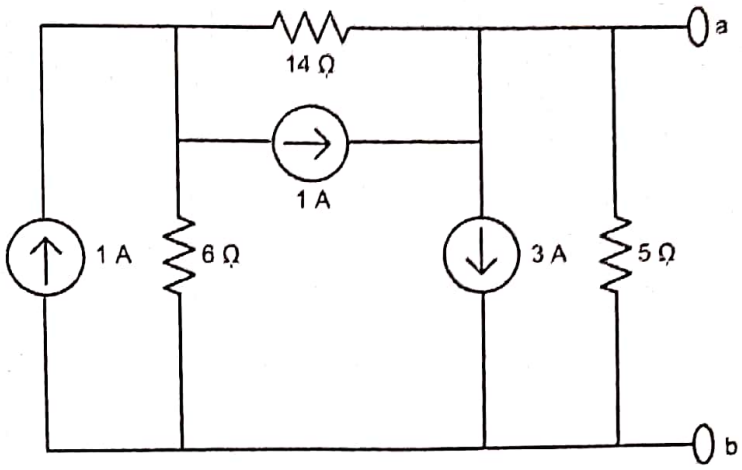

Fig. 2(c)

3. a) Prove that maximum power transfer occurs when R_L is equal to R_{TH} and find the expression of P_{max} for maximum power transfer. 5

b) In the circuit shown in Fig. 3(b) find R_{eq} and I_o. 10

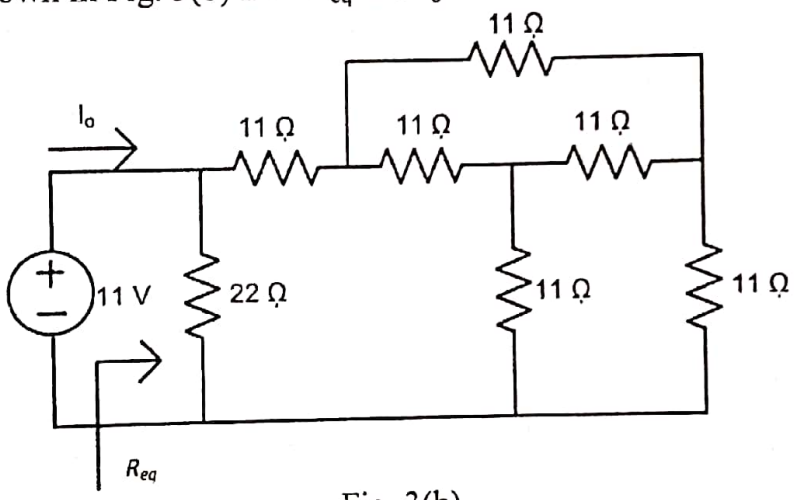

Fig. 3(b)

c) For the following circuit shown in Fig. 3(c) find I_1 to I_4 using mesh analysis. 10

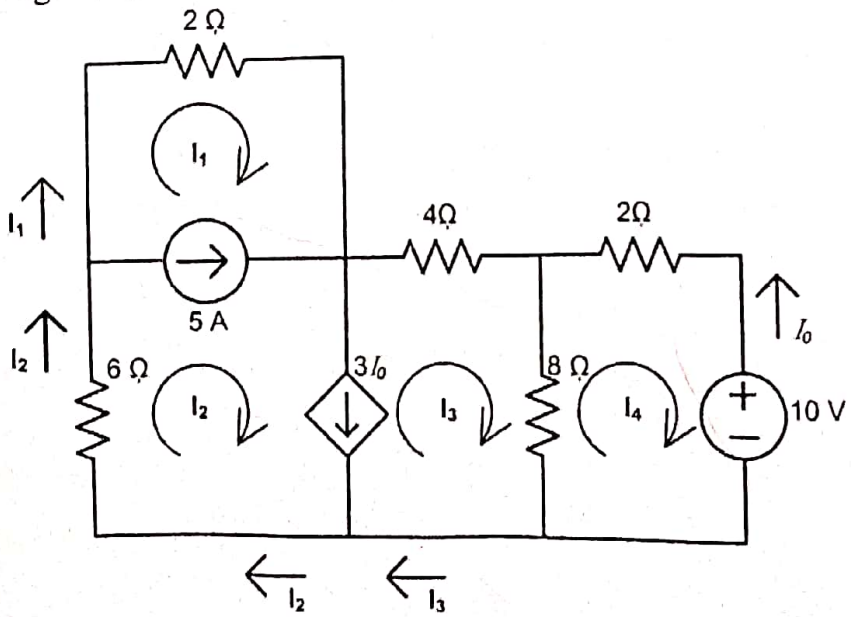

Fig. 3(c)

4. a) Find the phase angle between $i_1 = -4 \sin(377t + 25°)$ and $i_2 = 5 \cos(377t - 40°)$. State which sinusoid is leading. Show them graphically.

b) Find $v(t)$ and $i(t)$ in the following circuit shown in Fig. 4(b).

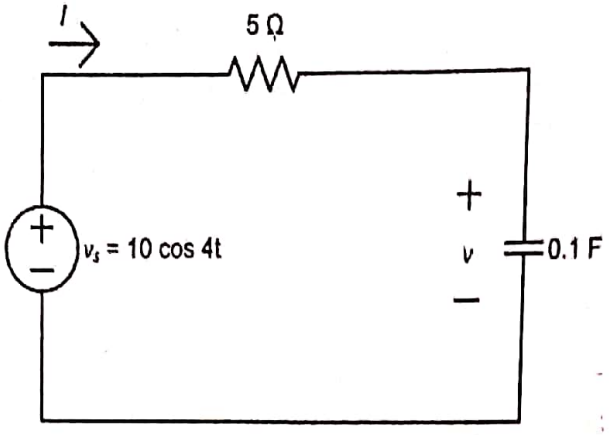

Fig. 4(b)

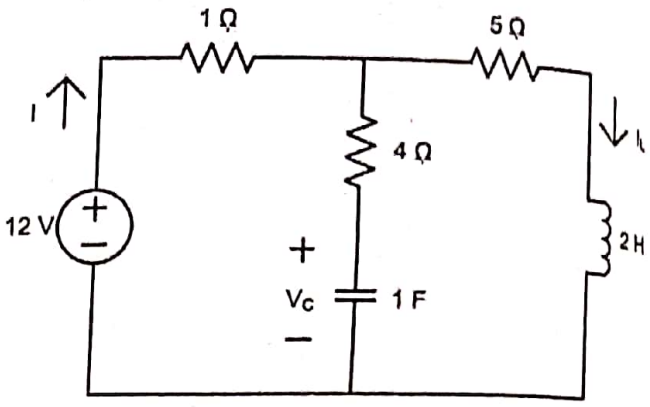

Fig 4(c)

c) Determine I, V_C, I_L and the energy stored in the capacitor and inductor in the circuit shown in Fig. 4(c).

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1. a) Find the equivalent resistance with respect to terminals A and B in the circuit of Fig. 1(a). Assume all the resistance values are equal to 1 kΩ. 15

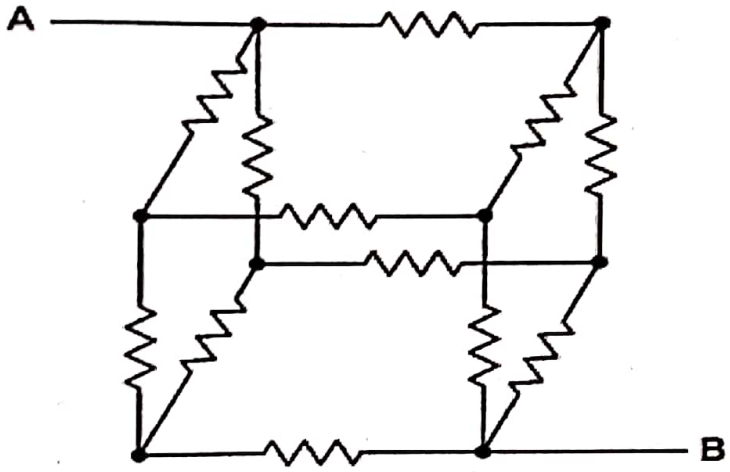

Fig. 1(a)

b) Assume a current of 3 ampere in entering through the terminal A in the circuit of Fig. 1(a). Now determine all the branch currents and show them in a diagram. 10

2. a) Calculate the value of I_1 from the circuit in Fig. 2(a). 15

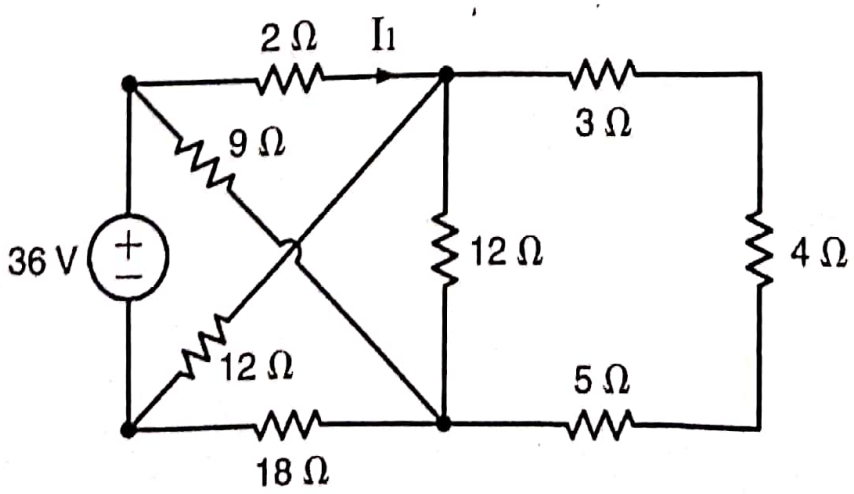

Fig. 2(a)

b) State the maximum power transfer theorem. For a circuit with ideal source, derive the condition for maximum power transfer with power vs. load graph. 10

3. a) Use mesh analysis to obtain i_o in the circuit of Fig. 3(a). 15

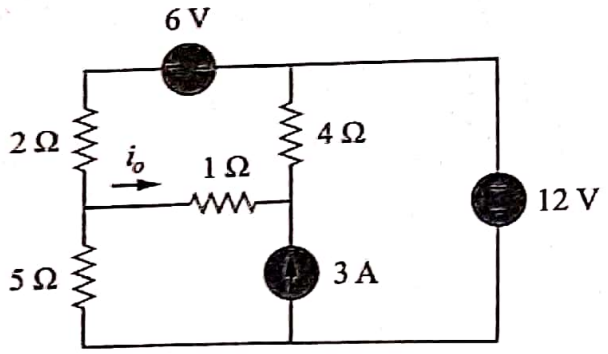

Fig. 3(a)

b) Derive the equations to convert a delta connected resistance network to an equivalent wye connected resistance network and vice-versa. 10

4. a) Find out all the node voltages in the circuit of Fig. 4(a). 10

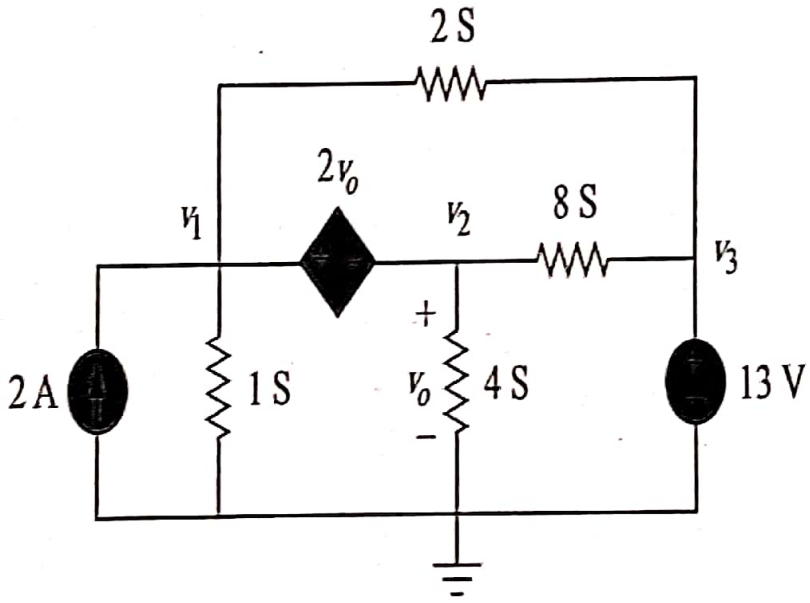

Fig. 4(a)

b) Determine the value of R_L when maximum power is transferred in R_L in the circuit of Fig. 4(b). What is the maximum power? 15

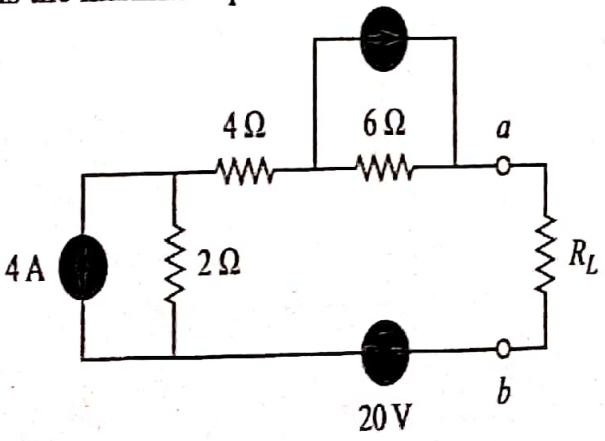

Fig. 4(b)