B.Sc. Engg. (CSE), 2nd Sem. Date: October 30, 2018

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

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Semester Final Examination — Summer Semester, A. Y. 2017-2018
Course No.: Phy 4241 — Time: 3 Hours
Course Title: Physics II — Full Marks: 150

There are **8 (eight)** questions. Answer **any 6 (six)** 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.

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1. a) The circuit of Fig. 1(a) contains five identical capacitors. Find the value of C. 09

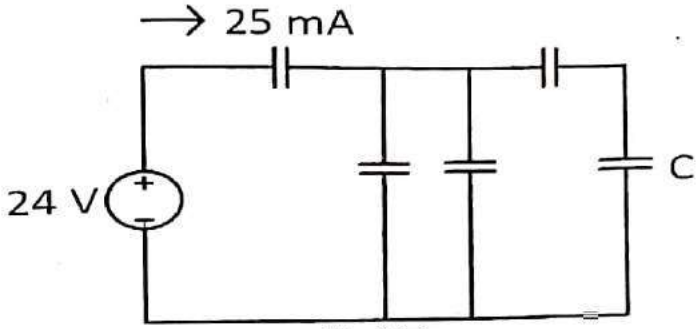

Fig. 1(a)

b) Determine L_{eq} of the inductive network of Fig. 1(b) at the terminals a-b. 13

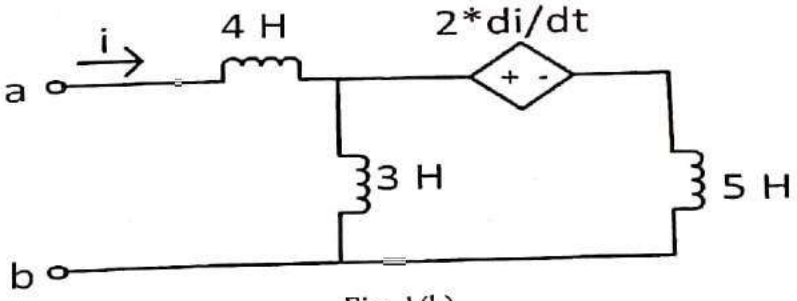

Fig. 1(b)

c) The current through a 12 mH inductor is 4 sin (100t) A. Find the voltage across the inductor for $0 < t < \frac{\pi}{200}$ s and the energy stored at $t = \frac{\pi}{200}$ s. 03

2. a) Calculate the mesh currents, I_1 and I_2 in the circuit of Fig. 2(a) 10

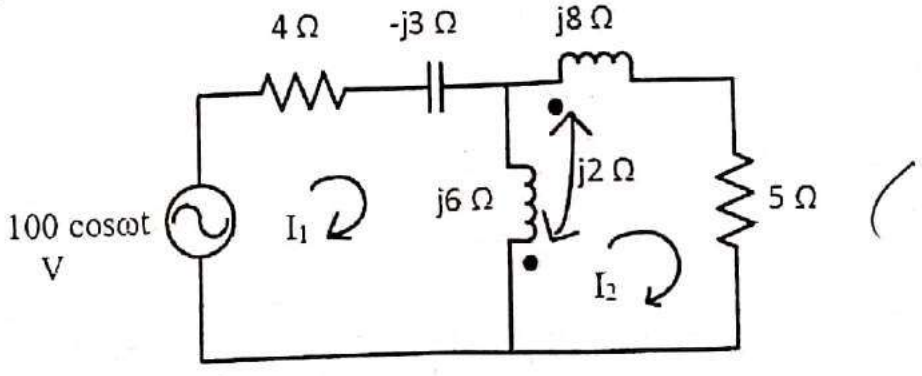

Fig. 2(a)

8L

b) For the network in Fig. 2(b), find Z_{ab} and I_0.

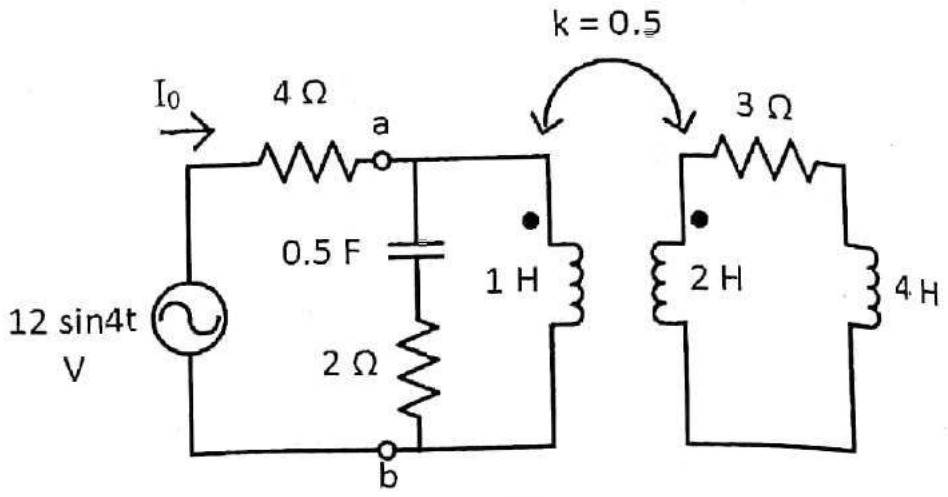

Fig. 2(b)

3. a) Find the current, I in the circuit of Fig. 3(a).

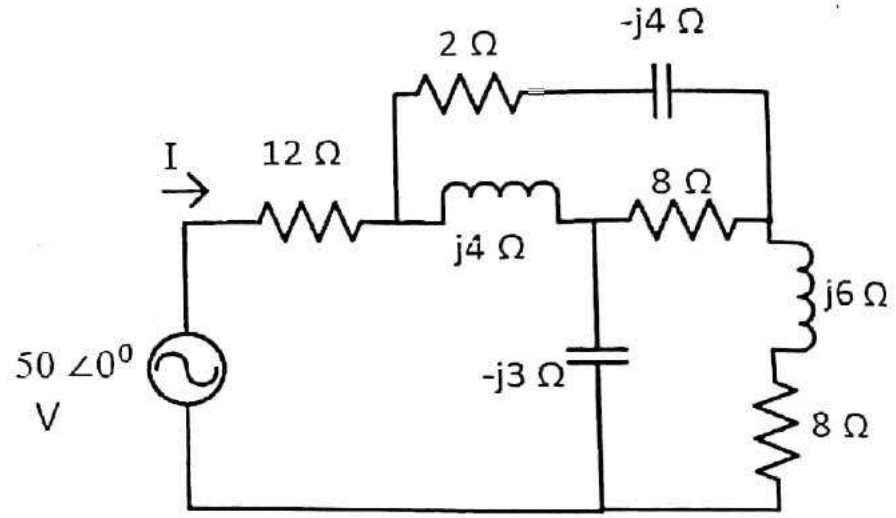

Fig. 3(a)

b) In the circuit of Fig. 3(b), find V_s if $I = 2\angle 0^0$ A.

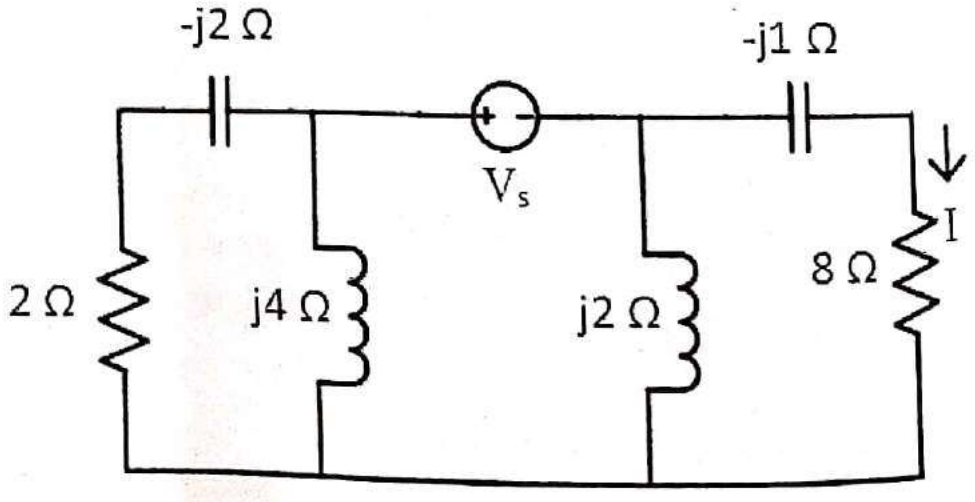

Fig. 3(b)

4. a) In solving for currents using mesh analysis, the following equations are obtained. Draw the circuit and find the currents. 12

$$15\, i_1 - 10\, i_2 = -10$$
$$10\, i_1 - 22\, i_2 + 10\, i_3 = 0$$
$$10\, i_2 - 15\, i_3 = 12$$

b) Find the current, i in the 10 kΩ resistor in the circuit shown in Fig. 4(b) by making a succession of appropriate source transformations. 13

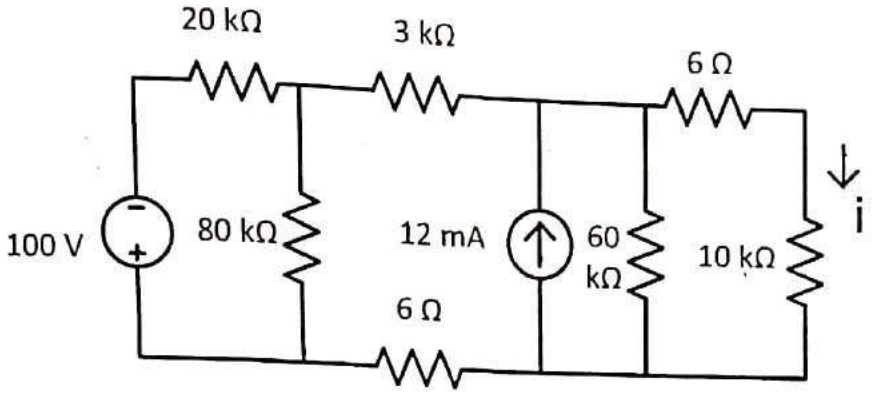

Fig. 4(b)

5. a) Find the average power absorbed by the 8 Ω resistor in the circuit shown in Fig. 5(a). 18

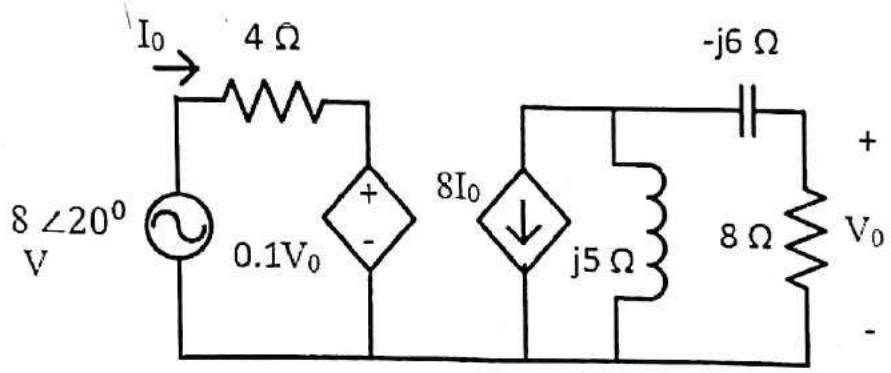

Fig. 5(a)

b) Determine the Thevenin equivalent of the circuit in fig. 5(b) as seen from the terminals a-b. 07

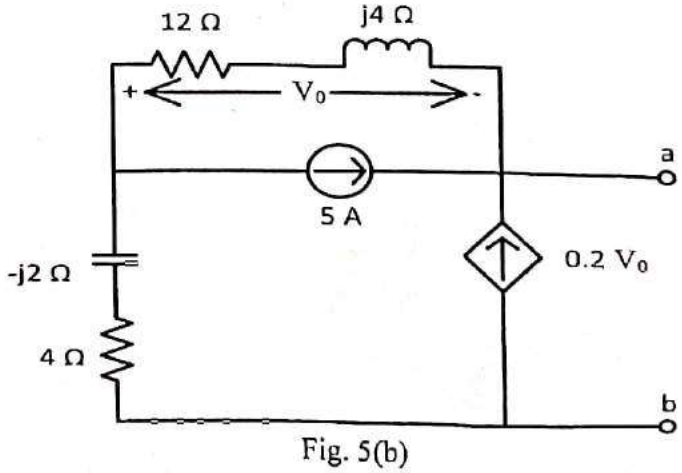

Fig. 5(b)

6. a) Obtain the inductor current, $i(t)$ for both $t < 0$ and $t > 0$ in the circuit of Fig. 6(a).

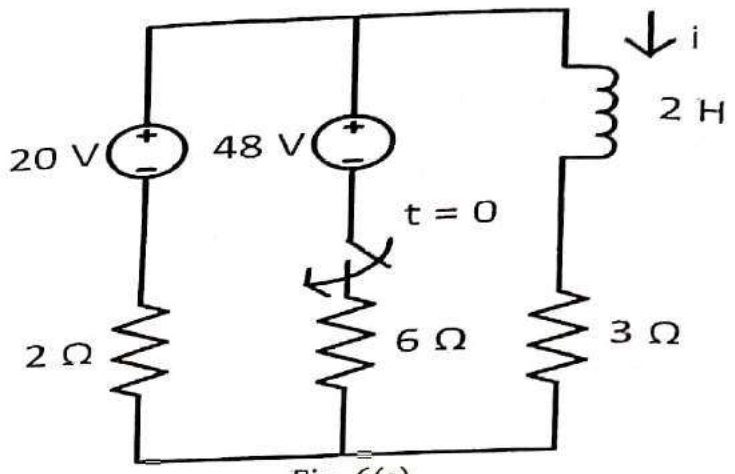

Fig. 6(a)

b) Find the current, $i(t)$ for both $t < 0$ and $t > 0$ in the circuit shown in Fig. 6(b).

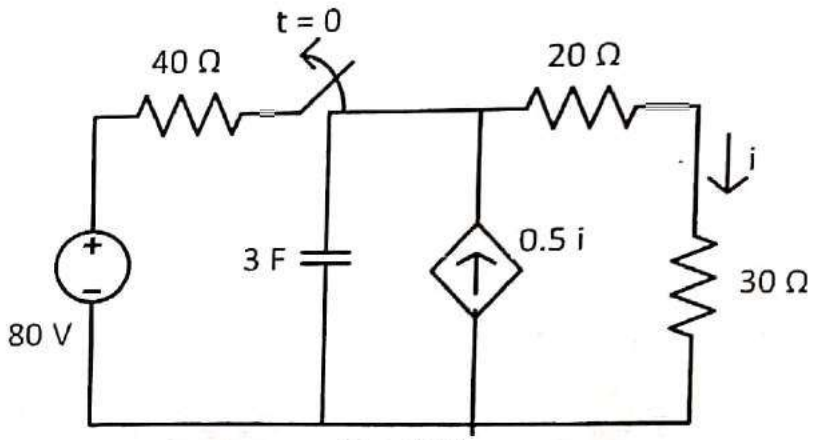

Fig. 6(b)

7. a) Compute the value of R that results in maximum power transfer to the 10 Ω resistor shown in Fig. 7(a). Find the maximum power.

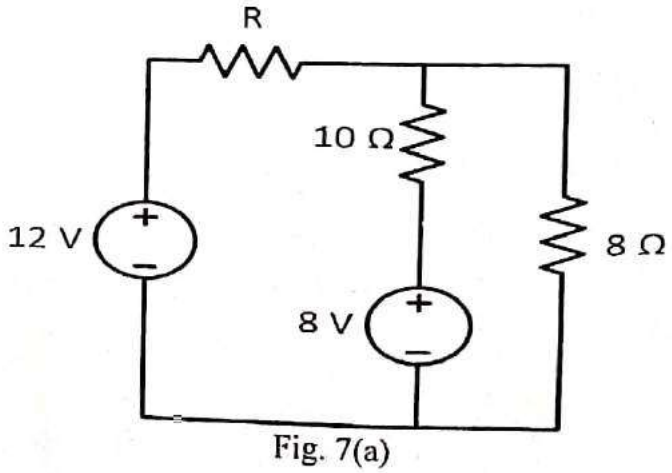

Fig. 7(a)

b) Obtain the Norton equivalent of the circuit shown in Fig. 7(b) to the left of terminals x-y. Use the result to find the current, *i*. 15

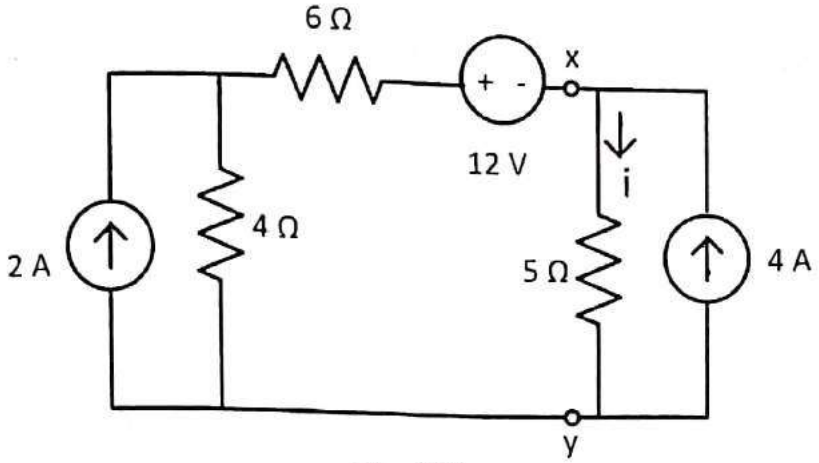

Fig. 7(b)

8. a) Select values for R_1 and R_2 in the circuit of Fig. 8(a) so that $V_R(0^+) = 10$ V and V_R (1 ms) = 5V. 12

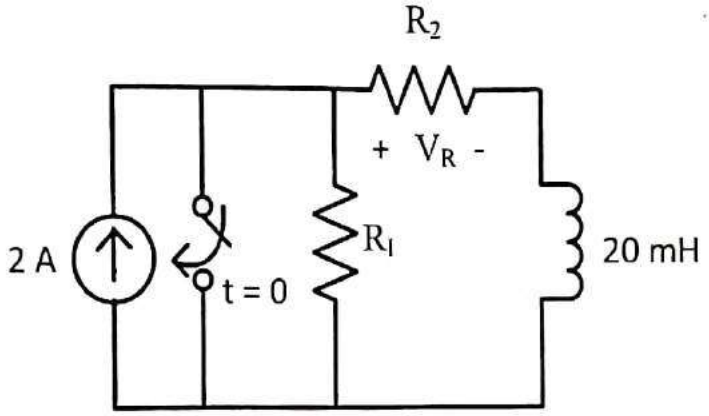

Fig. 8(a)

b) For the circuit shown in Fig. 8(b), Find equivalent resistance by looking into terminals a-b. For finding equivalent resistance, connect a 1 A current source across terminals a-b. (No other method will be acceptable). 13

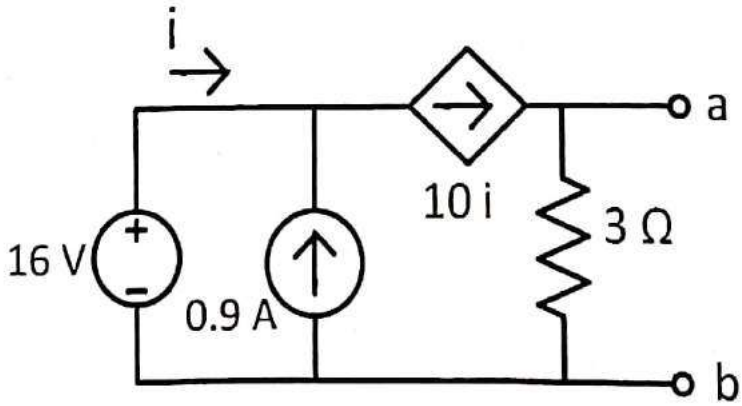

Fig. 8(b)