Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering

Final Examination, Winter 2018-2019 **Level-1 Term-I**

Course Code: EEE 1163 **Course Title: Basic Electrical Engineering**

Time: 03 (Three) hours **Full Marks: 210**

N.B. (i) Answer any three questions from each PART (ii) Use separate answer script for each PART
(iii) Marks allotted are indicated in the margin (iv) All the symbols bear their usual meanings.

PART A

1. (a) What is electrical circuit? Define Charge, Electric Current and Voltage. 10

   (b) What do you understand by Circuit Elements? Explain with example. 10

   (c) Find the currents and voltages in the circuit of Fig. 1(c). 15

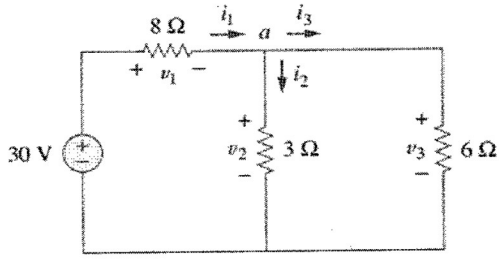

Fig. 1(c)

2. (a) State and derive Ohm's Law. Define short circuit and open circuit in electrical circuit analysis. 10

   (b) Find R_{ab} in the circuit of Fig. 2 (b). 10

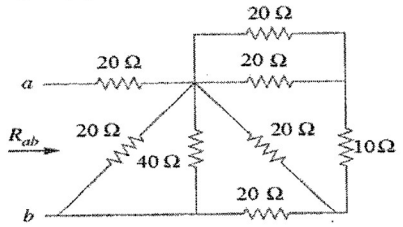

Fig. 2 (b)

   (c) Determine V in the circuit of Fig. 2 (c). 15

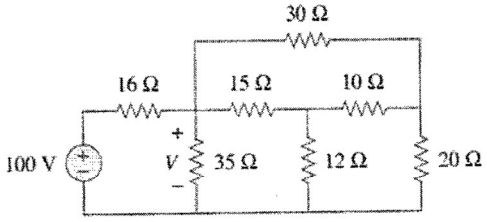

Fig. 2 (c)

3. (a) Define Super Mesh and Super Node. 05

   (b) For the circuit shown in the Fig. 3 (b), find v and i. 15

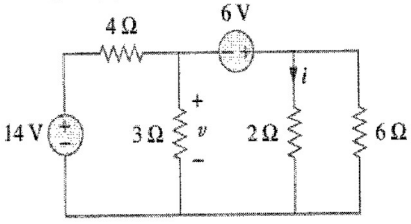

Fig. 3 (b)

(c) For the circuit in Fig. 3 (c) find v_1 and v_2 using nodal analysis. 15

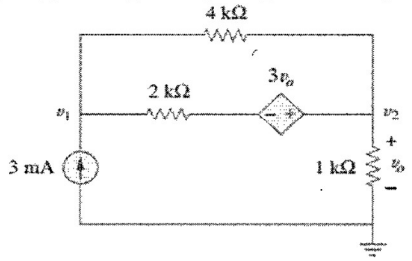

Fig. for 3 (c)

4. (a) Explain Kirchhof's current law (KCL) and Kirchhof's voltage law (KVL). 10

(b) Use mesh analysis to determine I_1, I_2 and I_3 in Fig. 4 (b). 15

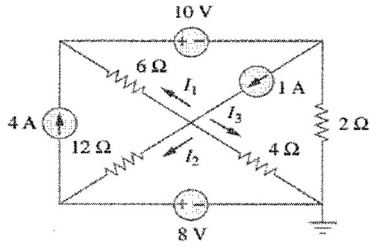

Fig. 4 (b)

(c) Find I in the circuit of Fig. 4 (c), using superposition. 10

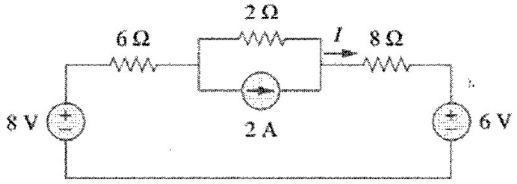

Fig. 4 (c)

PART B

5. (a) Find the Thevenin equivalent of the circuit shown in 5 (a). 15

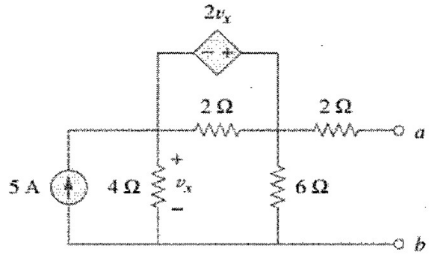

Fig. 5 (a)

(b) For maximum power transfer theorem prove that $R_L = R_{TH}$. 10

(c) Find the value of R_L for maximum power transfer in the circuit of Fig. 5 (b). Find the maximum power. 10

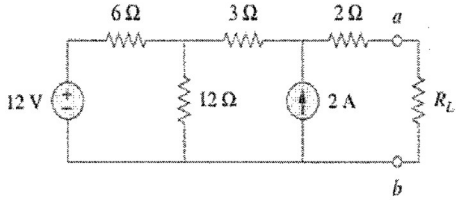

Fig. 5 (b)

6. (a) Prove that, in a pure Inductor current lags the voltage by 90^0. 10

(b) Calculate the phase angle between $v_1 = -10\cos(\omega t + 50^0)$ and $v_2 = 12\sin(\omega t - 10^0)$. State which sinusoid is leading? 10

(c) Determine v_0 in the circuit of Fig. 6 (c). 15

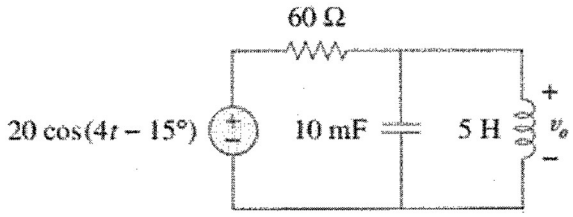

Fig. 6 (c)

7. (a) What is Effective value? Show that the effective value of a periodic signal is its root mean square value. 10

(b) What do you mean by power factor? Draw a power triangle and an impedance triangle. 10

(c) In the circuit of Fig. 7 (c), $Z_1 = 60\angle -30^0\ \Omega$ and $Z_2 = 40\angle 45^0\ \Omega$. Calculate the total apparent power, real power, reactive power and pf. 15

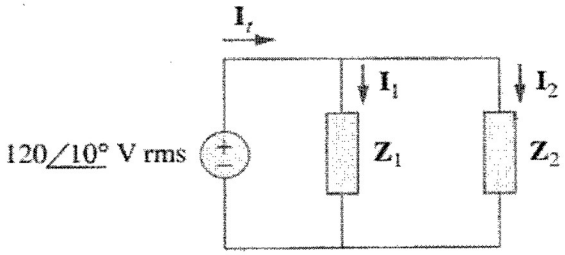

Fig. 7 (c)

8. (a) What are advantages of three phase over single phase? 5

(b) Find the wattmeter reading of the circuit in Fig. 8 (b). 15

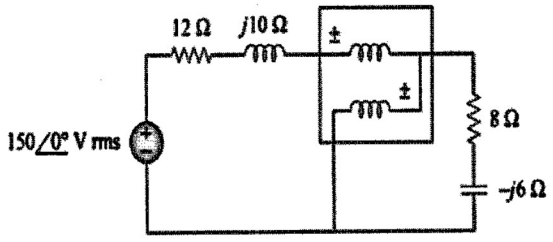

Fig. 8 (b)

(c) A Y-connected balanced three-phase generator with an impedance of $(0.4 + j0.3)\Omega$ per phase is connected to a Y-connected balanced load with an impedance of $(24 + j19)\Omega$ per phase. The line joining the generator and the load has an impedance of $(0.6 + j0.7)\Omega$ per phase. Assuming a positive phase sequence for the source voltages and that $V_{an} = 120\angle 30^0$ V, find the line voltages and line currents. 15