ONDO STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY (OSUSTECH), OKITIPUPA, ONDO
FACULTY OF ENGINEERING AND ENGINEERING TECHNOLOGY
2018/2019 SESSION FIRST SEMESTER EXAM (60 MARKS)
COURSE CODE: GET 201; COURSE TITLE: BASIC ELECTRICAL ENGINEERING I
TIME ALLOWED: 1 HOUR 45 MINS; INSTRUCTION: Answer ANY FOUR Questions

1 (a) State Ohm's Law. (2 marks)

(b) A 1.5 kW electric heater draws 12 A of current, calculate the resistance, R of the electric heater and the voltage drop, V across the electric heater. (4 marks)

(c) In the circuit shown in Figure 1, (i) determine the number of branches, nodes and independent loops present in the circuit. (3 marks) (ii) Find equivalent resistance, R_{ab} and current, i. (6 marks)

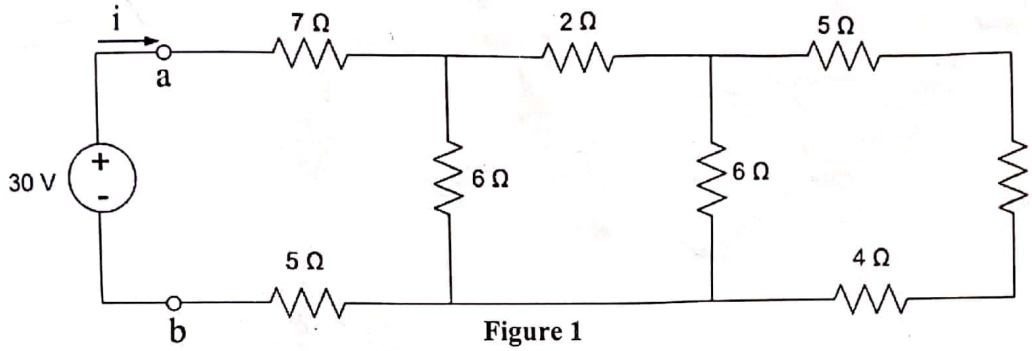


Figure 1

2 (a) State Kirchhoff's Current Law. (2 marks)

(b) In the circuit shown in Figure 2, determine the value of current, i_o and voltage, v_o. (7 marks)

(c) Using Nodal analysis, determine the node voltages in the circuit shown in Figure 3. (6 marks)

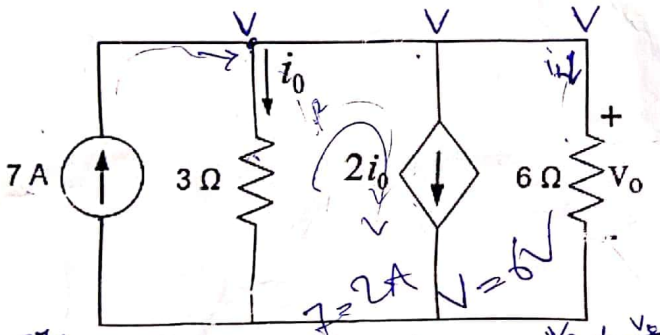


Figure 2

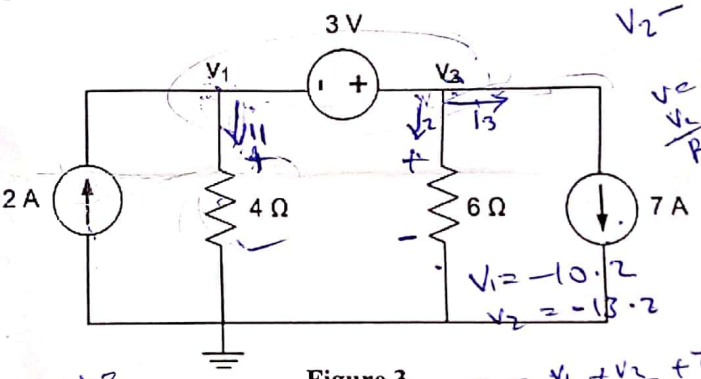
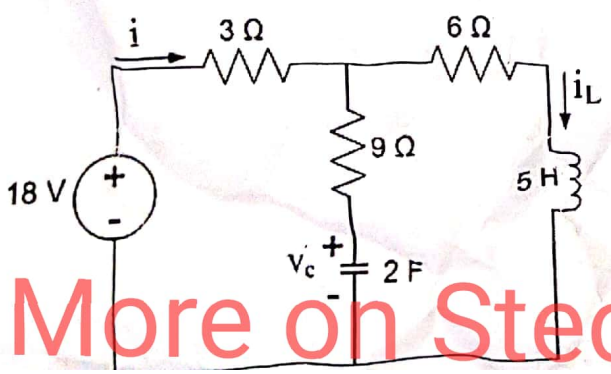
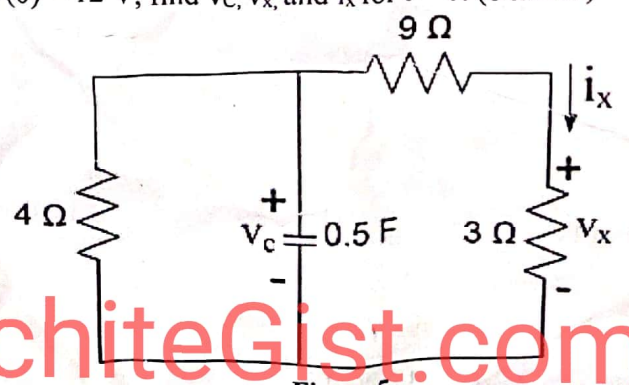


Figure 3

3 (a) Under dc conditions, find (i) i, v_C, and i_L (ii) energy stored in the capacitor and inductor; in the circuit shown in Figure 4. (6 marks)

(b) In the circuit shown in Figure 5, let the $v_C(0) = 12$ V, find v_C, v_x, and i_x for $t > 0$. (6 marks)





3 (c) In a series RLC circuit, R = 4 Ω, L = 8 H and C = 0.5 F. Is the natural response overdamped, underdamped or critically damped? (3 marks)

4 (a) Define a Linear Circuit and mention the two conditions for linearity. (3 marks)
(b) Using Superposition Theorem, find the voltage, v_o in the circuit of Figure 6. (6 marks)
(c) Using Source Transformation, find the voltage, v_o in the circuit of Figure 7. (6 marks)

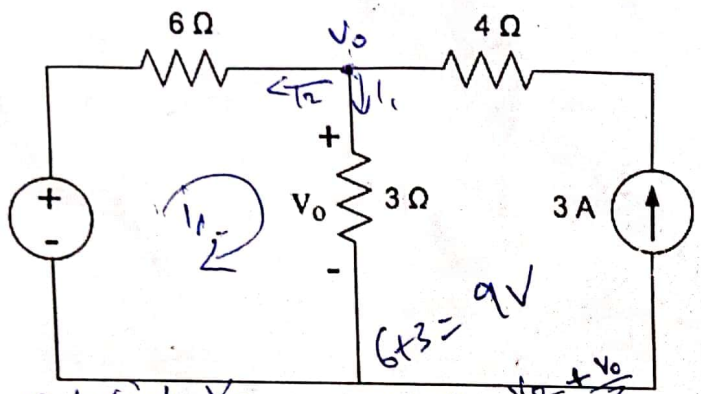


Figure 6

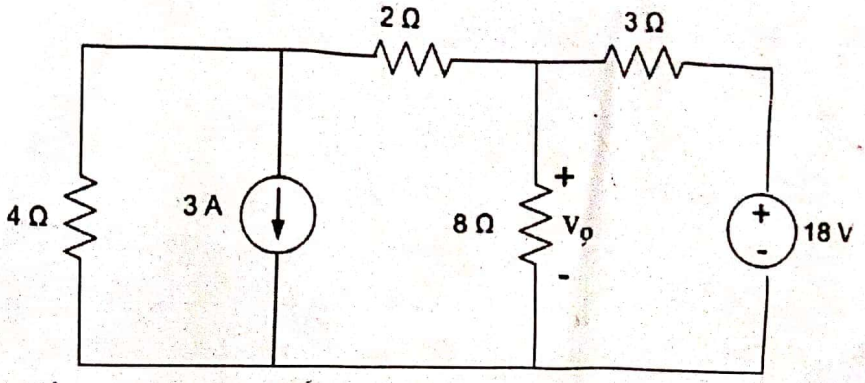


Figure 7

5 (a) What is a semiconductor? (2 marks)
(b) Differentiate between an N-type and a P-type semiconductor. (4 marks)
(c) With the aid of a diagram, explain briefly and differentiate between forward bias and reverse bias of a PN junction diode. (4 marks)
(d) Mention five (5) examples of special purpose diodes. (5 marks)

6 (a) State Thevenin's Theorem. (2 mark)
(b) Find the Thevenin equivalent circuit of the circuit shown in Figure 8. Calculate the maximum power transfer of the circuit. (8 marks)
(c) Transform the wye network in Figure 9 to a delta network. (5 marks)

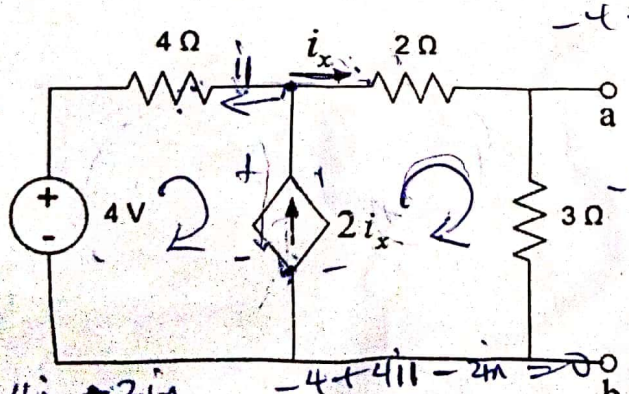


Figure 8

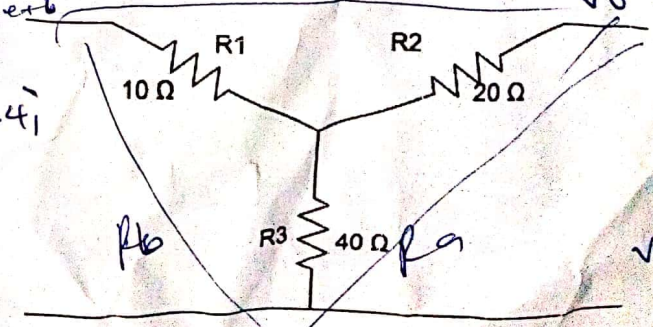


Figure 9

Best Wishes – Engr. Tunde Iyaomolere