ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Mid-Semester Examination   Winter Semester, A. Y. 2022-2023
Course No.: Phy 4143   Time: 90 Minutes
Course Title: Physics II   Full Marks: 75

There are 3 (three) questions. Answer all 3 (three) questions. The symbols have their usual meanings.
Programmable calculators v are not allowed. Marks of each question and corresponding COs and POs are
written in the brackets.

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1. a) Explain the difference between independent source and dependent source. Write   5
        down the names of the four different types of dependent sources and sketch their   (CO1,
        corresponding symbols.   PO1)

    b) Find V_o and the power absorbed by each element in the circuit of Fig. 1(b).   10
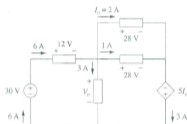   (CO2,
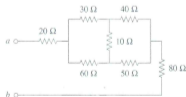   PO2)

Fig. 1(b)

    c) Determine equivalent resistance R_{ab} in the circuit of Fig. 1(c).   10
                                                                                          (CO2,
                                                                                          PO2)

Fig. 1(c)

2. a) If the circuit shown in Fig. 2(a) has b branches, n nodes, and l independent loops, then determine the values of b, n, and l. Verify that, these values satisfy the fundamental theorem of network topology: $b = l + n - 1$.
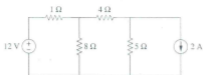
5
(CO2, PO2)

Fig. 2(a)

b) Find v_0 in the circuit in Fig. 2(b) and the power absorbed by the dependent source. (For solving the circuit, any method can be used)

10
(CO2, PO2)

Fig. 2(b)

c) For the circuit in Fig. 2(c), find v_1, v_2, and v_3 using nodal analysis.
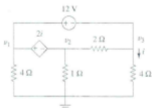
10
(CO2, PO2)

Fig. 2(c)

3. a) Calculate the voltages at the three non-reference nodes in the circuit of Fig. 3(a) using nodal analysis.
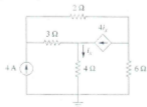
7
(CO2, PO2)

Fig. 3(a)

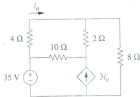b) Find i_o for the circuit in Fig. 3(b) using mesh analysis:

Fig. 3(b)

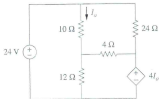c) Using mesh analysis, determine the value of current I_o in the circuit of Fig. 3(c).

Fig. 3(c)