Set A (For Student ID having last digit is an even number)

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring-2020	Program: B.Sc. Engg. (EEE)
Course Code: **EEE-1101**	Course Title: **Electrical Circuits-I**
Time: **5 hours** (Writing - **4 hours 30 minutes** + **30 minutes** submission time)	Full Marks: **50** (**Written** 30 + **Viva**-20)

[Answer **each of the** questions from the followings; Figures in the right margin indicate full marks. **Answer script must be submitted through online method within 5 hours from starting time. Also, write down the Q. Set on the front page of your answer script]**

Q. Set-A

1(a).	In the following circuit of Fig. 1, before the 5 mA current source is connected to the terminal of a and b, the current i_o is calculated and found to be 3.5 mA. Apply superposition theorem to find the value of i_o after the current source is added to the circuit.	**CO2**	**Ap**	**3**
1(b).	Find the Thevenin Equivalent circuit with respect to the terminal a and b of the circuit of Fig. 2	**CO2**	**Ap**	**3**

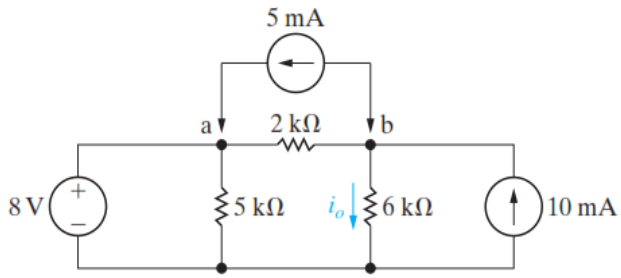

Fig. 1 Circuit for Question 1 a

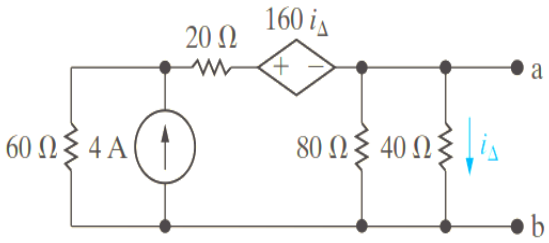

Fig. 2 Circuit for Question 1 b

2.	Show that at maximum power transfer condition $P_{max}=V_{th}^2/4R_{th}$, and the efficiency is 50%. For a series circuit containing a voltage source E, line resistance Rth, and the load resistance R_L, if the load resistance increases up to a value where $R_L>>R_{th}$ (R_L is very large compared to R_{th}), what will be the value of V_L, I_L? What will be the relation between input power and output power?	**CO1**	**E+An**	**6**
3.	A resistor and a capacitor have been connected with a 10 V DC supply at time of 0 ms. The initial voltage of the capacitor was zero. The value of the capacitor C=0.X μF (Where X is the Digits of the Student ID e.g. for the student ID of ET201010 the value of the capacitor will be C=0.201010). If the time constant is 5ms, Find the value of the resistor. Suppose, at time $t_1=y\tau$, the voltage across the capacitor becomes 80% of the steady state value. Find y and t_1.	**CO2**	**Ap**	**6**
4(a).	Explain the hysteresis curve in your own word. Indicate all the parameters in the diagram. Discuss about the reason for the existence of the residual magnetic flux density in both direction. Also specify the coercive force.	**CO1**	**E**	**6**

5.	For the series-parallel magnetic circuit of Fig. 3, Determine the value of I required to establish a flux in the gap of $\Phi_g=2\times10^{-4}$ Wb. (B-H curve has been attached with the question)	**CO2**	**E**	**6**

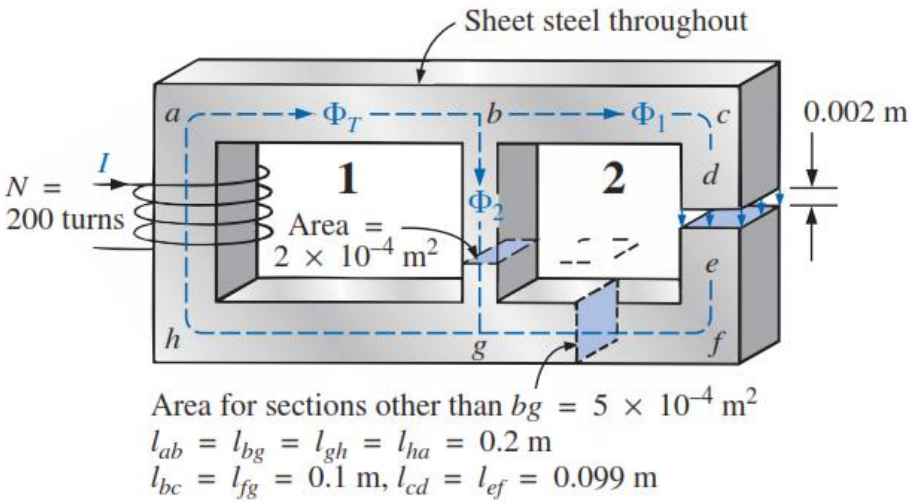

Fig. 3 Diagram for question no 5

6.	Viva: The time of viva will be declared in Google classroom.	**N/A**	**20**

B-H Curve