Time: 110 minutes (10:10-12:00)

學號：

姓名：

Instructions:

1. Please sign and return this exam paper with the answer sheet.

   於試題卷上簽名，與答案卷一同繳回。

2. This is not an open-book exam. Do not use any notes. Do not use the pencil. Calculator is allowed.

   不可看書、不可使用小抄、不可使用鉛筆作答，但可使用計算機。

3. Please clearly address the question number on the answer sheet. Answer the multiple choice questions on the answer sheet. No need to include the calculation process for "Multiple choice question".

   請在答案卷上清楚標註題號；選擇題答案請寫在答案卷上(選擇題不需寫計算過程)。

4. Raise your hand to ask questions, do not discuss with others.

   任何問題請舉手問助教，切勿逕行與同學討論。

5. Students who do not submit their tests at the end of the examination period will receive a score of zero. Students who cheat in their tests will also receive a zero.

   未繳回考卷或有作弊情事者以零分計算。

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1. (b) [5 points] An energy source forces a constant current of 2 A for 10 s to flow through a light bulb. If 2.3 kJ is given off in the form of light and heat energy, calculate the voltage drop across the bulb.

   (a) 11.5 V   (b) 115 V   (c) 460 V   (d) 11.5 kV

2. (d) [5 points] The electron beam in a TV picture tube carries 10^{15} electrons per second. As a design engineer, determine the voltage V_o needed to accelerate the electron beam to achieve 4 W.

   (a) 25 V   (b) 250 V   (c) 2.5 kV   (d) 25 kV

3. (C) [5 points] A resistor absorbs an instantaneous power of $30\cos^2 t$ mW when connected to a voltage source $v = 15 \cos t$ V, find the resistance of that resistor.

   (a) 0.13 Ω   (b) 0.5 Ω   (c) 7.5 Ω   (d) 60 Ω

4. (a) [5 points] What is the equivalent resistance at terminals a-b in the left circuit?
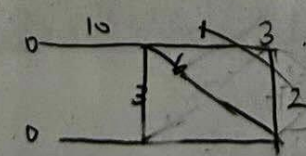
   (a) 11.2 Ω   (b) 10.8 Ω   (c) 12 Ω   (d) 13 Ω
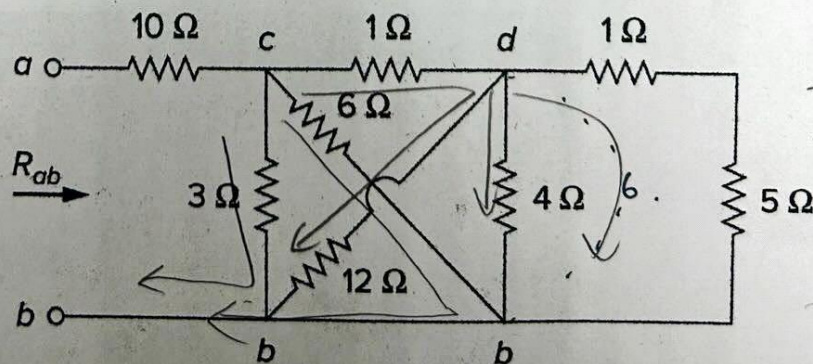
5. [10 points] Calculate V_o and I_o in **Fig. 1**.
6. [10 points] Use a Y-to-Δ transformation to find v_1 and v_2 in **Fig. 2**.
7. [20 points] Use <u>node voltage method</u> to calculate v_o in the simplified transistor circuit of **Fig. 3**.
8. [20 points] Use <u>mesh current method</u> to find v_x, and i_x in the circuit shown in **Fig. 4**.
9. [20 points] For the bridge network in **Fig. 5**, find i_o in the circuit by using <u>your preferred methods</u>.
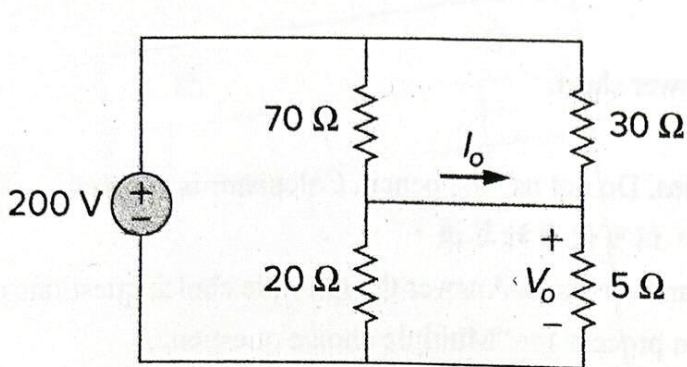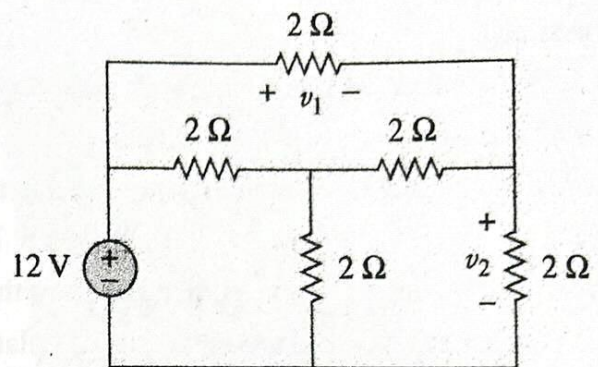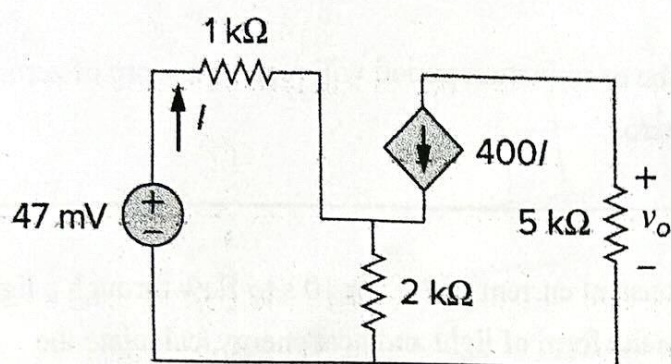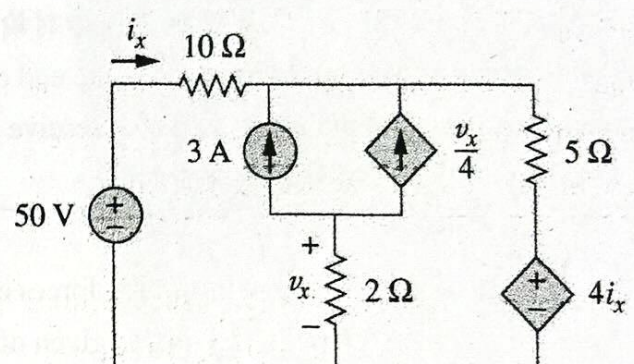

Fig.1

Fig.2

Fig.3

Fig.4

Fig. 5