



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

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QUALIFICATION : BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 6
COURSE: ELECTRICAL CIRCUIT AND ELECTRONIC	COURSE CODE: ECE602S
DATE: JANUARY 2025	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY/SUPPLEMENTARY: EXAMINATION PAPER

EXAMINER: MR. MARKUS HITILA

MODERATOR: DR. VAINO INDONGO

INSTRUCTIONS

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. Scientific Calculator

This paper consists of three pages including this front page

Question 1**[15]**

Describe an experiment to measure the open-circuit voltage of a cell. In your answer, explain how Thevenin's theorem can be applied to simplify the circuit for this measurement and how you can use the theorem to determine the internal characteristics of the cell

Question 2**[40]**

Find v in the circuit of Fig. 1 by using

- a) Nodal Analysis (10)
- b) Mesh Analysis (10)
- c) Superposition (10)
- d) Thevenin's and Norton's theorems (10)

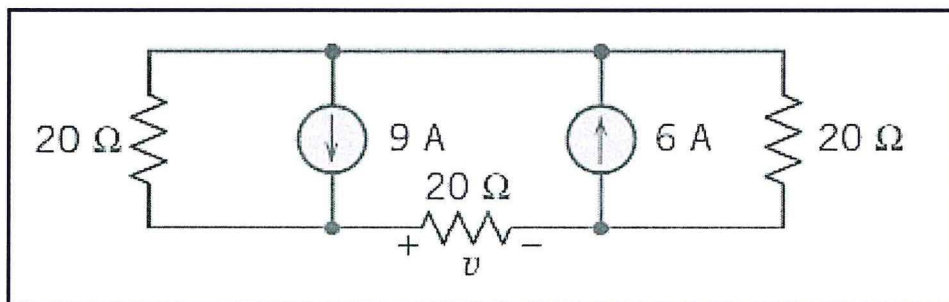


Figure 1: Circuit

Question 3**[10]**

Find the output voltage v_o and the output current i_o of the op-amp circuit shown

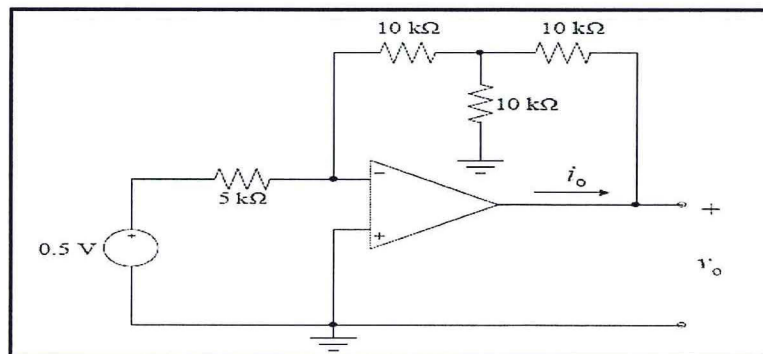


Figure 2: Circuit

Question 4**[20]**

The voltage and current were measured at the terminals of the device shown in the Figure. The results are shown in the Table.

- a) Construct a circuit model for this device using an ideal current source and a resistor. (10)
- b) Use the model to predict the amount of power the device will deliver to a 20Ω resistor. (10)

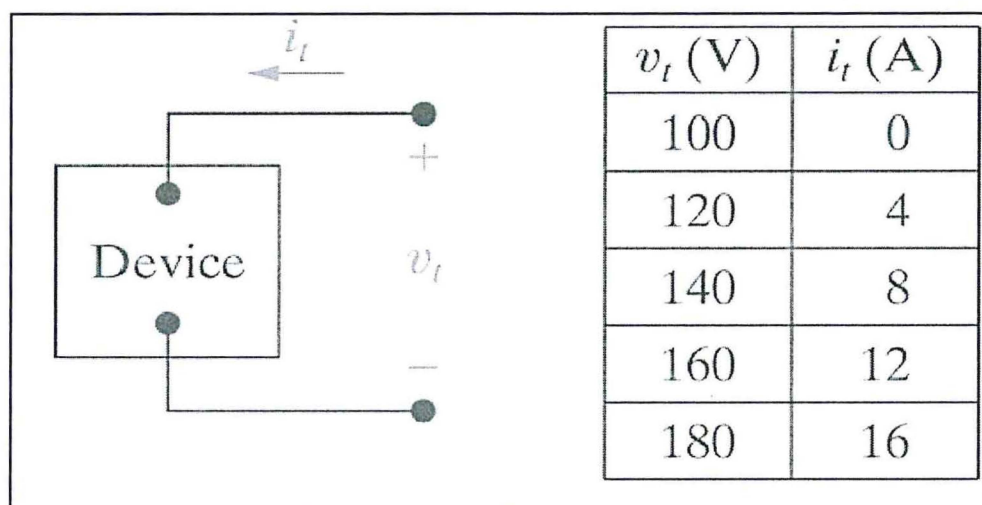


Figure 3: Experiment results and set up

Question 5

[15]

- a) What is a transistor? Give two functions of a transistor (2)
- b) What are the charge carriers in P-type and N-type semiconductors (2)
- c) Describe the difference between P-type and N-type semiconductors materials (4)
- d) For a CE transistor amplifier, the audio signal voltage across the collector resistance of $2.0\text{k}\Omega$ is 2.0V . suppose the current amplification factor of the transistor is 100, what should be the value of R_B in series with V_{BB} supply of 2.0V if the dc base current must be 10 times the signal current. Also calculate the dc drop across the collector resistance. Assume $V_{EE} = 0.6\text{V}$ (7)

END OF QUESTION PAPER