



QUALIFICATION : BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 6
COURSE: ELECTRICAL CIRCUITS AND ELECTRONICS	COURSE CODE: ECE602S
DATE: NOVEMBER 2023	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY: EXAMINATION QUESTION PAPER

EXAMINER: PROF MUNAWAR KARIM

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.

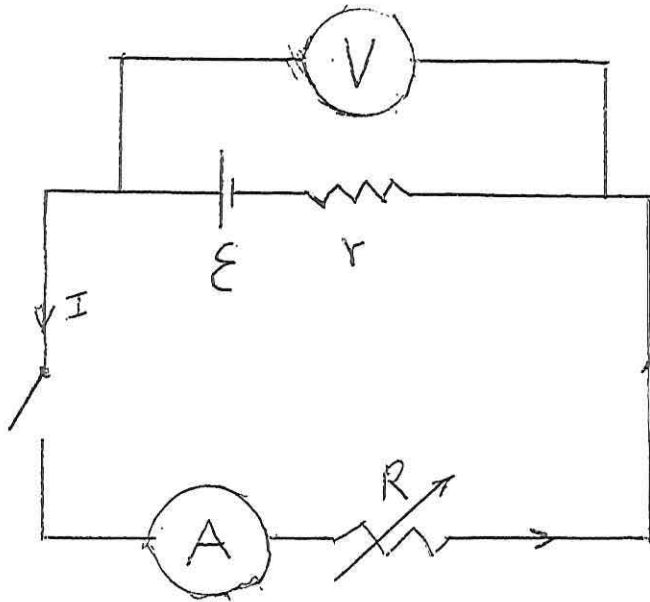
PERMISSIBLE MATERIAL:

Non-Programmable Calculator

This paper consists of 4 pages including this front page

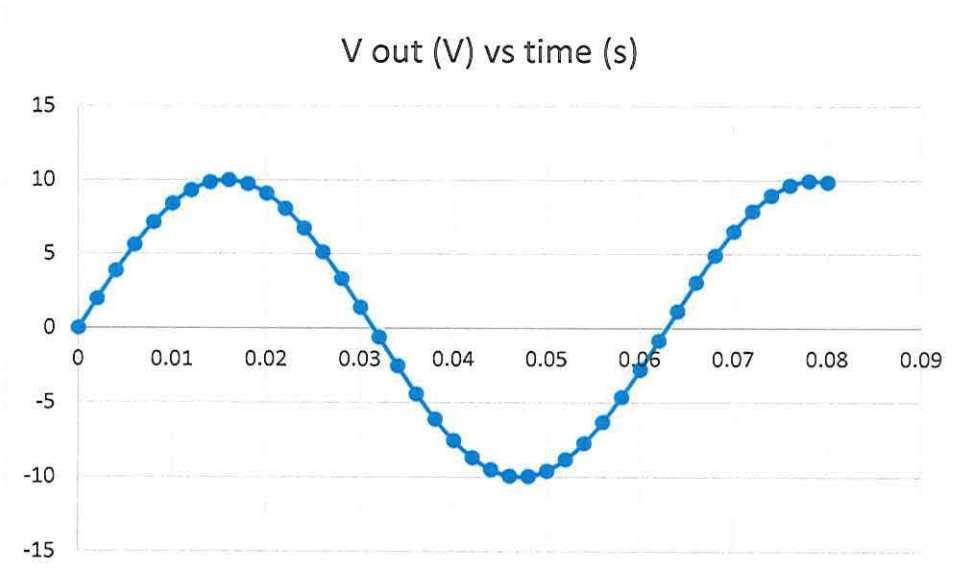
1) A cell of emf \mathcal{E} has internal resistance r .

- (a) Using a voltmeter, ammeter, variable resistor and wires set up an experiment to measure r . Draw a circuit diagram. (10)

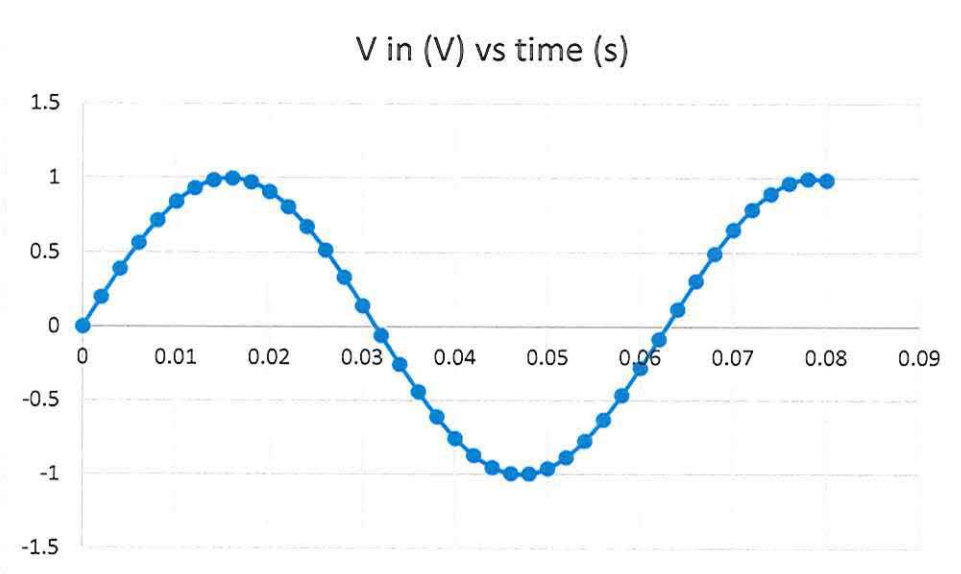


- (b) If current I flows in the circuit, and V is the potential across the cell show that $\mathcal{E} = V + Ir$. Rewrite this as $V = -rI + \mathcal{E}$, which looks like the equation of a straight line with slope r and intercept \mathcal{E} . (10)
- (c) In an experiment the data fit the equation $V = -1.11I + 1.6$. What is the value of r ? (10)

- (2) The output and input from a circuit are measured as a function of time. A graph of V_{out} (V) vs t (s) is shown below:



The input V_{in} (V) vs t (s) is shown below:



- (a) Design a circuit which has an output V_{out} given V_{in} as shown. (15)
 (b) Calculate the component values. (15)

- (3) Draw a circuit for a RC-bandpass filter. (10)
- (a) Calculate R and C-values when the low-frequency cut-off value is 3000 Hz. (10)
- (b) Calculate the R and C values when the high frequency cut-off value is 10,000 Hz. (10)
- (c) Draw a graph of $\ln v_0/v_i$ vs $\ln(f)$. (10)

END OF QUESTION PAPER