



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

ELECTRICAL AND ELECTRONIC ENGINEERING

MODULE: Electrical Engineering Technology 1

PAPER NO: 321/25/M05/1

DURATION: 3 hours

JUNE 2026 EXAMINATION

REQUIREMENTS

1. Answer booklet
2. Non-programmable calculator

INSTRUCTIONS TO CANDIDATE

1. Answer all ten (10) questions.
2. Start each question on a new page.
3. Take: $\epsilon_0 = 8,85 \times 10^{-12} \text{ F/M}$
 $\mu_0 = 4\pi \times 10^{-7} \text{ H/M}$

This paper consists of 7 printed pages.

QUESTION 1

- a) State to which units the following abbreviations refer to:
- i) S
 - ii) C
 - iii) A
 - iv) J
- (4 marks)
- b) i) State three (3) main effects of electric current. (3 marks)
- ii) Give one real life industrial application of each in (i). (3 marks)

QUESTION 2

- a) State the factors upon which the resistance of a conductor depends on. (4 marks)
- b) A coil consists of 2 000 turns of copper wire having a cross-sectional area of 0.8mm^2 . the mean length per turn is 80cm and the resistivity of copper is $0.02\ \mu\Omega\text{m}$.
- Find:
- i) The resistance of the coil (3 marks)
 - ii) The power absorbed by the coil when connected across a 110V dc supply. (3 marks)

QUESTION 3

- a) State three (3) characteristics of a series circuit. (3 marks)
- b) For the circuit shown in fig. 3 below determine:
- i) Current I_1 (2 marks)
 - ii) Voltmeter reading V_L (2 marks)
 - iii) Current I_2 (1 mark)
 - iv) Voltmeter reading V_2 (1 mark)
 - v) Current I_6 (1 mark)

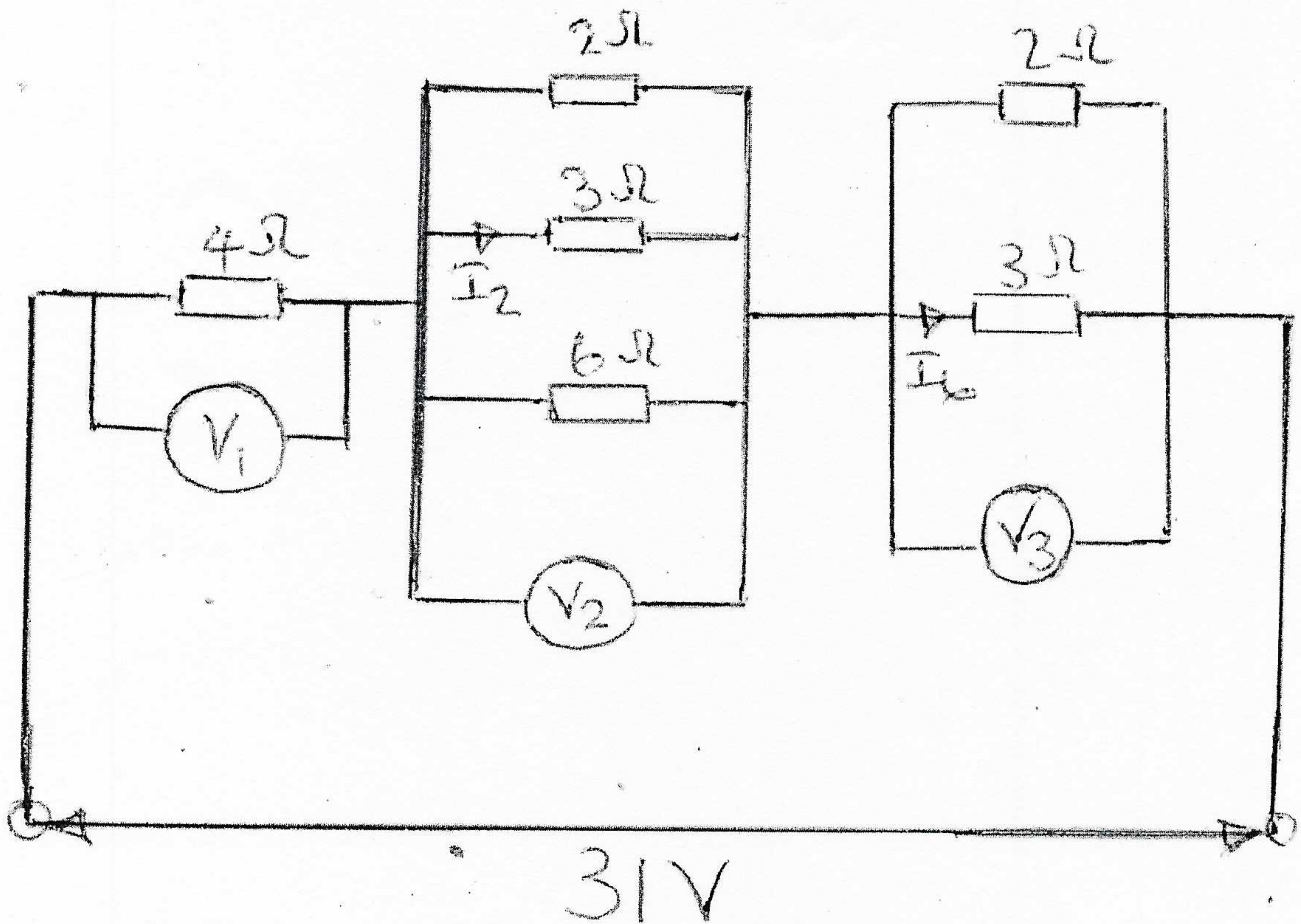


Fig. 3

QUESTION 4

For the circuit shown in Fig. 4 below find the value of:

- a) the total resistance (4 marks)
- b) the supply current (2 marks)
- c) current marked I_1 (2 marks)
- d) current marked I_x (2 marks)

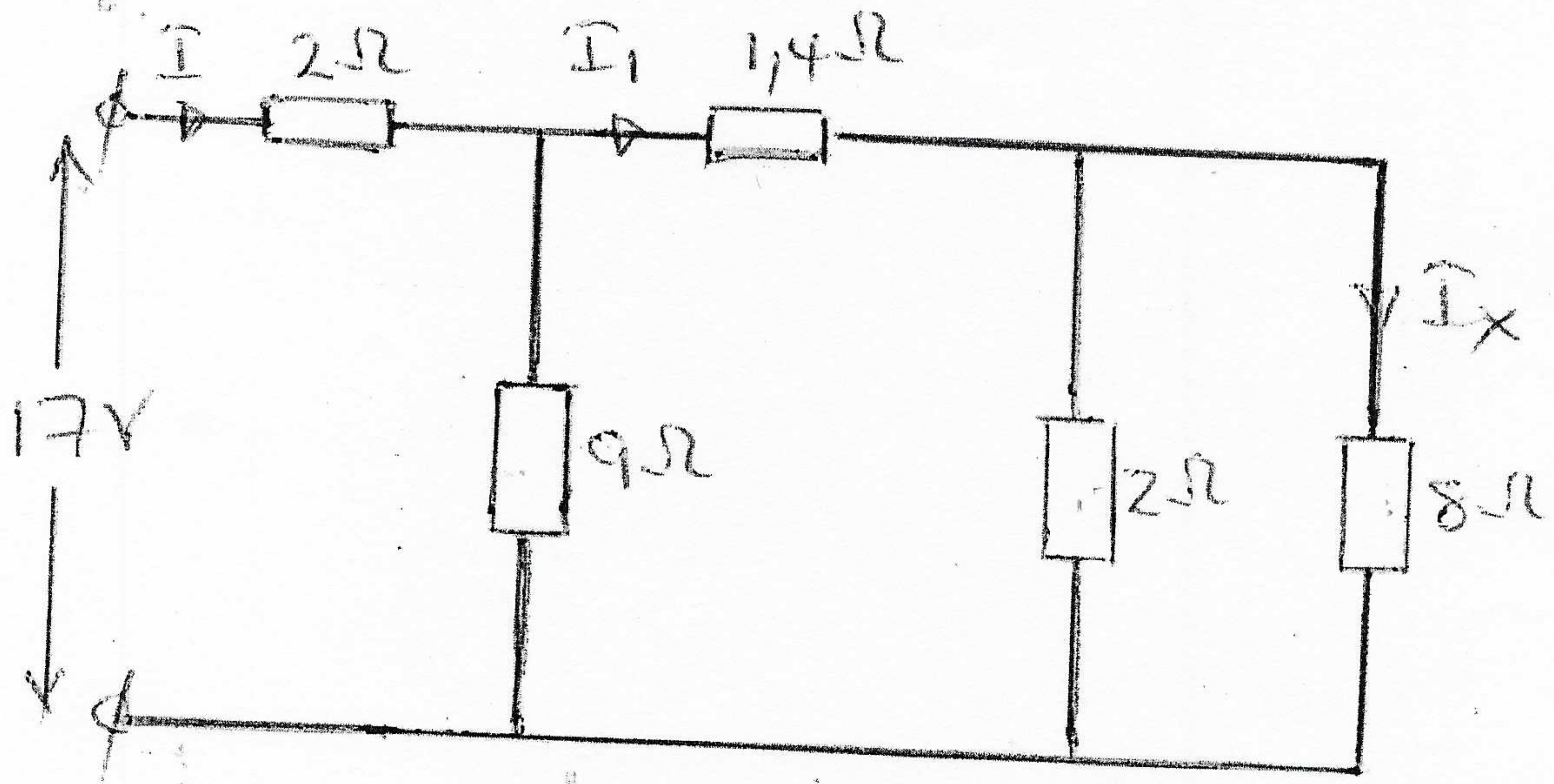


Fig. 4

QUESTION 5

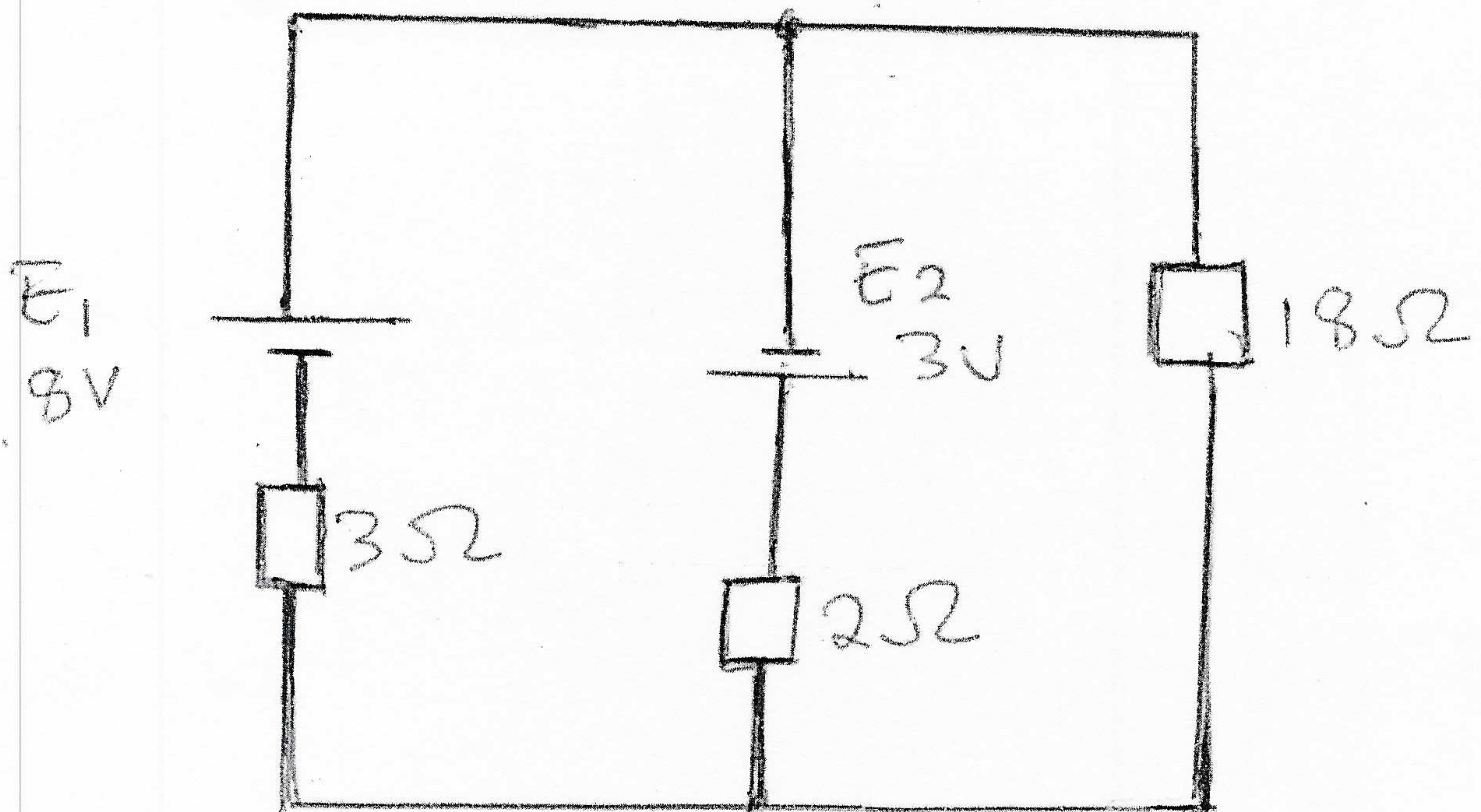
- a) State two (2) causes of faults in a cell. (2 marks)
- b)
 - i) State two (2) effects of corrosion in a cell. (2 marks)
 - ii) How is corrosion prevented (2 marks)
- c) Ten 1.5V cells each having an internal resistance of 0.2Ω are connected in series to a load of 58Ω . Determine the pd at the battery terminals. (4 marks)

QUESTION 6

a) State the super position theorem.

(2 marks)

b)



Find using super position theorem:

- i) The current flowing and the pd across 18Ω resistor
- ii) The current in the 8V battery
- iii) The current in the 3V battery

(8 marks)

QUESTION 7

a) Define the following terms:

- i) Electric flux
- ii) Electric flux density
- iii) Electric field strength

(3 marks)

- b) Two parallel plates having a pd of 200V between them are spaced 0.8mm apart. What is the electric field strength. Also find flux density when the dielectric between the plates is:
- Air
 - Polythene of relative permittivity 2.3
- (4 marks)
- c) Two parallel rectangular plates measuring 20cm by 40cm carry an electric charge of $0.2\mu C$. calculate the electric flux density. If the plates are spaced 5mm apart and the voltage between them is 0.25KV. Determine the electric field strength.
- (3 marks)

QUESTION 8

- a) A $5\mu F$ capacitor is charged so that the pd between its plates is 800V. Calculate how long the capacitor can provide an average discharge current of 2mA.
- (2 marks)
- b) A ceramic capacitor has an effective plate area of $4cm^2$ separated by 0.1mm of ceramic of relative permittivity 100.
- Calculate the capacitance of the capacitor in picofarads
 - If the capacitor in part b(i) is given a charge of $1,2\mu C$ what will be the pd between the plates?
- (3 marks)
(2 marks)
- c) A parallel plate capacitor has 19 interleaved plates each 75mm by 75mm separated by mica sheets 0,2mm thick. Assuming the relative permittivity of the mica is 5. Calculate the capacitance of the capacitor.
- (3 marks)

QUESTION 9

- a) Complete the table below:

ELECTRIC CIRCUIT	MAGNETIC CIRCUIT
Emf ()	
.....	Flux ($\emptyset$)
Resistance R	
$R = \frac{V}{I}$	
$R = \frac{\rho l}{A}$	

(5 marks)

b) Define the following terms:

- | | | |
|------|-----------------------|----------|
| i) | Magnetic flux | (1 mark) |
| ii) | Magnetic flux density | (1 mark) |
| iii) | Magneto motive force | (1 mark) |
| iv) | Reluctance | (1 mark) |
| v) | Relative permeability | (1 mark) |

QUESTION 10

a) Define the terms in relation to electrical measuring instruments.

- | | | |
|------|--------------------------------|-----------|
| i) | Deflecting or operation device | (2 marks) |
| ii) | Controlling device | (2 marks) |
| iii) | Dumping device | (2 marks) |

b) State two (2) advantages and two (2) disadvantages of moving coil instruments.
(4 marks)

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