

MAKERERE COLLEGE SCHOOL
S.4 Electricity Questions
HOLIDAY WORK TERM 1 2017

Exercise 1 1. Write down advantages of charging by induction over charging by contact

2. Explain why the leaf of uncharged gold-leaf electroscope diverges as a charged body is brought near its cap
3. Explain why when a conductor is brought near the cap of a charged gold-leaf electroscope the divergence of the leaf decreases.
4. Distinguish between an electric cell and a battery
5. Give reasons why lead acid battery may be preferred to dry cells
6. Give differences between primary and secondary cells
7. In making a simple the two electrodes used are not of the same kind. Explain why
8. Why is it possible to start a car with the lead-acid battery but not with dry cells in series giving the emf equal to that of a battery?
9. What are the defects and their remedies in the working of a dry cell?
10. Explain the following;
 - a) A glass window when wiped with a dry cloth on a dry day soon becomes dusty
 - b) A nylon dress sticks on the body and crackles when removed

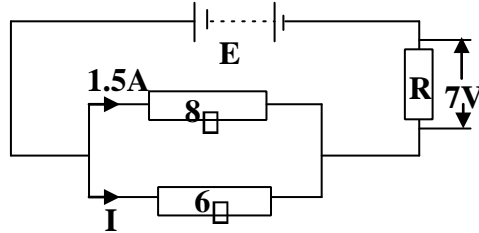
Exercise 2

1.
 - a) A charge of 180C flows through a lamp every minute. Calculate the current flowing through the lamp
 - b) Calculate the number of electrons involved if the charge on an electron is $1.6 \times 10^{-19}C$
2. A battery circulates charge round a circuit for 1.5 minutes. If the current is held at 2.5A, what quantity of charge passes through the wire?
3. A current of 10mA flows for 4 hours in a circuit. Calculate the quantity of electricity that flows in the circuit
4. When a resistance of 2Ω is connected across a battery a current of 1A flows. When the 2Ω resistor is replaced with a 4Ω resistor the current becomes 0.6A. Find i) the internal resistance of the battery ii) the emf of the battery
5. A kettle is marked "2500W, 240V"
 - i) What do these markings mean?

ii) What current does the kettle draw when connected to a 200V source.

6. Calculate the power used in 100Ω connected to a source of emf 12V

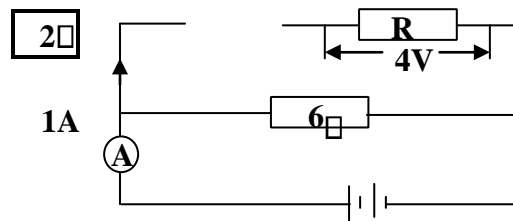
7. In the circuit diagram below, the battery has emf, E and negligible internal resistance



Calculate;

- i) Current, I
- ii) The resistance, R
- iii) The emf, E

8. In the circuit diagram below, the battery has emf, E and negligible internal resistance



Find;

- i) Ammeter, A reading
- ii) The resistance, R
- iii) The emf, E

9. Two appliances are rated 240V, 2kW and 240V, 500W. Find the cost of running them for three hour if the cost of one unit of electricity is 70/=

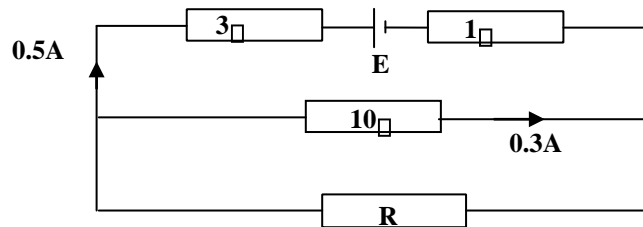
10. The table below shows a number of appliances and how they are used in Mr. Kato's house

Appliance	Number	Rating	Time per day
Bulbs	4	100W	4hours
Bulbs	5	60W	3hours
Cooking plate	1	1500W	3hours
Flat iron	1	750W	30minutes
Kettle	1	2.7kW	30minuts
Oven	1	2.8kW	1½hours

If a unit costs 150/= calculate Mr. Kato's April bill

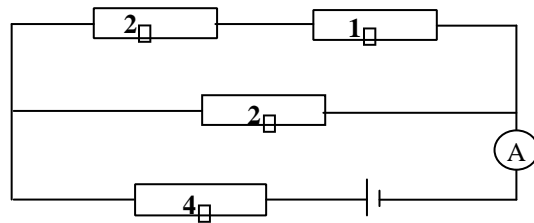
UNEB QUESTIOS

1.
 - a) State what happens when each of the following is brought near the cap of a positively charged electroscope
 - i) A glass rod rubbed with silk
 - ii) An uncharged metal rod
 - iii) An ebonite rod rubbed with fur
 - b) Describe how a conductor can be charged negatively by induction
 - c) i) What is a neutral point as applied to an electric field ii) Draw a diagram of electric field pattern when a negative charge is placed near a positive plate
2.
 - a) i) What is meant by electrical resistance
 - ii) State factors that determine the resistance of a metallic wire
 - b) Three identical bulbs, each rated at 6V, 3W are used to investigate the various combinations of them when connected to a 6V source
 - i) How many combinations of three bulbs are possible?
 - ii) Find the minimum and maximum power consumption during these investigations



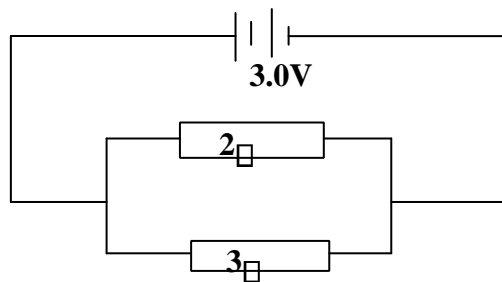
- In the circuit above, find the
- i) Resistance, R
 - ii) E.m.f, E of a cell of negligible internal resistance
3.
 - a) i) Draw a well labeled diagram of a gold leaf electroscope
 - ii) Describe how electroscope can be charged positively by induction
 - b) Sketch the electric field patterns for the following
 - i) Two negatively point charges close to each other
 - ii) A positively charged hollow conducting sphere
 - iii) Two positively charged parallel plates
 - c) Explain how a lightning conductor safeguards a house against lightning
 4.
 - a) Describe how you would use a gold leaf electroscope to determine the sign of the charge on a given charged body
 - b) Explain how an insulator gets charged by rubbing
 - c) Sketch the electric field pattern between a charged point and a metal plate
 - d) Describe how a lightning conductor safeguards a tall building from being struck by lightning
 5. Define the following terms;
 - i) A volt
 - ii) Internal resistance of a cell

b) The circuit diagram below shows a cell of emf 4V and internal resistance $2\ \Omega$ connected to network of resistors



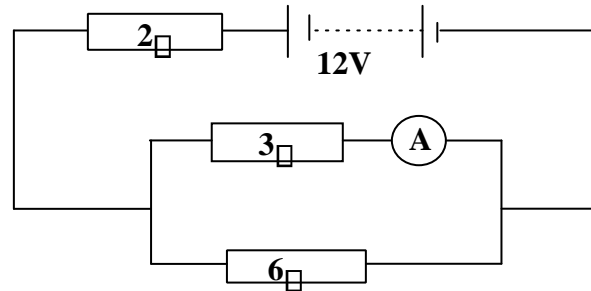
Calculate;

- i) Total resistance
 - ii) Ammeter, A reading
 - iii) The p.d across $1\ \Omega$ resistor
- c) Draw a labeled diagram of a simple cell
- d) i) Define the term electric field ii) Draw an electric field pattern between a positive charge and a negative plate
6. a) Draw sketch graphs of p.d, V against current, I for following
- i) A wire
 - ii) An electrolyte
 - iii) A semi-conductor diode
- b) Explain the differences between a voltmeter and an ammeter in terms of their
- i) Construction
 - ii) Use
- c) State three physical properties that affect the resistance of a solid conductor
- d) Two cells each of emf 1.5V and negligible internal resistance are connected in series across two resistors of $2\ \Omega$ and $3\ \Omega$ as shown below



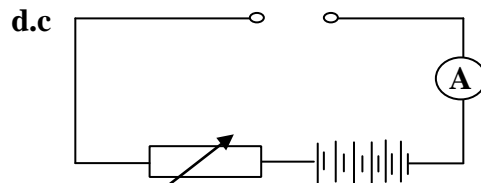
Calculate the current

- i) Supplied by the cells
 - ii) That passes through a $3\ \Omega$ resistor
7. Define the following terms;
- i) A volt
 - ii) Electrical resistance
- b) List ways by which the life of an accumulator can be prolonged
- c) A battery of e.m.f 12V and negligible internal resistance is connected to resistances of $2\ \Omega$, $3\ \Omega$ and $6\ \Omega$ as shown below.



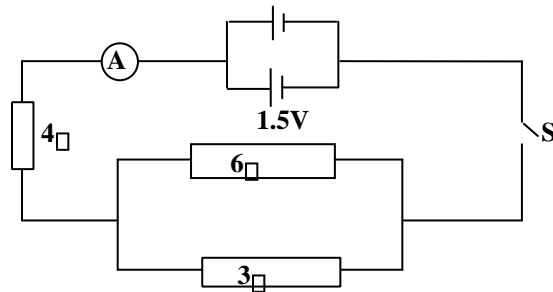
Find

- i) The reading of the ammeter, A
 - ii) Current passing through 6Ω resistor
 - d) State three advantages of an alternating current over a direct current in power transmission
 - e) Sketch the current versus voltage variation for a semi-conductor diode
- 8.
- a) What is meant by a conductor and an insulator. Give an example of each
 - b) Explain how an insulator gets charged by rubbing
 - c) i) Explain briefly how you can charge a conductor negatively by induction ii) Describe how it can be confirmed that the conductor in (b) (i) is negatively charged d) Explain the action of a lightening conductor
 - e) i) Explain what is meant by polarization as applied to a simple cell
- ii) State how polarization can be minimized in a simple cell
- 9.
- a) i) What is meant by the e.m.f of a source of electrical energy ii) Draw a labeled diagram to show the structure of a dry cell
 - b) Six accumulators each of e.m.f $2V$ and each of internal resistance 0.1Ω are charged from a $24V$ a.c supply as shown below + $24V$ -



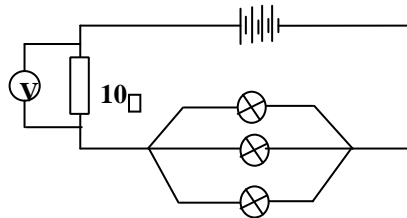
0 - 10Ω

- i) Explain why it is necessary to include a rheostat in the circuit
 - ii) What will the ammeter, A read if the rheostat is set at 5.4Ω
 - iii) Find the rate at which electrical energy is converted to chemical energy in (ii) above
10. Name one instrument that turns
- i) Chemical energy to electrical energy
 - ii) Heat energy to electrical energy
 - b) With the help of a well labeled diagram describe how dynamo generates an electromotive force (e.m.f)
 - c) Two cells each of internal resistance 1Ω are connected to a circuit which includes switch, S as shown in the figure below $1.5V$



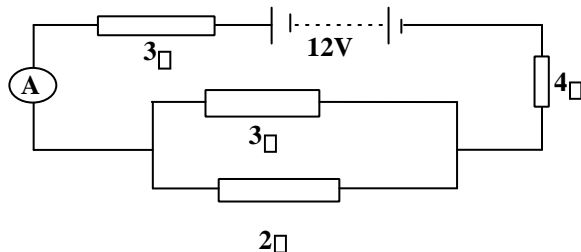
- i) What is the reading of the ammeter, A when the switch, S is closed
- ii) Calculate the power developed in the 4Ω resistor when switch, S is closed

11. a) Sketch the current and p.d variation for a semi-conductor diode
- b) Four identical cells each of internal resistance 0.2Ω are connected to form a battery. Three identical lamps each marked $3W$ and a 10Ω resistor are connected to the battery as shown below



- If the current through each lamp is $0.5A$, find
- i) The resistance of each lamp
 - ii) The reading of the voltmeter, V
 - iii) The effective resistance in the circuit
 - iv) The energy delivered by the battery per second

- c) Calculate the cost of running an electric fire for $2\frac{1}{2}$ hours, if an electric fire draws a current of $13A$ on a $100V$ supply and each unit costs shs. $40/=$
12. a) i) Draw a diagram to show the structure of a simple cell and state how it is minimized
- ii) Give one defect of a simple cell
- b) Explain how a lead acid accumulator can be recharged when it has run down
- c) Four resistors are connected across a $12V$ battery of negligible internal resistance as shown below



Determine

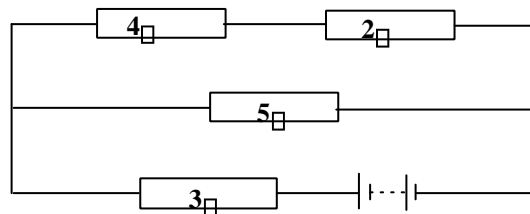
- i) The reading of the ammeter, A
- ii) The p.d across the parallel combination of resistors
- d) When two identical heating elements of a kettle are connected in series to a $240V$ supply, the power developed is $400W$. Find

- i) The resistance of either element ii) The power developed when the element of a kettle are connected in parallel to the same supply

13. a) Define the volt
 b) Draw a circuit diagram which can be used to investigate the p.d-current relationship for a wire
 c) Sketch a graph of current against p.d for
 i) A carbon resistor ii)

A semi-conductor diode

- c) An accumulator of e.m.f 24V and internal resistance of $2\ \Omega$ is connected to $3\ \Omega$, $4\ \Omega$, $2\ \Omega$ and $6\ \Omega$ resistors as shown below



Calculate

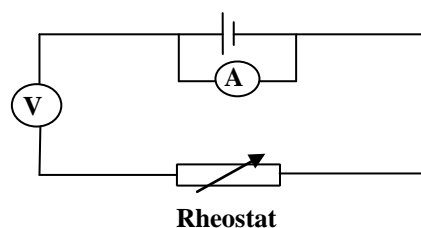
- i) Current through the $6\ \Omega$ resistor $24\text{V}, 2\ \Omega$ ii)

The total power expended

- e) State two precautions which must be taken to protect an accumulator

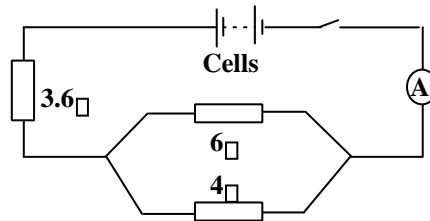
14. a) What happens when a glass rod is rubbed with
 i) Silk
 ii) An identical glass rod
 b) Describe how a gold leaf electroscope may be used to test the nature of the charge on an object
 c) Draw an electric field patterns for;
 i) An insulated negative charge
 ii) Two oppositely charged parallel plates at a small distance apart
 d) Explain why it is not advisable to touch the copper strip of a lightning conductor when it is raining

15. a) An ammeter, A and a voltmeter, V are connected as shown in the circuit below



What can you say about these connections?

- b) Two resistors of 6Ω , 4Ω and 3.6Ω are connected to eight identical cells of negligible internal resistance as shown below



If the ammeter, A reads 2A, when the switch is closed, determine

- Current through a 4Ω resistor
- E.m.f of each cell

- c) Abbot paid an electricity bill of shs. 180/= after using two identical bulbs for 2 hours every day for ten days at a cost of shs. 60/= per unit
- Determine the power consumption by each of the bulbs
 - State the energy changes that occur in the bulb

16. a) i) Draw a labeled diagram of a lead acid accumulator ii) List three precautions necessary to prolong the life of an accumulator iii) State two advantages of a Nife cell over a lead acid cell
- b) What is meant by the following?

- Electromotive force
- Internal resistance of a cell
- Explain the differences between a voltmeter and an ammeter in terms of their
 - Construction
 - Use
- State three physical properties that affect resistance of a solid conductor

17. a) Describe the structure and action of a fluorescent tube
- b) Give one advantage of fluorescent tube over a filament lamp
- c) Describe the functions of;
- A fuse

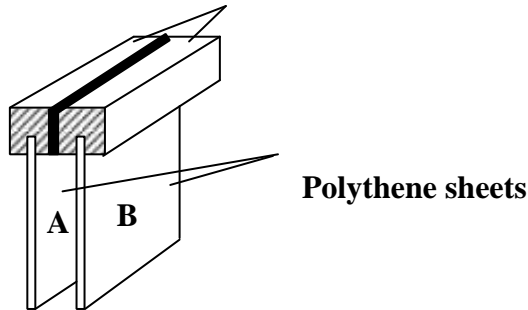
- ii) An earth wire
- Describe briefly how power is transmitted from a power station to a home
 - Find the cost of running two 60W lamps for 20 hours if the cost of each unit is shs. 40/=

18. a) Describe the structure and action of a fluorescent tube
- b) Give one advantage of fluorescent tube over a filament lamp
- c) Describe the functions of;

- A fuse
- An earth wire
 - Describe briefly how power is transmitted from a power station to a home
 - Find the cost of running two 60W lamps for 20 hours if the cost of each unit is shs. 40/=

19. a) i) What is a conductor ii) Give two examples of conductors
 b) Describe how a gold leaf electroscope can be positively charged by electrostatic induction
 c) Two polythene sheets A and B are both negatively charged with equal amounts of charge. One end of each polythene sheet is fixed into an insulator and the two sheets brought near each other as shown below

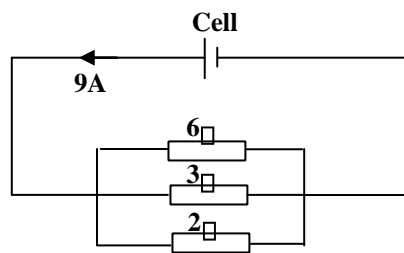
Insulator



- i) Describe and explain what happens ii) Describe and explain what happens if an earthed sheet of metal is inserted between the polythene sheets without touching them
 d) Explain how thunder is produced during rainstorm

20. a) Sketch the current versus p.d variation for
 i) Metal wire ii) Semi-conductor diode

b) The figure below shows a cell of negligible internal resistance connected to a system of resistors.



Calculate

- i) E.m.f of the cell ii) The current through the 3Ω iii)

Power dissipation in the 3Ω

- c) Describe the energy changes which occur from the time an electric bulb is switched on

END