*Ms p2*

**SECTIONtiotion A (25 MARKS)**

***Answer all the questions in the spaces provided***

1. Differentiate between a vector and a scalar quantity (1mark)

 ----------------vector---------------------------------scalar--------------------------------------

 ***Has b both mag and dir Has only magnitude***

2. The figure below shows a circuit consisting of a battery of 2 of cells ,a 1.5Afuse F, a switch S and two identical lamps L1 and L2. A current of 1.5A flows through lamp L2 when the switch is open.



Explain why the fuse may blow when the switch,L1 is closed..

 ***- reduced effective resistance ;***

 ***- INCREASED CURRENT ;***

3. When a highly negatively charged rod is brought near the cap of a positively charged leaf electroscope, the leaf first falls and then rises .. Explain this observation. (2marks)

 ***- neutralization takes place ;***

 ***- then , induction of + charge;***

4. The figure below shows two plane mirrors inclined at an angle of 400 to one another. A ray of

 light strikes the bottom mirror at an angle of 500 to the horizontal as shown on the diagram.

**400**

**500**

 L1

 A1

 (2 marks)

1. A charge of 90 coulombs flows through a circuit for one minute. Determine the amount of current

 that flows through the circuit. (3marks)

 ***I = Q/t***

 ***= 90/60***

 ***= 1.5 A***

1. State two methods of charging an electroscope. (2marks)
* ***INDUCTION***
* ***CONTACT***
1. The figure below shows two bar magnets placed close to each other.

 **N**

**S**

 **N**

**S**

 Sketch the magnetic field pattern around the two magnets. (2 marks)

1. An electric heater is rated 5000W, 250V. Determine its resistance. (3marks)

 ***R= V2/P ;***

 ***= 2502/5000 ;***

 ***= 12.5 Ω ;***

1. The figure below shows the magnetic field pattern round a current-carrying conductor. Indicate

 on the conductor the direction of the current . (1mark)

 **Direction ;**

 

1. Explain how polarization of a cell increases the cell’s internal resistance. (2mks)

 - ***Bubbles insulate the electrode ;***

 ***- Insulation increases internal ;***

1. **Figure below** shows a ray of light incident on an air bubble which is inside water,

 Complete the ray to show the path it follows through the air bubble. (1mk)

1. A battery is rated 40Ah. Determine the time in hours it would work steadily supplying a current

 of 2A.

 **P = It ;**

 **40 = 2(t) ;**

 **t = 20 hours ;**

1. The figurebelow is that of a dry cell. Name parts labeled **A** and **B**

 A

 B ***A= CARBON ROD/GRAPHITE ;***

 ***B = AMMONIUM CHLORIDE PASTE*** ;

**SECTIION B (55MARKS)**

 ***Answer all the questions in the spaces provided***

1. a) Define frequency . (1mark)

 ***Number of oscillations made per given time ;***

b) The figure below represents a displacement time graph wave.

  ***At least one oscillation*** ***, one mark.***

1. On the graph draw a line marking the amplitude of the wave . (1mark)
2. Determine the period of the wave. ( 1mark)

 ***T = 20 S ;***

1. Calculate the frequency of the wave. (3marks)

F = 1/T ;

 = 1/20x10-3 ;

 = 50 Hz ;

 (iii) Given that the wavelength of the wave is 0.2m, find the speed of the wave. (3marks)

 **V = F٨**

 **= 50X0.2 ; ;**

 **= 10m/s ;**

 c) On the same axes in (b) above, sketch another wave with double the frequency and half the

 amplitude. (2marks)

1. a) State Ohm's law. (1 mark)

 The current through a conductor is directly proportional to the pd across the conductor

 provided the temperature and other conditions remain constant.

 b) Differentiate between Pd and EMF . (2marks)

|  |  |
| --- | --- |
|  Pd |  EMF |
| ***Voltage across cell when supplying current ;*** | ***Voltage across cell when not supplying current ;*** |

The figure shows a graph drawn from data obtained in an experiment to verify Ohm's law.

 

Voltage(v)

 Current(A)

 c) Draw an electric circuit diagram that can be used to verify Ohm's law . (1mark)

 A

 V

 d) Use the graph to determine the resistance of the conductor used in the circuit . (3 marks)

 **R =** $∆V/∆I$ **;**

 **= 1.3/1.1;**

 **= 1.18 Ω ; (± 0.15 )**

 e) The figure belowshows resistors connected in a circuit diagram.

Ω







 10V

* + 1. Calculate the effective resistance in the circuit . (2 marks)

RP = 2Ω ;

 RT = 2+7+1 ;

 RT = 10Ω ;

* + 1. Determine the current through the 6Ω resistor. ( 3marks)

 **IT = 1A ;**

 **V = IR ;**

 **V =2V ;**

1. a) Define capacitance of a capacitor (1mk)

  **Charge per unit volt ;**

 b)In fig below, a sharp pin is fixed on a cap of a leaf of the electroscope. The electroscope is

 highly charged and then left for sometime.

 

 State and explain the observation made after sometime. (3marks)

* ***leaf falls ;***
* ***sharp pin ionizes air ;***
* ***discharging takes PLACE ;***

 c)Figure below shows a circuit where a battery of e.m.f. 4.5 V, switches A and B, two

 capacitors C1 = 0.6F and C2 = 1.0 F and a voltmeter are connected.

 

1. Determine the charge on C1 when switch A is closed and switch B is open.(2marks)  ***Q = CV ;***

 ***Q = 0.6x10-6 x 4.5 ;***

 ***Q = 2.7x10-6C ;***

ii) State and explain what is observed on the voltmeter when switch A is closed and switch B is

 open. (2marks)

 ***- Voltage rises gradually and then stops ;***

 ***- capacitor charges until it is fully charged at 4.5 V ;***

d) The Figure bellow shows a pair of parallel plates of capacitors connected to a battery. The upper plate

 is displaced slightly to the left.

 

 Suggest two adjustments that can be made to so as to reduce the effective capacitance.(2marks)

* ***Move upper plate further to the left ;***
* ***Increase distance d ;***

1. (a) State two differences between light and sound waves (2mark)

|  |  |
| --- | --- |
|  Light |  sound |
| ***Are transverse*** | ***Are longitudinal ;*** |
| ***Travel through vacuum*** | ***Don’t travel through vacuum ;*** |

 (b) A boy standing in front of a cliff blows a whistle and hears the echo after 0.5s. He then moves

 7 meters away from the cliff and blows the whistle again. He now hears the echo after 0.6s.

 Determine the speed of the sound in air. (3 marks)

 ***V = S/t ;***

 ***V = 34/0.1 ;***

 ***V = 340m/s ;***

 ( c) Thunder is heard long after lightning has been seen. Explain. (2marks)

 **Light travels faster than sound ;;**

 (d) State 2 factors that affect the speed of sound in a material. (2marks)

 ***- Temperature ;***

 ***- density ;***

1. a) State Snell’s law (1mark)

 ***The ratio of sine i to sine r is constant ;***

 (b)A coin is placed beneath a transparent block of thickness 10cm and refractive index

 1.56 .Calculate the vertical displacement of the coin. (3marks)

 ***n = real depth/apparent depth***

 ***1.56 = 10/A.D***

 ***A.D = 6.41 cm***

 (c)The speed of green light in a prism is 1.94×108m/s

 (i)Determine the refractive index of the Prism material (speed of light in air = 3 x 108 m/s). (3marks)

 ***n = C/V ;***

 ***n = 3x108/1.94x108 ;***

***n = 1.55 ;***

 (ii) Determine the critical angle of the prism material (3marks)

 ***Sin C = 1/Sin n***

 ***Sin C = 0.6452***

 ***C = 40.20***

(e) The refractive indices of glass and water are 3/2 and 4/3 respectively. Find the value of angle Ф in

 the figure below. (3marks)

 42

 Ф

 ***n1sinФ1 = n2SinФ2 ;***

 ***8/9sin42 = sin Ф2 ;***

 ***Ф2 = 36.50 ;***