**Name**: **………………………………………………………. Reg. No……………..Class………**

**232/2**

**FORM FOUR**

**PHYSICS**

**2021/2022**

*2 hours*

**OPENER EXAMINATION**

**TERM ONE 2021/2022**

**PAVEMENT NATIONAL EXAMINATION**

**PHYSICS PAPER 2**

*2 hours*

**INSTRUCTIONS TO CANDIDATES**

* *This paper consists of* ***20*** *questions.*
* *Answer* ***ALL*** *the questions in the spaces provided.*
* ***ALL*** *working* ***MUST*** *be clearly shown.*
* ***ALL*** *numerical answers* ***MUST*** *be expressed in decimal forms.*

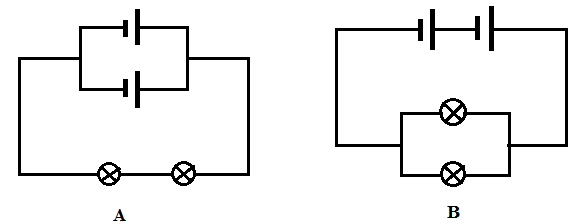
**For Examiners use only**

|  |  |  |
| --- | --- | --- |
| Question | Maximum  Score | Candidate’s  Score |
| **1 - 20** | **80** |  |

**The paper consists of 10 printed pages.**

***Students should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.***

**1.** A form one student was investigating the brightness of bulbs when set up in circuits. He used identical bulbs and cells.



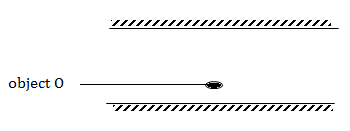
State and explain which set up had the brightest bulb **(2 marks)**

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**2.** Distinguish between hard and soft magnetic materials. **(2 marks)**

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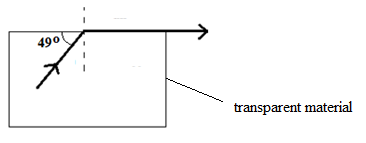
**3.** The figure below shows two mirrors M1 and M2 arranged parallel to each other



O is an object placed in between the mirrors. The eye observes infinite number of images in M1 explain the observation. **(2 marks)**

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**4.** The figure below shows a ray of light through a transparent material placed in air



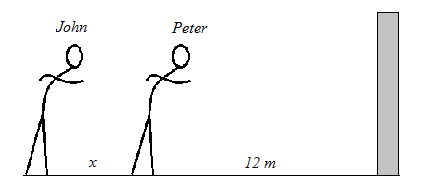
Calculate the refractive index of the transparent material. **(2 marks)**

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**6.** An electric heater is found to have a resistance of 950Ω when operating normally on a 240 V mains. Find the power rating of the heater. **(2 marks)**

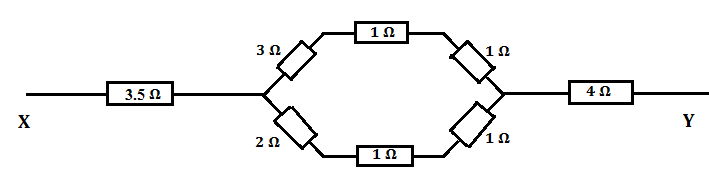
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**7.** Peter and John are 12m and X metres respectively away from a wall as shown peter claps his hands once. John hears the echo 0.45s later. Calculate the distance between John and Peter Speed of *(sound in air =330 m/s)*  **(3 marks)**



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**8.** Calculate the effective resistance of the network from X to Y **(4 marks)**

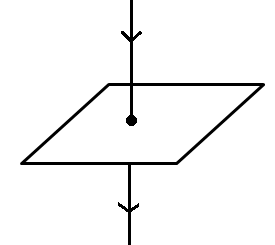


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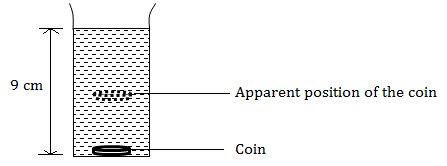
**9.** A small electric motor takes a current of 5A from a 200V mains supply. Calculate the resistance offered by the motor and power consumed in watts. **(3 marks)**

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**10.** The figure below shows the direction of current in a conductor. Sketch on the diagram the magnetic field pattern due to the current. **(2 marks)**



**11.** (a) In the set up below the vertical displacement of the coin as seen from the liquid surface is 4cm. Determine the refractive index of the liquid used. **(3 marks)**



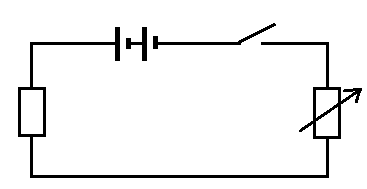
(b) Determine the critical angle for a ray travelling from the liquid above to air **(2 marks)**

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(c) Name the conditions necessary for total internal reflection to occur **(2 marks)**

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**12.** The circuit below was used to investigate how the current passing through Q varied with p.d applied across its ends.



Indicate on the diagram the position of ammeter and voltmeter **(2 marks)**

**13.** When a highly positively-charged rod is brought from high position towards a negatively charged electroscope, it is observed that the leaf divergence first decreases and then rises as the rod nears the cap. Explain. **(2 marks)**

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**14.** A charge of 360 Coulombs pass in a circuit in 15 minutes. Calculate the size of current supplied during that period? **(2 marks)**

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**15.** Determine the speed of light in water given that the speed of light in air is 3.0 × 108 ms-1 and the refractive index of water is 1.33 **(3 marks)**

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**16.** An object is placed 50cm in-front of a concave mirror of focal length 20cm. Determine by calculation the position and nature of the image formed.  **(3 marks)**

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**17.** (a) Name a device that would convert kinetic energy into electric energy

**(1 mark)**

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(b) The filament of an electric lamp is made of tungsten. Why is tungsten the suitable material? **(2 marks)**

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(c) A current of 2A flows in a resistor for 10 minutes, 1500j of electric energy is dissipated. Determine

(i) The voltage across the resistor  **(2 marks)**

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(ii) The total resistance of the resistor in ohms **(2 marks)**

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**18.** A current I passing through a coil when the P.d across it is V as measured on a voltmeter for which allowance was not made when the reading was taken

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| --- | --- | --- | --- | --- | --- |
| **I(A)** | 0.05 | 0.20 | 0.35 | 0.50 | 0.65 |
| **P.d(v)** | 0.85 | 2.8 | 4.75 | 6.70 | 8.65 |

Plot a graph of V against I and use it to determine **(4 marks)**

1. The resistance of the coil **(2 marks)**

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1. The Zero error of the voltmeter **(1 marks)**

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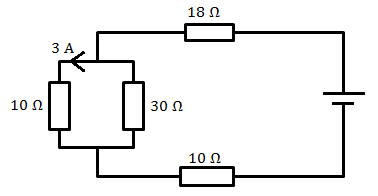
1. The correct value of the first P.d measured. **(1 mark)**

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**19.** (a) State Ohms’ law **(1 mark)**

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(b) From the circuit diagram below



Determine

(i) The current through the 30Ω resistor **(2 marks)**

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(ii) The total current in the circuit **(2 marks)**

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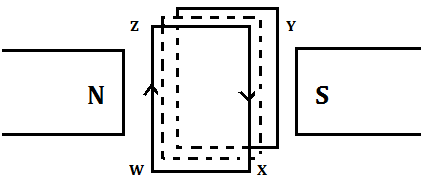
(iii) The total resistance in the circuit **(2 marks)**

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(iv) The total P.d in the circuit **(2 mark)**

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**20.** The figure below shows a coil of wire WXYZ situated between the poles of a permanent magnet. The coil is pivoted about the line PQ and carries a current I



1. Which of the sides of the coil WX, WX, YZ and ZW experiences a force? **(2 mark)**

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1. Which way will the coil begin to rotate? **(1 mark)**

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1. Give four methods by which you would increase the size of the force on the coil. **(4 marks)**

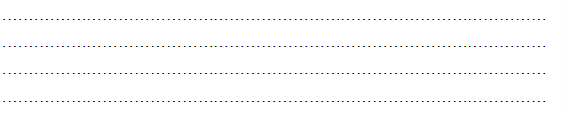
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1. State the effect on the coil of interchanging the poles of the magnet. **(1 mark)**

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**21.** (a) Draw a diagram to show the formation of a solar eclipse **(2 marks)**

(b) Explain how a single observer may see both a partial and total eclipse of the sun while remaining at the same place on earth **(2 marks)**

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(c) What change would be necessary for an observer to see an annular eclipse. **(1 mark)**

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