**BURAMU PAPER 2**

**Section A 25 marks**

1.



Plane mirror

The plane mirror is then rotated clockwise through 200 keeping the incident ray fixed. What would be the new angle of reflection? (1mk)

1. Why is a concave mirror suitable for use as a shaving mirror? (2mks)
2. The figure below shows a wave profile for a wave whose frequency is 2Hz



Time (s)

displacement

Determine the value of t3 (s) (2mks)

1. A certain material has a critical angle of 420. The diagram below shows a ray of light incident on the material-air boundary.



Boundary

Material

(i) What’s the refractive index of the material? (2mks)

(ii) On the diagram indicate the path of the ray after hitting the boundary, showing the angles (1mk)

1. The diagram below shows an object placed some distance from a biconcave lens.



Object

Construct the image on the diagram (3mks)

1. Two capacitors of x Farads and 2 micro Farads are connected in parallel and the combination joined in series to 5 micro Farads capacitor. The effective capacitance of the network is then 2.5 micro Farads.

Determine the value of x (3mks)

1. The diagram below shows a method of magnetization



Permanent magnet

Path of magnet

 Ferromagnetic material is being magnetized

* 1. What pole is acquired by the end B? (1mk)
	2. Sketch a graph to show how the strength of the magnet being created varies with the number of strokes (2mks)
1. Name two advantages which a lead accumulator has over a dry cell (2mks)
2. A girl observes her face in a concave mirror of a focal length 90cm. If the mirror is 70cm away, state two characteristics of the image observed. (2mks)
3. The sharp point of a pin is held with a bare hand and brought near the cap of a positively charged electroscope. State and explain the observation made on the electroscope (2mks*)*
4. The figure (3) below shows waves incident on a shallow region of the shape shown with dotted lines



on the same diagram sketch the wave pattern in and beyond the shallow region (1mk)

1. In the figure 4 below coils X and Y are connected in series. The e.m.f of A.c supply is 15V. if the voltmeter (V) reads 12.5Volts and the resistance of coil X is 50Ω calculate the resistance of the coil Y (3mks)



15 volts

**SECTION B (55 Marks)**

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

1. (a) (i) State Ohm’s law

 (1mk)



(ii) The circuit diagram above shows two cells each of e.m.f. E volts and internal resistance 0.5

 Ohms supplying a current to a network of resistors.

When switched on the ammeter reading is found to be 0.2Amperes. Determine the value of E

 (4mks)

(b) A cell of e.m.f E and internal resistance r is used to pass a current through various resistors R, Ohms and the values of current recorded in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| R(Ohms) | 1.6 | 2.1 | 2.5 | 3.6 | 5 | 8 |
| i(A) | 1 | 0.8 | 0.7 | 0.5 | 0.37 | 0.24 |
| 1/i(A-1) |  |  |  |  |  |  |

 (i) On the table record values of 1/i (1mk)

 (ii) Plot a graph of 1/i versus R and use it to determine E (8mks)

1. (a) A coin is placed at the bottom of a tall gas jar. When the jar is filled with paraffin to a depth of 32.4cm, the coin is apparently seen displaced 9.9cm from the bottom. What is the refractive index of paraffin? (3mks)

 (b) State Snell’s law (1mk)

(c) (i) The critical angle for crown glass is 420 . Using this information complete the figure below to show the passage of the ray shown through the glass block (1mk)

Air



Glass block

Ray box

 (ii) The critical angle of paraffin is 450 what is the refractive index of paraffin (2mks)

1. (a) (i) Distinguish between diffraction and refraction of waves (2mks)

(ii) Complete the diagram below to show the pattern across the slit S



 (b) The figure below shows the rays of monochromatic light incident on two adjacent slits S1 and S2



Monochromatic light source

 (i) What is the purpose of having slit S0, behind the slits S1 and S2

 (ii) Give an expression for the wavelength λ of light in terms of d, x and y (1mk)

 (iii) In the space below sketch the interference pattern observed if white light was used instead of monochromatic light (1mk)

(iv) Explain the variation of frequency across the pattern in b(iii) above. (1mk)

(v) Given that the wavelength of the monochromatic light is 1.0x10-8m, calculate its frequency (Speed of light is 3.0x108ms-1) (3mks)

**END**

1. (a) (i) **State three** properties of electric field lines. (3mks)

 (ii) With the help of a diagram **explain** how a lighting arrestor works. (5mks)

 (b) (i) **Define** the term capacitance of a capacitor. (1mk)

 (ii) Other than area of overlap of plates and the separation distance between plates. **State** any other factor that affects the capacitance of a capacitor. (1mk)

 (iii) **Write down** an equation relating three factors in b(ii) above to the capacitance of a capacitor. (1mk)

 (c) A 2f capacitor is charged to a potential of 200v, then the supply is disconnected. The capacitor is then connected to another uncharged capacitor. The potential difference across the parallel arrangement is 80v. **Find** the capacitance of the second capacitor. (4mks)

17. (a) A car battery is used to light a 12V lamp A constant current of 3 A passes round the circuit.

1. **Explain** what happens to the energy of the electron as they flow through the lamp wire. (3mks)
2. **How** much energy is transferred by the lamp in 20 seconds? (2mks)
3. For a particular specimen of wire, a series of readings of the current through the wire for different potential differences across it is taken and plotted as shown.

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 (i) **Explain** how the resistance of the wire changes (3mks)

1. **How** would the resistance of a piece of wire change if

(I) the length were doubled (2mks)

(II) the diameter were doubled (2mks)