PHYSICS F 4 M/S PP2

1. Rectilinear propagation. ✓1

4. (a) Unlike poles attract, like poles repel ✓1

(b) The keepers become magnetized thus neutralizing ✓ the pole; this reduces repulsion at the poles ✓ thus helping in retention of magnetism.

5. It has a wider field of view than that of a plane mirror. ✓

6

Total resistance R= 6+6+0.5Ω=12.5Ω
Current I= V/R=3.0/12.5=0.24A

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7. When the terminals of the heater are at a p.d of 240V and connected to an alternating current of frequency 50Hz, it converts 2500J of electrical energy to 2500 J of heat energy per second.

8. TV waves----microwaves—blue light---Ultra-violet—gamma rays.
9. Transformer uses a.c only while induction coil uses d.c
Transformer produces a humming sound while induction coil is quiet

10, (a)

Transverse	Longitudinal wave

1.	Displacement of particles in the wave is perpendicular to the direction of wave motion.	- Displacement of particles in the wave is parallel to the direction of wave motion.
2.	Requires no medium for propagation.	- Requires a material medium for propagation.
3.	Can be mechanical or electromagnetic in nature.	- Purely mechanical wave.

Any 1 combination

(b) $f = \frac{1}{T}\ T = 2(S)$

Hence $f = \frac{1}{2} = 0.5H_z$

(c) (i) Can travel for long distances as a beam without getting scattered.

(ii) It can be reflected by tiny particles like grains hence can defect them. ✓¹

Any 1

12. P = VI ✓¹

$$I = \frac{P}{V} = \frac{3000}{240}$$

= 12.5A✓¹

The fuse is not suitable since the appliance is drawing more current than the fuse rating ✓¹ the fuse will blow off.

13. **His car gets charged by friction during the day. He then acts as earth wire when he step on the ground holding the metal handle.**

SECTION

14. (a) (i) $\frac{V_P}{V_S} = \frac{N_P}{N_S}$ ✓¹

$$\frac{800}{V_S} = \frac{2000}{150}$$

$$V_S = \frac{800 \times 150}{2000}$$

= 60V✓¹

(ii) Power input = Power output ✓¹

$$I_P = \frac{1000}{800}$$

= 1.25A✓¹

(iii) $I_s = \frac{Power\ output}{Output\ voltage} = \frac{1000}{60}$

= 16.67A ✓¹

(iv) Step-down transformer ✓¹

(b) (i) - To minimize power loss.

- Thick cables minimizes resistance.

(ii) $\frac{2000}{1000} \times 2 \times 30 = 120kwh$ ✓¹

$\frac{75}{1000} \times 10 \times 30 = 22kwh$ ✓¹

$\frac{1500}{1000} \times 1 \times 30 = \underset{\text{Total}}{45kwh}$ $189kwh$

Cost 187×9.50

= Ksh.1776.50 ✓¹

(ii) No of units = 187

Fuel levy $187 \times \frac{70}{100}$

= 130.90

Standing charge= 200.00

Total charge = 1776.50 + 330.90

= Ksh.2107.40

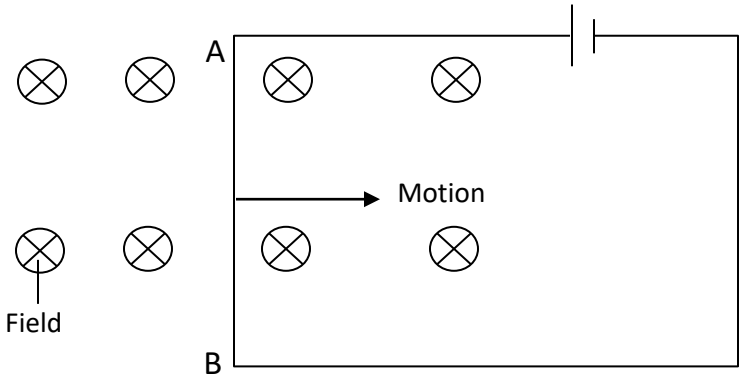
15. (a) (i) Increasing the number of turns in the coil.

(ii) Increasing the size of current.

(iii) Using a soft iron core.

(iv) Reducing the length of the core.

(b)



(b) $E = IR + Ir$

$= 5 \times 1.6 + 5r$ --- (i)

$E = 3.2 \times 2.8 + 3.2r$ ---- (ii)

Hence

$5 \times 1.6 + 5r = 3.2 \times 2.8 \times 3.2r$

$1.8r = 8.96 + 8$

$1.8r = 0.96$

$r = \frac{0.96}{1.8} = \underline{\underline{0.5333}}$

$E = 5 \times 1.6 + 5 \times 0.53$

$= 8 + 2.65$

$= 10.65V$

(d) $\rho = \frac{RA}{\ell}$ ✓①

$$\ell = \frac{10 \times 7 \times 10^{-8}}{1.1 \times 10^{-6}} \checkmark ①$$

$$= \frac{70}{1.1} \times 10^{-2} m$$

$= 63.6 \times 10^{-2}$m

or

63.6cm ✓①

(e) P.d across R = p.d across 10Ω resistor. ✓①

V + IR = 2 × 10 = 20V ✓①

16. **(a) (i)** **Long sight**

(ii) **--eye ball being too long**
--focal length too short

b. **It is the ability of the eye to focus the image on the retina**

c. (i). **1/u + 1/v = 1/f**

1/u + 1/45=1/15

1/u =1/15-1/45 =2/45

U=45/2= 22.5cm

Apparent depth =22.5cm

(ii) n= real depth/apparent depth

real depth=n x AD

= 4/3 x 45/2

=15x2

=30cm.

$_{g}n_{l}$ =1.4/1.6 =sin 45^0/sinr

sinr =1.6sin45/1.4

=0.742

r = 53.0

d. (i). **i = 45^0**

17. (a) (i) Increasing the surface area of the liquid. ✓①

(ii) Reducing the pressure on the liquid surface. ✓①

(b) Heat gained by water = Heat lost by metal block

$M_w C_w \Theta_w = M_m C_m \Theta_m$ ✓①

$2 \times 4200 \times (50 - T_1) = 10 \times 450 \times 70$

$$50\ T_1 = \frac{10 \times 450 \times 70}{2 \times 4200} = 37.5$$ ✓①

$T_1 = 50 - 37.5 = 12.5°C$ ✓①

(c) Water has a high heat capacity hence can absorb a lot of heat ✓①

(d) (i) Increasing the pressure on the ice. ✓①

(ii) Adding impurities e.g. salt ✓①

(f) As ether evaporates, it extra it's the latent heat of vaporization from its surroundings

hence the water is cooled. ✓①

(g)

Heat	Temperature
- Form of energy which flows from a hotter to a cooler part of an object - Measured in joules - Measured using a calorimeter	- Degree of hotness or coldness of an object measured on a given scale. - Measured in Kelvin or °C. - Measured using a thermometer.

Any two

18. Last…

(i) **Up motion $h_1 = 40t - 5t^2$** } ✓1
Down motion $h_2 = 5t^2$
But $h_1 + h_2 = 100m$
$100 = 5t^2 + -5t^2 + 40t$✓1
$t = \frac{100}{40}$ = 2.5 seconds ✓1

(ii) **$hi = 40t - 5t^2$**

$= (40 \times 2.2) - 5\ (2.5)^2$✓1

$= 100 - 31.25$

$= 68.75$m✓1 from the ground

(b)

(i) **$w = 2\pi f$**

$= 2 \times \frac{22}{7} \times 6$✓

= 37.7 radis✓

(ii) **$a = rw^2$**

$= 0.6 \times (37.7^2)$ ✓

= 853.42 radis✓

(iii) **F = ma**

= 0.045 x 853.42✓

= 38.4N ✓

(iv) **v = rw**

= 0.6 x 37.7

= 22.62 m/s ✓