**FORM FOUR PAPER TWO**

**PHYSICS TERM 3 2022**

**OPENER EXAMINATION TERM 3, 2022**

**MARKING SCHEME**

**Section 1 (25 marks)**

1. i) Moon is between sun and the Earth

 ii) During new moon

 iii) Moon far from the Earth

2. Number of images = 3600 = I

 ϴ

3600 = I

 120

 = 21 Images

3. Hard magnetic material – hard/difficult to magnetize but once magnetized retains the magnetism for a long time.

Soft magnetic materials – magnetized easily but do not retain their magnetism for long.

Potential difference – Voltage across the terminals of a cell when current drawn from it (in a closed circuit)

4. a) Short sightedness/Myopia

 b) Use diverging lens

5. i) Polarization – Add a depolarizer e.g. manganese dioxide – react with hydrogen to form water

 ii) Local Action – Use pure Zinc

 Alloying Zinc electrode with Mercury

6. Electromotive force – Voltage between the terminals of a cell when no current is flowing through an external circuit when the circuit is open.

 Potential difference – Voltage across the terminals of a cell when current is being drawn from

 it (in a closed circuit)

7. P = 40W

V = 240v

R = V2*/P*

R = 2402

 40

R = 1440 Ω

8. i) Length of the wire

 ii) Tension in the wire

9. Refractive index η = 1

sin C

C = (900 – 490) = 410

η = 1

 sin 410

η = 1.524

10. Length of the conductor inside the M.F

11. Y-rays, X-rays, UV light, Radio waves

12. Power loss inform of heat which dissipated due to resistance of the conductor wire.

 Minimized by reducing current and resistance

13. i) Radar communication, cooking

 ii) Infrared radiation

**Section Two (55 marks).**

**14.a) D\_\_\_\_\_\_\_soft iron armature.**

 **E\_\_\_\_\_\_ contact screw.**

 **[ii]. Current flows in the circuit and the core becomes magnetized. The electromagnet induces magnetism in the soft iron strip(armature) which is then attracted by the armature striking the gong.**

**[ii]. The attraction of the soft iron armature separates the contacts, breaking the circuit. Magnetism in the core ' dies off' and the spring returns the armature to its original position. Contact is made again and the process is repeated.**

b.[i] Power = VI

 I = P/V

 = 60/240

 = 0.25A.

 [ii] R = V/I

 = 240/0.25

 = 960 Ohms.

15. a) Faraday law of electromagnetic induction states that the magnitude of the induced emf is directly proportional to the rate of charge of magnetic flux linkage.

b) i) Np = Vp

 Ns = Vs

1200 = 240

60 Vs

Vs = 12V

ii) Ip = 0.5

Ip = Vp

Ip = Vs

Is = 240 × 0.5

 12

Is = 10A

iii) The core is laminated

c) E = PI

P = 3000W

P = 3.0KW

t = 30Hrs

E = 3 × 30

E = 90Kwh

Cost = 90 × 8

 = Kshs 720

d) Current direction in the coil - downwards

 Anticlockwise when viewed from end B

16.a) Ohm’s law states that the voltage across a conductor is directly proportional to the current flowing through it provided that all physical conditions and temperature remain constant.

 b) Voltage across 10Ω Resistor

V = 3 × 10

 = 30V

Current through the 30Ω

I = V/R

I = 30/30

I = 1A

[ii]. Total current = 3A +1A = 4A

[iii]. Total resistance = 18+ 10+ ( 30×10)/(30+10)

 =35.5 Ohms

[iv]. V = IR

 = 4 × 35.5

 =142 V.

[C].(i)

 (ii). E = IR + Ir

 E = V + Ir

 V=E - Ir. V = -Ir + E

 E = Y intercept

 = 9.5 V.

[iii]. r = gradient

 = 1.759 Ohms.

17.a) Hard xrays : produced by fast moving electron as a result of high accelerating Voltage. They have Short wavelength and thus high penetrative power.

 Soft x-rays: produced by electrons of low velocities. Have less energy's, longer wavelength thus low penetrative power.

b). [Ii]. Focusing cathode \_\_focuses electron beam onto the target.

 [iii]. Copper anode.

 [iv]. To change the point of impact of the beam,thereby reducing wear and tear.

c. Increasing the heating current so as to produce greater number of electrons.

d. Electrical power = V X I

 = 30000 X 0.02

 = 600W.

e. . Has infinite resistance and does not therefore take any current.

 . Can measure both ac and dc.

 .can measure large voltage without damage.

f. Cathode rays: beam of electrons. Negatively charged particles.

 Xrays. Electromagnetic radiation.

g.(i) Time base control = 10ms/div

 No. of div. = 8

 Total time = 8×10

 =8ms

 No. of cycles. = 2

Periodic time. =80/2

 =40ms.

 Frequency. = 1/40ms

 f = 25Hz.

[ii] peak voltage = 200 ×3

 = 600V.

18.a) Alpha particles \_\_. Cause heavy ionisation loosing energy rapidly, hence their short range.

 b).fraction remaining = [1/2]^32/8

 =[1/2]^4

 = 1/16

 c) This is an intrinsic semiconductor to which some impurities have been added to enhance conductivity.

d). Connecting p-type region to the positive terminal and n-type to the negative terminal.

e.(i) 

(ii) 