

THE UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

SONGEA MC MARCH 2024

031/1-PHYSICS 1 MARKING SCHEME

1.

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
C	E	B	C	E	B	D	C	A	A

(Each 01 marks)

2.

(i)	(ii)	(iii)	(iv)	(v)
D	H	B	E	G

(Each 01 mark)

3.

- (a) (i) The volume of liquid displaced
(ii) The density of the fluid
(iii) The volume of immersed body

(Each 01½ marks)

- (b) (i) From principle of conservation of momentum

$$mu + 0 = (m + m)v \quad \textbf{(01 mark)}$$

$$v = \frac{mu}{m + m} \quad \textbf{(00½ mark)}$$

$$= \frac{m \times 20ms^{-1}}{2m} \quad \textbf{(01 mark)}$$

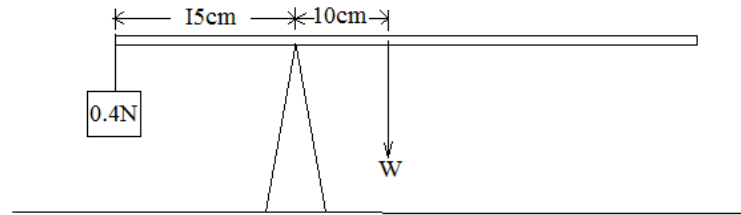
$$= 10ms^{-1} \quad \textbf{(01 mark)}$$

- (ii) Because some of the kinetic energy is lost as heat and sound during collision.

(02 marks)

4.

- (a) Sketched diagram



(02 marks)

From the diagram;-

The sum of clockwise moment = the sum of anticlockwise moment **(01 mark)**

$$0.4 \times 15 = W \times 10$$

$$W = \frac{0.4 \times 15}{10}$$

(01 mark)

$$= 0.6N$$

(01 mark)

(b) A screw jack has a screw pitch of 5mm and the effort arm of 16cm .

(i) - Kinetic energy (due to the motion of the effort arm) **(01 mark)**

- Potential energy (due to the position of the Load) **(01 mark)**

(ii) From $MA = \frac{L}{E} = \frac{750N}{30} = 25$ **(01 mark)**

$$V.R = \frac{2\pi R}{p} = \frac{2 \times 3.14 \times 16}{0.5} = 201$$

(01 mark)

$$efficiency = \frac{MA}{VR} \times 100\% = \frac{25}{201} \times 100\% = 12.4\%$$

(01 mark)

5. (a) It is used as a driving mirror **(02 marks)**

It is preferred to a plane mirror because it forms a smaller image (diminished image) or it has a wide range of view **(02 marks)**

(b) The type of the lens is a convex lens (since the image formed is real) **(03 marks)**

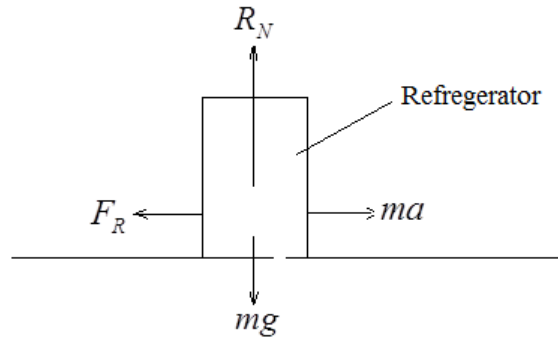
To the image at large distance the object must be placed at principal focus. So the value of focal length is 20cm **(03 marks)**

6. (a) (i) Both consists convex lens which focus an inverted image. In camera focused onto film while human eye focused on retina. **(02 marks)**

(ii) Both adjust the quantity of light entering. In camera it's done with aperture while in human eyes it's done with iris. **(02 marks)**

(iii) Both capture the image through an important element, retina for human eyes and film in a camera. **(02 marks)**

(b) From the diagram



$$F_R = ma \quad (01 \text{ mark})$$

$$\text{But } F_R = \mu R_N = \mu mg$$

$$\mu mg = ma \quad (01 \text{ mark})$$

$$a = \mu g = 0.44 \times 10 \text{ ms}^{-2} \quad (01 \text{ mark})$$

$$= 4.4 \text{ ms}^{-2} \quad (01 \text{ mark})$$

7. (a) A is the heater because brass expand more than iron. At high temperature, bend towards B to cool the room by cooler and at low temperature the bimetallic bends toward A to heat the room by the heater A. (05 marks)

- (b) (i) The one which painted matt black will cool mostly quickly because black body is a good radiant compared to white body. (03 marks)

- (ii) A process is called evaporation. (02 marks)

8. (a) In pressure cooker there is high pressure compared to the open saucepan hence the boiling point in pressure cooker is higher so it cook the beans quickly. (05 marks)

- (b) From principle of heat exchange in the mixture;

$$\text{Heat loss} = \text{Heat gained} \quad (01 \text{ mark})$$

$$m_1 c (\theta_{100} - \theta_f) = m_2 c (\theta_f - 0)$$

$$m_1 (\theta_{100} - \theta_f) = m_2 \theta_f \quad (01 \text{ mark})$$

$$0.2 \text{ kg} (100 - \theta_f) = 0.3 \text{ kg} \times \theta_f$$

$$20 - 0.2\theta_f = 0.3\theta_f \quad (01 \text{ mark})$$

$$0.5\theta_f = 20^\circ C$$

$$\theta_f = 40^\circ C$$

(02 marks)

9. (a) Current for a single bulb

$$I = \frac{P}{V} = \frac{60W}{240V}$$

(01 mark)

$$= 0.25A$$

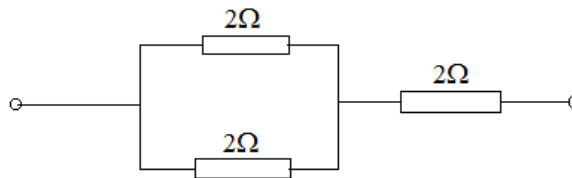
(01 mark)

For N bulbs total currents $I_T = 5A = NI$ **(01 mark)**

$$N = \frac{I_T}{I} = \frac{5A}{0.25A} = 20$$

He can connect 20 bulbs to a 240V and 5A fuse **(01 mark)**

- (b) By connecting two 2Ω resistors in parallel, then in series with another 2Ω resistor. As shown below;-



(04½ marks)

NOTE;

The above is minimum number, but there other alternatives which can be allowed using more resistors

- (c) (i) Step down transformer **(01 mark)**

$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$

- (ii) From

$$N_s = \left(\frac{V_s}{V_p} \right) N_p$$

(01

mark)

$$= \left(\frac{15,000}{1000} \right) \times 80$$

(01 mark)

$$= 1200 \quad (01 \text{ mark})$$

10. (a) (i) By changing the length of the wire (01 mark)
 (ii) By changing the size of the wire. (01 mark)
 (iii) By changing the tension on the wire. (01 mark)
 (b) From the graph period = 0.004s (01 mark)

$$Frequency = \frac{1}{T} = \frac{1}{0.004s} = 250Hz \quad (01 \text{ mark})$$

Since, $f = \frac{v}{\lambda} \quad (01 \text{ mark})$

$$\lambda = \frac{v}{f} = \frac{12}{250} \quad (01 \text{ mark})$$

$$Wavelength = 0.048m \quad (01 \text{ mark})$$

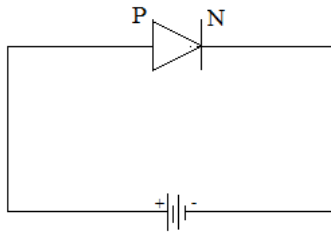
mark)

(c) From $v = \frac{2d}{t} \quad (01 \text{ mark})$

$$d = \frac{vt}{2} = \frac{1500 \times 3}{2} \quad (01 \text{ mark})$$

$$= 2250m \quad (01\frac{1}{2} \text{ marks})$$

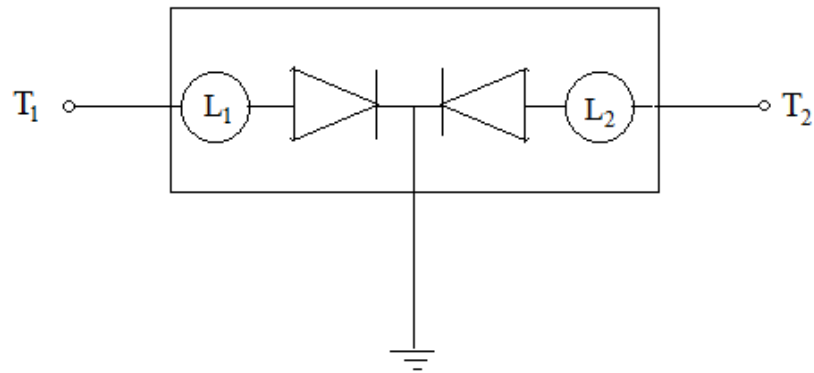
11. (a) In P-type semiconductors the majority charge carrier are holes which are positive WHILE in N-type semiconductors the majority charge carriers are electrons which are negative Why are some semiconductors called 'P' type and other 'N' type?(03 marks)
- (b) A semiconductor diode is connected as forward bias when the anode(positive terminal) is connected to P side and cathode(negative terminal) in N-side of the PN junction of the diode as shown below;- (They can use block diagram) (04 marks)



(c) A puzzle box consists of two lamps and two diodes.

(02 marks)

Connections



(03½marks)