THEUNITED 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 01$^1/_2$ marks)**

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

$$mu + 0 = (m+m)v$$ **(01 mark)**

$$v = \frac{mu}{m+m}$$ **(00$^1/_2$ mark)**

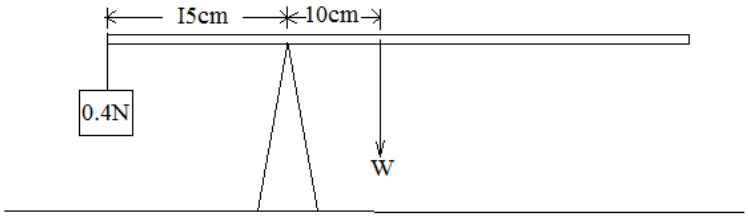
$$= \frac{m \times 20ms^{-1}}{2m}$$ **(01 mark)**

$$= 10ms^{-1}$$ **(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)**

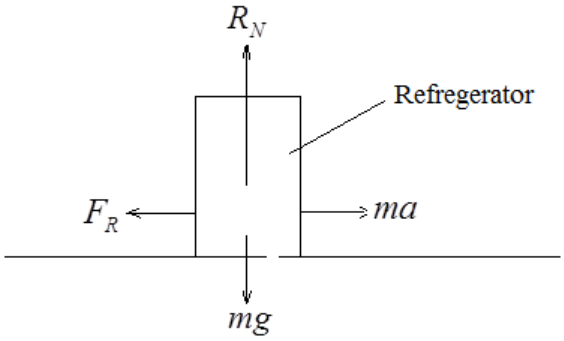
To the image at large distance the object must be placed at principal focus. So the value of focal length is 20cm **(03 marks)**

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



$$F_R = ma$$ **(01 mark)**

But $F_R = \mu R_N = \mu mg$

$$\mu mg = ma$$ **(01 mark)**

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

$$= 4.4 ms^{-2}$$ **(01 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;

Heat loss = Heat gained **(01 mark)**

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

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

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

$$20 - 0.2\theta_f = 0.3\theta_f$$ **(01 mark)**

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

$$\theta_f = 40^o C$$ **(02 marks)**

9. (a) Current for a single bulb

$$I = \frac{P}{V} = \frac{60W}{240V}$$ **(01 mark)**

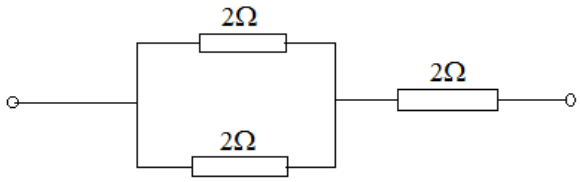
$$= 0.25A$$ **(01 mark)**

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;-



(04^1/$_2$ 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)**

(ii) From $$\frac{N_S}{N_P} = \frac{V_S}{V_P}$$

$$N_S = \left(\frac{V_S}{V_P}\right) N_S$$ **(01 mark)**

$$= \left(\frac{15{,}000}{1000}\right) \times 80$$ **(01 mark)**

$$= 1200$$ **(01 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)**

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

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

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

$$Wavelength = 0.048m$$ **(01 mark)**

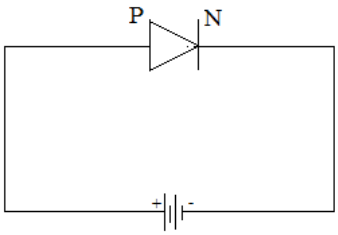
(c) From $v = \frac{2d}{t}$ **(01 mark)**

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

$$= 2250m$$ **(01$^1/_2$ marks)**

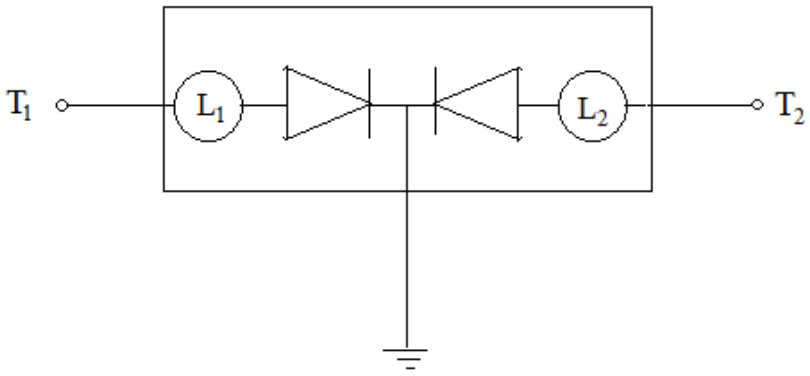
11. (a) In P-type semiconductors the majority charge carrier are holes which are **p**ositive WHILE in N-type semiconductors the majority charge carriers are electrons which are **n**egative Why are some semiconductors called 'P' type and other 'N' type?**(03 marks)**

(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



(03 1/2 marks)