Std.: 10th ICSE

Sub: Physics

Rathi's Aspire Academy
Preparing You For Tomorrow

Pre-Board Test Solution

Set-1

Marks : 80

Time: 2 Hrs.

Date : 28-12-2022

SECTION A

1. (i) *(c) Both (a) and (b)*

(ii) (b) zero

(iii) *(b)* Chemical energy to electrical energy

(iv) *(d) 8, 14*

Explanation: ${}_7N^{15} \xrightarrow{-1\beta} {}_6C^{14} \xrightarrow{-2\beta} {}_8O^{14}$

(v) (c) *its second focus*

(vi) *(a) 3×10^{20} Hz*

Explanation: Given : $\lambda = 0.01$ A

$= 10^{-12} m$

$f \times \lambda = c$

(v) Displacement is in the direction of force applied

(vi) Sound Network and ranging force

(viii) (b) Has a definite quality

(ix) *(a) 3600 J*

(x) (a) 15A fuse wire

(xi) (a) concentric circles centred on the wire.

(xii) (a) conservation of energy.

(xiii) (b) sublimation

(xiv) *(b) 10 cm*

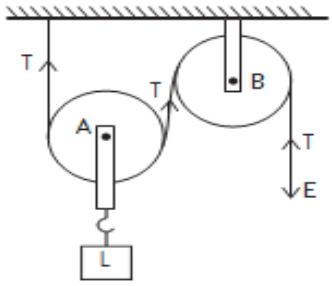
Explanation: *(As $|u| = |u| \therefore 2f = 20$)*

(xv) *(a) infrared radiations.*

2. (i) (a) A → single movable pulley

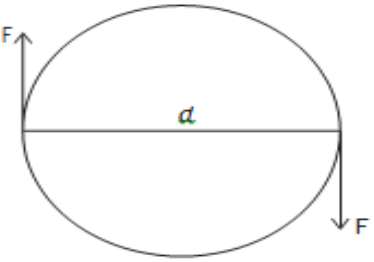
B → Single fixed pulley

(b)



(c) To change the direction of effort in convenient direction.

(ii)



Couple = F × d

As d increases, F decreases.

(iii) (a) $T_o = 12 \times \frac{3}{2}$ Nm = 18 Nm

(b) $T_O = 12 \times 3$ Nm = 36 Nm

(iv) (a) At intersection point of diagonals

(b) At mid-point of the axis of cylinder

(v) Initially $K = \frac{1}{2}mv^2$

If speed is halved

$K^1 = \frac{1}{2}m\left(\frac{V}{2}\right)^2$

$\Rightarrow K^1 = \frac{1}{4} \times \frac{1}{2}mv^2$

$\Rightarrow K^1 = \frac{1}{4} \times K$

Kinetic energy becomes one-fourth

(vi) (a) If the natural frequency of suspension bridge matches the frequency of steps of soldiers, resonance will occur and bridge may break.

(b) Hollow sound box provides both large surface area as will as due to resonance, amplitude of sound increases.

(vii) (a) At a given temperature, for a given conductor, the ratio of voltage applied across its ends to the current flown remains constant.

$\frac{V}{I}$ = constant.

(b) Given R = 6Ω

$R = \rho\frac{l}{A} \Rightarrow 6 = \rho\frac{l}{A}$ ...(i)

Now length becomes twice ($2l$), so area becomes half $\left(\frac{A}{2}\right)$

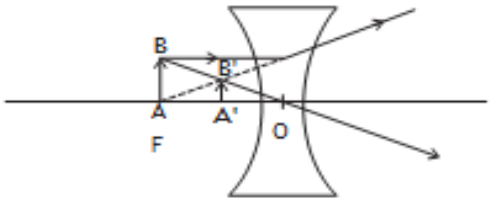
New resistance $R^1 = \rho\frac{2l}{(A/2)}$

$R^1 = \rho\frac{l}{A} \times 4$

$\Rightarrow R^1 = 4 \times 6$ from (i)

$\Rightarrow R^1 = 24\Omega$

3. (i) Concave lens.



(ii) (1) Overloading

(2) Shortcircuiting

(iii) (1) Either 0° or 180°.

(2) 90°

(iv) Given $m = 3$ Kg

$T_1 = 25°C$

$T_2 = 100°C$

$C = 4200\ J\,Kg^{-1}\,K^{-1}$

$Q = mc(T_1 - T_1)$

$= 3 \times (4200\ (100 - 25)\ J$

(v) **Alpha decay** - A common mode of radioactive decay in which a nucleus emits an alpha particle (a helium-4 nucleus).
Beta decay - A common mode of radioactive decay in which a nucleus emits beta particles. The daughter nucleus will have a higher atomic number than the original nucleus.

(b) Nuclear waste should be kept in thick lead boxes so that radiations may not came out of it and be disposed off deep into the sea.

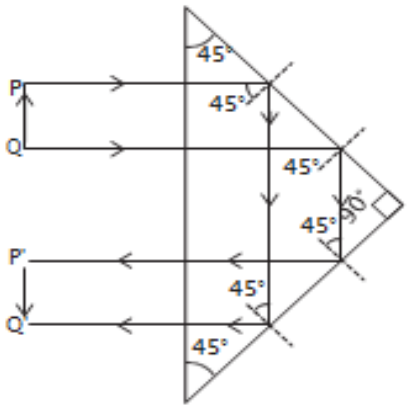
SECTION B

4. (i) (a) No.

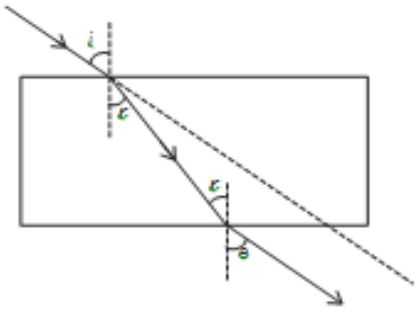
(b) The letter of violet colour appears to be raised maximum. Refractive index for violet colour is maximum and

Apparent depth = $\frac{\text{Real depth}}{n}$

(ii)



(iii) (a), (b)



(c) $i = e$

5. (i) Given: $h_i = 16$ cm

$h_o = 4$ cm

$u = -6$ cm

(a) Virtual and errect image is formed on the same side of object.

(b) $m = \frac{v}{u} = \frac{h_i}{h_o}$

$\Rightarrow \frac{V}{-6} = \frac{16}{4}$

$\Rightarrow v = -24$ cm

(c) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{-24} - \frac{1}{-6} = \frac{1}{f}$

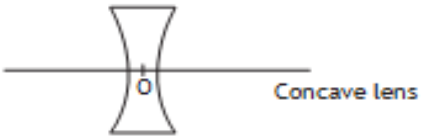
$\frac{-1}{-24} - \frac{1}{-6} = \frac{1}{f}$

$\Rightarrow f = 8$ cm

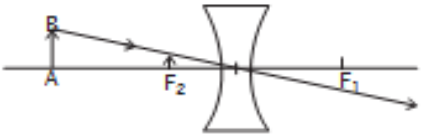
(ii) (a) Gamma rays

(b) High penetrating power and causes biological damage.

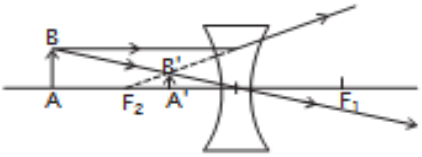
(iii) (a)



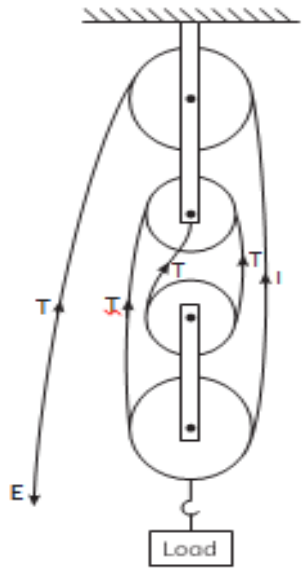
(b)



(c)



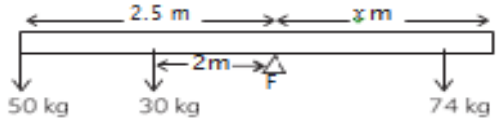
6. (i) (a)



(b) V.R = 4

(c) M.A. $= \frac{\text{Load}}{\text{Effort}}$

(ii)



$50 \times 2.5 + 30 \times 2 = 74\,x$

$\Rightarrow x = \frac{185}{74} = 2.5$ m

Explanation: V.R. is equal to number of pulleys.

(B) (b) $E = \frac{L}{4}$

Explanation: M.A. $= \frac{L}{E}$

$4 = \frac{L}{E}$

or $E = \frac{L}{4}$

(C) (d) 100 N

Explanation: M.A. = V.R. × efficiency.

$\frac{L}{E} = 4 \times \frac{90}{100}$

$\frac{360}{E} = 3.6$

$E = \frac{360}{3.6}$

$= 100$ N

(D) (b) force multiplier

7. (i) $f = 5$Hz

5 vibrations in one sec

1 vib. in $\frac{1}{5}$ sec

8 vib. in $\frac{8}{5}$ sec.

$\therefore \quad t = \frac{8}{5}$ sec

$v = 340$ ms^{-1}

$2d = v \times t$

$\Rightarrow \quad 2d = 340 \times \frac{8}{5}$

$d = 272$ m

(ii) For A

Protons = 84

Neutrons = 128

After on alpha decay

(a) For B

Protons = 82

Neutrons = 126

(b) After on β-decay

For C

Protons = 83

Neutrons = 125

(c) 84 + 128 = 212

(d) No.

(iii) (a) Loudness $\propto$ (amplitude)^2

$\frac{I_1}{I_2} = \left(\frac{a_1}{a_2}\right)^2$

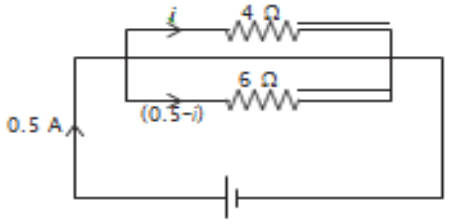
$\frac{L_1}{L_2} = \left(\frac{4}{5}\right)^2 = \frac{16}{25}$

$L_1 : L_2 = 16 : 25$

(b) $f_1 : f_2 = 1 : 1$

For resonance $f_1 = f_2$

8. (i) (a)



(b) $4i = 6(0.5 - i)$

$4i = 3 - 6i$

$10i = 3$

$i = 0.3$ Ampere

$0.5 - i = (0.5 - 0.3)$ Amp

$= 0.2$ Amp

(ii) (a) $^{27}_{13}\text{Al} + {}^{4}_{2}\text{He} \longrightarrow {}^{30}_{14}\text{Si} + {}^{1}_{1}\text{H}$

(b) $^{39}_{19}\text{K} + {}^{4}_{2}\text{He} \longrightarrow {}^{42}_{20}\text{Ca} + {}^{1}_{1}\text{H}$

(c) $^{24}_{11}\text{Na} \longrightarrow {}^{24}_{12}\text{Mg} + {}^{0}_{-1}\text{e}$

(iii) (a) P = 5000 W

V = 200 volts

$I = \frac{P}{V} = \frac{5000}{200} = 25$ A

No. 8A fuse can't be used

(b) Switch and MCB/fuse

9. (i) (a) $c = 42\ w\ J\ kg^{-1}\ c^{-1}$

$\therefore$ Quantity of heat released = 4200 J

(b) $Q = mc\Delta t$

$0.02 \times 4200 \times 25$

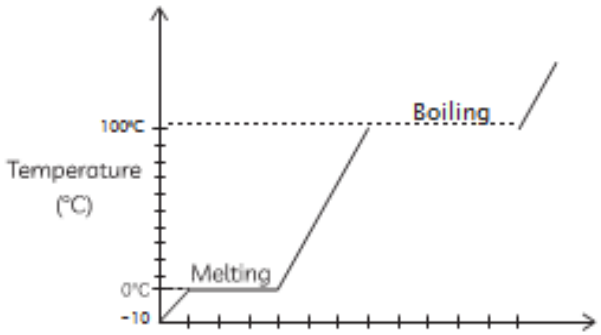
$= 2100$ J

(c) $Q = mc\Delta T$

$2100 = 0.16 \times c\ (45 - 15)$

$c = \frac{2100}{0.16 \times 30} = 437.5\ J\ kg^{-1}\ c^{-1}$

(ii)



(iii) (a) At A → North pole

(b) its magnetic strength can be increased or decreased.