

CJSSC SOUTHERN ZONE 2026

PHYSICS MARKING SCHEME FORM FOUR

SECTION A

1

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

2

LIST A	i	ii	iii	iv	v	vi
LIST B	D	F	E	B	C	A

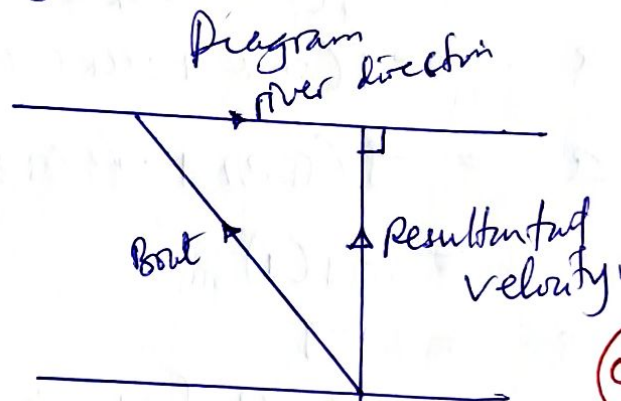
(1 mark @)
(Total 10 marks)

(1 mark @)
(Total 06 marks)

SECTION B

3

(a) The boatman must steer the boat at an angle upstream towards the North-West. (2 marks)



(02 marks)

Solution

(b)

Data:

Angle (θ) = 38°

Initial speed (u) = 5 m/s

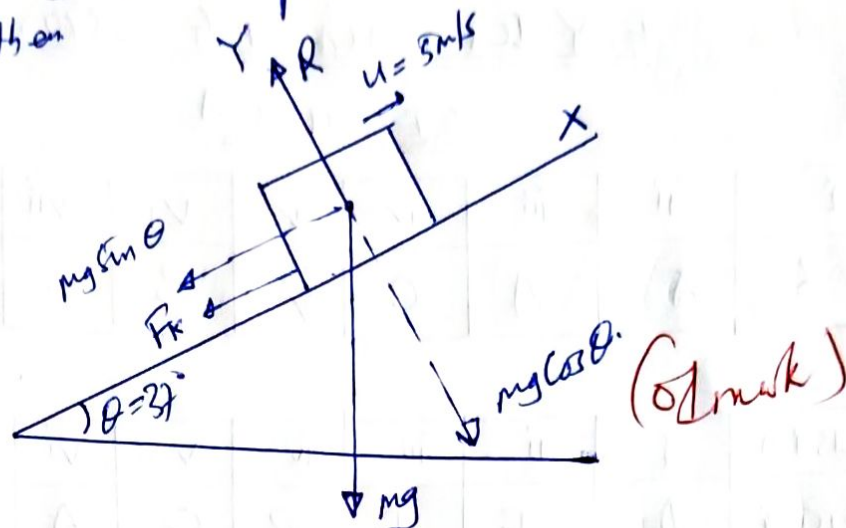
Final speed (v) = 0 m/s

Coefficient of static (μ_s) = 0.8

Coefficient of kinetic friction (μ_k) = 0.5

Acceleration due to gravity (g) = 10 m/s^2

3 (b) By taking x be positive direction up the plane, then



Net force = $(-mg \sin \theta) + (-F_k)$ (0.2 mark)
 but $F_k = \mu_k mg \cos \theta$

$$ma = -mg \sin \theta + (-\mu_k mg \cos \theta)$$

$$= -mg (\sin \theta + \mu_k \cos \theta)$$

$$a = -g (\sin \theta + \mu_k \cos \theta)$$

$$a = -g (\sin 37 + 0.5 \cos 37)$$

$$= -g (1)$$

$$a = -g$$

$$= -10 \text{ m/s}^2 \quad (0.1 \text{ mark})$$

Then from.

$$v^2 = u^2 + 2as$$

$$0 = 5^2 + 2(-10)s$$

$$0 = 25 - 20s$$

$$20s = 25$$

$$s = \frac{25}{20}$$

$$= 1.25 \text{ m} \quad (0.1 \text{ mark})$$

"The block will go 1.25 m up an incline before it comes to rest."

3 (b) For the body to slide the response angle (θ_s) is given by

$$\mu_s = \tan \theta_s$$

$$\tan \theta_s = 0.8$$

$$\theta_s = \tan^{-1}(0.8)$$

$$= 38.7^\circ$$

(01 mark)

The $37^\circ < 38.7^\circ$ then the body will not slide. It will remain at the point when it comes to rest.

4 (a) Magnitude $\Rightarrow$ opposing forces must have equal magnitude (01 mark)

Direction $\Rightarrow$ The forces must be in the direction such that their resultant force equal to zero (01 mark)

Form of application $\Rightarrow$ The place where forces are applied must be in such a way that their total moment cancels out completely. (01 mark)

Solution

Data

$$\text{Velocity ratio (V.R)} = 5$$

$$\text{Work input (W.in)} = 600 \text{ J}$$

$$\text{Load (L)} = 400 \text{ N}$$

$$\text{Load distance (L.d)} = 0.5 \text{ m.}$$

$$\text{Mechanical advantage (M.A)} = ?$$

$$\text{Efficiency (E)} = ?$$

4 (b) Work output (W_o) = $L \times L \cdot D$
 $= 400 \times 0.5$ (01 mark)
 $= 200 \text{ J.}$

$$E = \frac{\text{Work output}}{\text{Work input}} \times 100\%$$

$$= \frac{200 \text{ J}}{600 \text{ J}} \times 100\%$$

$$= \frac{1}{3} \times 100\%$$

$$= 33.33\%$$

But also

$$E = \frac{M \cdot A}{V \cdot R} \times 100\%$$

$$33.33 = \frac{M \cdot A}{5} \times 100$$

$$\frac{100}{3} = \frac{M \cdot A}{5} \times 100$$

$$M \cdot A = \frac{100 \times 5}{100 \times 3}$$

$$= \frac{5}{3}$$

$$= 1\frac{2}{3}$$

$$= 1.67$$

$\therefore$ The efficiency is 33.33% and mechanical advantage is 1.67. (01 mark)

5 (a) The fish looked near at apparent depth due to the refraction of light in water. The depth seen was not real depth that is why a student didn't manage to catch the fish. (03 marks)

5 (a) Data

Solution

Refractive index of glass (μ_{lg}) = 1.5

Refractive index of water (μ_{lw}) = 1.33

Angle of refraction (r) = ?

Angle of incidence (i) = 50°

From

$$\mu_1 \sin i = \mu_2 \sin r$$

$$\mu_{lg} \sin i = \mu_{lw} \sin r \quad (2 \text{ marks})$$

$$1.5 \sin 50^\circ = 1.33 \sin r$$

$$\sin r = \frac{1.5 \sin 50^\circ}{1.33} \quad (2 \text{ marks})$$

$$r = \sin^{-1} \left(\frac{1.5}{1.33} \sin 50^\circ \right)$$

$$= 59.76$$

$$\approx 59.8^\circ \quad (2 \text{ marks})$$

$\therefore$ The angle of refraction is 59.8°

6 (a) The density of dry air is greater than that of saturated air because dry air has large ability of containing holding water vapour. (4 marks)

(b)

Solution

Data:

Saturated vapour pressure at 20°C ($S.V.P$)₂₀ = 17.5 mmHg

Saturated vapour pressure at 5°C ($S.V.P$)₅ = 6.5 mmHg

6 (b) Relative humidity at 20°C ($R.H.$)₂₀ = 80%

Let the amount of vapour pressure be equivalent to mass of vapour (0.1 mark)

$$\text{Actual vapour pressure } (p_1) = \frac{80}{100} \times 17.5 \text{ mmHg} \\ = 14 \text{ mmHg} \quad (1 \text{ mark})$$

The amount of water vapour condensed to 5°C (m_2)

$$= 14 \text{ mmHg} - 6.5 \text{ mmHg} \\ = 7.5 \text{ mmHg} \quad (0.1 \text{ mark})$$

Fraction of mass of water condensed

$$= \frac{m_2}{m_1} \\ = \frac{7.5 \text{ mmHg}}{14 \text{ mmHg}} \quad (0.1 \text{ mark}) \\ = 0.5357 \\ = 0.54$$

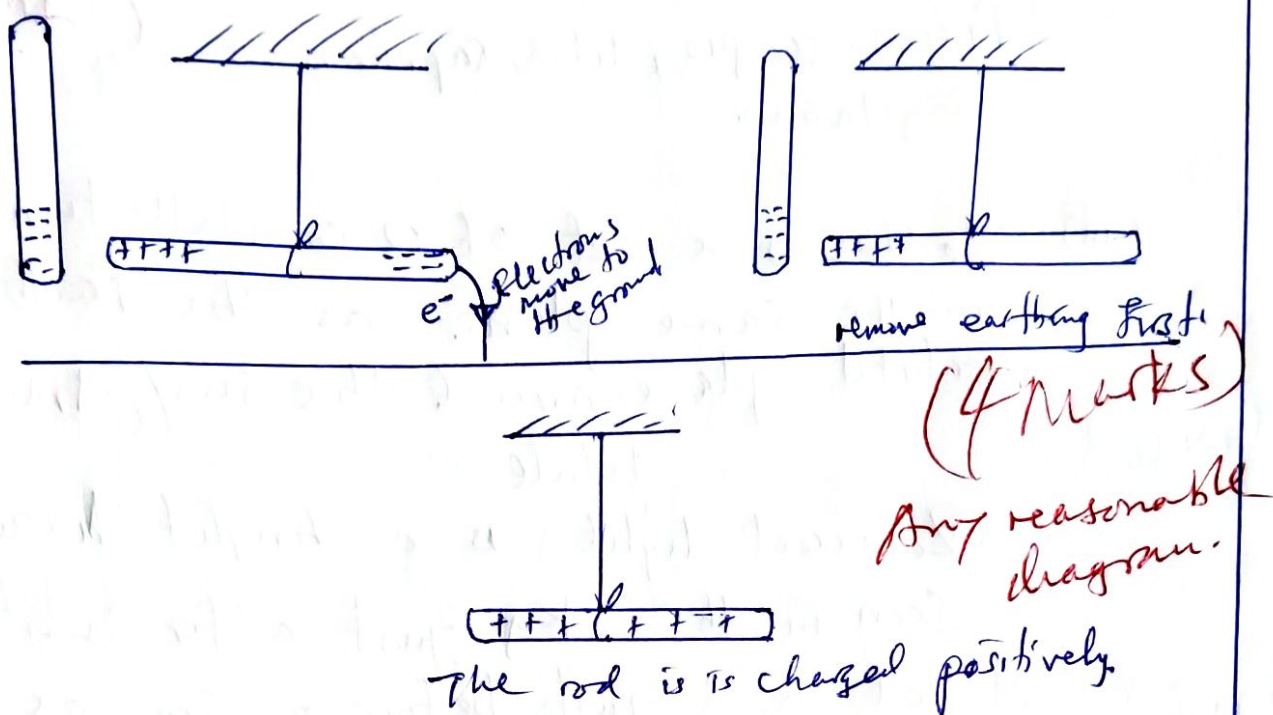
$\therefore$ The fraction of steam condensed is 0.54 (1 mark)

7 (a) Answer

- A polythene rod is rubbed with a wolen cloth to charge it negatively.
 - Copper rod is hung horizontally with cotton thread.
 - A charged polythene rod is brought near one end of the copper rod. Electrons are repelled to the far side while positive charge are attracted near the polythene rod.
 - Earth the far side while the polythene rod is still held in position, then remove earthing.
 - Finally remove the polythene rod (3 marks)
- Any relevant explanation

(b)

The copper will be charged positively by induction.



(4 marks)

Any reasonable diagram.

Solution

Data:

Voltage (V)

= 220V

Current (I)

= 5.5A

Resistance (R)

= ?

$$V = IR \quad (1 \text{ mark})$$

$$R = \frac{V}{I}$$

$$= \frac{220}{5.5} \quad (1 \text{ mark})$$

$$= 40 \Omega$$

$\therefore$ The resistance 40Ω (1 mark)

- 8 (a) Constellation is a group of ^{bright} stars that
- (2) form pattern in the sky that resemble the familiar animals or objects on the Earth. (1 mark)

8 (a)(i) Example of zodiac constellations are Virgo, Leo, Cancer, Gemini, Taurus, Aries, Pisces, Scorpio, Libra, Capricorn and Sagittarius. (2 marks)

(ii) Zodiac is a set of 12 constellations in the same plane as the Earth's orbital plane around the sun. (2 marks)

While
Zodiacal light is a bright haze seen in the sky just after sun set and just before sunrise as a result of sunlight reflected from asteroids. (1 mark)

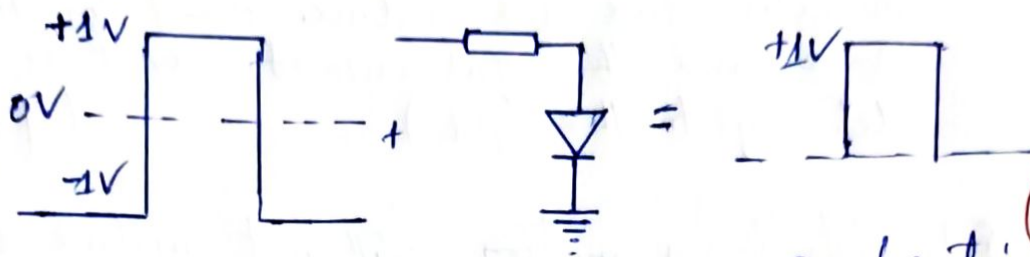
(b) Prolonged use of charcoal will lead to the clearing of vegetation and burning of charcoal which is main source of CO_2 in the atmosphere. CO_2 is the green house gas which leads to the global warming. Global warming will cause the following

- (i) Increase in the temperature of the ocean. (4 marks)
- (ii) Rise in sea level.
- (iii) Change in world's climatic pattern.
- (iv) Acidification of the ocean.
- (v) Extreme weather events.

Any relevant explanation
qualifies (4 marks)

SECTION C

Q (a)



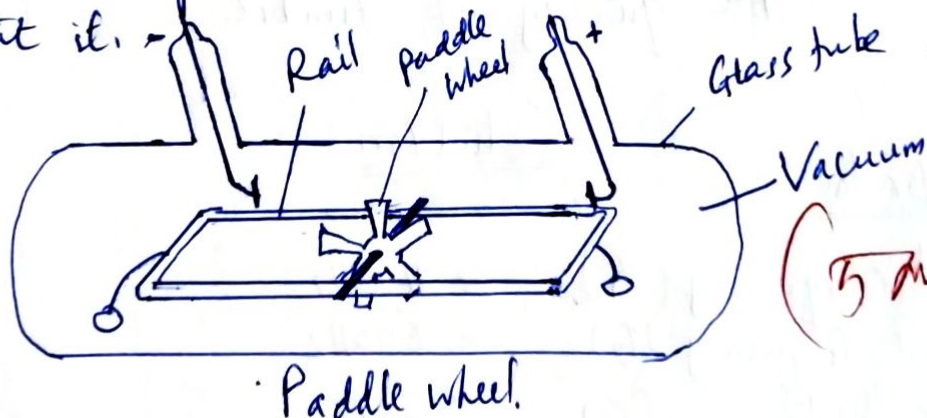
output (5 marks)
(forward biasing)

(b) (i) Alpha particles (α) are less penetrating and they can be stopped by a sheet of paper (0.5 marks)

(ii) Beta particles (β) are moderate penetrating and they can be stopped by an aluminium foil but they pass through the paper (1 mark)

(iii) Gamma radiation (γ) have extremely high penetrating power, they pass through paper and aluminium foil but they can be stopped lead block or high density concrete shields. (2 marks)

(c) Electrons travel in straight and they make a paddle wheel to rotate when they hit it. (2 marks)



(5 marks)

10

(a) (i) Relative motion will cause change in magnetic flux and induce emf in the wire and the galvanometer will deflect (let say to the right) (4 marks)

(ii) Stationary state will not induce emf here the galvanometer will remain undeflected (3 marks)

(iii) Also there will relative motion and change in magnetic flux which will induce emf and cause galvanometer to deflect eg (to the left) (4 marks)

(b) By using Fleming's right hand rule the current will flow in anticlockwise direction (from A to B) (4 marks)

11 (a) (i) Fundamental frequency alter during the day due to the expansion and contraction of the string. Expansion and contraction alters the frequency and tension which later changes the note (frequency) (3 marks)

(ii) This occurs due to difference due to the quality of timbre. (3 marks)

Solution

Data

First frequency (f_1) = 400 Hz
 Second frequency (f_2) = 600 Hz
 First tension (T_1) = 2 N
 Second tension (T_2) = ?

$$f \propto \sqrt{T} \quad (1 \text{ mark})$$

$$f = K\sqrt{T}$$

$$K = \frac{f}{\sqrt{T}}$$

$$\frac{f_1}{\sqrt{T_1}} = \frac{f_2}{\sqrt{T_2}} \quad (1 \text{ mark})$$

$$\sqrt{T_2} = \frac{f_2 \times \sqrt{T_1}}{f_1}$$

$$T_2 = \left(\frac{600 \times \sqrt{2}}{400} \right)^2 \quad (2 \text{ marks})$$

$$= \left(\frac{3\sqrt{2}}{2} \right)^2$$

$$= 4.5 \text{ N}$$

∴ The tension is 4.5 N (1 mark)

(c)

Solution

Data

$$\text{Distance (s)} = 3.84 \times 10^6 \text{ m}$$

$$\text{Speed of light (v)} = 3 \times 10^8 \text{ m/s}$$

$$\text{Time (t)} = ?$$

$$\text{From Speed} = \frac{\text{Distance}}{\text{Time}} \quad (1 \text{ mark})$$

$$t = \frac{s}{v}$$

$$= \frac{3.84 \times 10^6 \text{ m}}{3 \times 10^8 \text{ m/s}} \quad (2 \text{ marks})$$

$$= 0.0128 \text{ seconds}$$

∴ The time is 0.0128 seconds (1 mark)