

C SSC
SOUTHERN ZONE 2026
PHYSICS MARKING SCHEME FORM FOUR

SECTION A

1

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

(1 mark @)
total 10 marks

2

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

(1 mark @)
(total 6 marks)

SECTION B

- 3 (a) Liquids cannot be compressed, ensuring that the force applied at one end is transmitted instantly and efficiently to the other end.

(3 marks)

(b)

Solution

Data:

Wheel radius (R_w) = 33 cm
 Crank radius (R_c) = 16.5
 Crank wheel teeth (N_c) = 44
 Sprocket teeth (N_s) = 16
 Mechanical advantage (M.A) = 0.94

Velocity ratio between the wheel and rear crank:

$$\begin{aligned}
 VR_1 &= \frac{\text{Radius of driver}}{\text{Radius of driven}} \quad (1 \text{ mark}) \\
 &= \frac{16.5}{33}
 \end{aligned}$$

Velocity ratio between crank wheel and rear sprocket

$$VR_2 = \frac{\text{No of teeth of driven}}{\text{No of teeth of driver}} \quad (1 \text{ mark})$$

3 (b)

$$= \frac{16}{44}$$

Total velocity ratio $V \cdot R$

$$V \cdot R = VR_1 \times VR_2$$

$$= \frac{16.5}{33} \times \frac{16}{44} \quad (1 \text{ mark})$$

$$= 0.1818 \dots$$

$$= 0.182 \quad (1 \text{ mark})$$

$$\text{Efficiency } (E) = \frac{M \cdot A}{V \cdot R} \times 100\%$$

$$E = \frac{0.14}{0.182} \times 100\% \quad (1 \text{ mark})$$

$$= 77\%$$

$\therefore$ The efficiency of the system is 77% (1 mark)

4 (a) This is because the gun has much larger mass compared to the bullet mass. Therefore the velocity of bullet is compensated by the large mass of the gun. (0.2 marks)

$$\text{ie } m_g V_g + m_b V_b = 0$$

The law of conservation of linear momentum states that "When two or more bodies act upon one another, their total momentum remains constant, provided ~~there~~ is no influence of external forces." (0.2 marks)

- (b) Time during acceleration (t) = 20 sec
 mass of the body (m) = 10 kg
 Distance covered by the body (acceleration) (S) = 60 m.
 Time during deceleration (t_2) = 5 sec.
 Force (F) = ?

Velocity attained after pushing
 $= \frac{60 \text{ m}}{5 \text{ sec}}$ (1 mark)

$= 12 \text{ sec.}$ (1 mark)

Then $F = \frac{m \Delta V}{t}$ (2 marks)

$= \frac{10 \times 12}{20}$

$= 6 \text{ N.}$ (1 mark)

$\therefore$ The magnitude of the force is (1 mark)

5 (a) The procedures are as follows

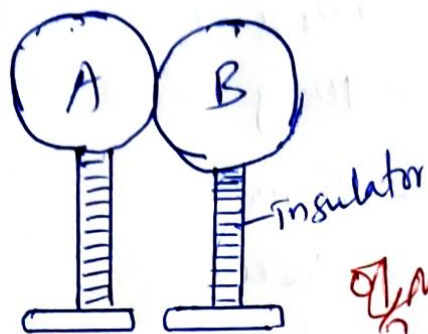
(i) Two insulated metal spheres say A and B are placed together so that they touch one another and thus form in effect a single conductor. (0.5 mark)

(ii) A positively charged rod is now brought near to A. As a result, a negative charge is induced on A and a positive charge on B. (0.5 mark)

(iii) Still keeping the charged rod on position, sphere B is moved a short distance from A. (0.5 mark)

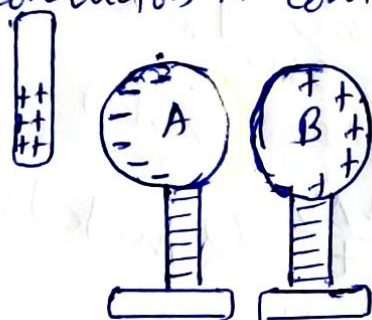
(iv) The charged A and B are tested for charge. (0.5 mark)

5 (a)



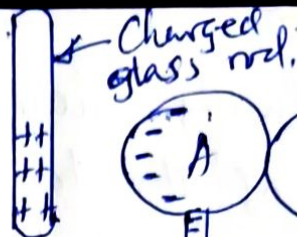
(i)

Insulated uncharged conductors in contact.



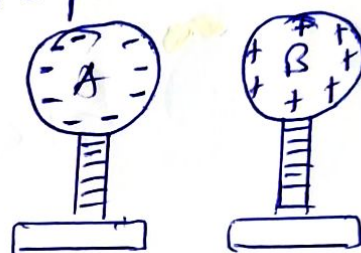
A and B separated in presence of inducing charge.

(ii)



(iii)

-ve and +ve charges induced on A and B respectively



Inducing charge removed, A and B have opposite charge.

(b)

Date.

Solution

Capacitance (C) = 25 μ F

= 250×10^{-6} F

Voltage (V) = 10 V

Charge (Q) = ?

from $Q = CV$

= $250 \times 10^{-6} \times 10$

= 2.5×10^{-3} C

= 2.5 mC.

$\therefore$ One plate has a charge of -2.5 mC and the other plate has a charge of +2.5 mC.

6 (a) At first the level of water in the capillary tube will drop, after a while will continue to rise in the capillary tube. This is because the vessel expands first before water. (04 marks)

(b) Date: Solution

Cross-sectional area (A) = πr^2

Diameter (d) = 0.4 cm

radius (r) = 0.2 cm

Height (h) = 27 cm

Initial volume (V_i) = 120 cm³

Initial temperature (θ_i) = 23°C

Final temperature (θ_f) = 53°C

Apparent volume expansivity (γ_{ap}) = ?

$$\text{Change in volume } \Delta V = \pi r^2 h$$

$$= 3.14 \times 0.2^2 \times 27$$

$$= 3.3929 \text{ cm}^3 \text{ (02 marks)}$$

$$\text{From } \gamma_{ap} = \frac{\Delta V}{V_i (\theta_f - \theta_i)} \text{ (02 marks)}$$

$$= \frac{3.3929 \text{ cm}^3}{120 (53 - 23)} \text{ (02 marks)}$$

$$\gamma_{ap} = 0.00009447 \text{ } ^\circ\text{C}^{-1}$$

\therefore The apparent volume expansivity is (02 marks)
 $0.00009447 \text{ } ^\circ\text{C}^{-1}$

7 (a) No, white light will not be formed. Mixing them gives an excess of red light ($2R + G + B$) creating a warm, pinkish-orange hue rather than balanced white light ($R + G + B$). (4 marks)

(b)

Solution

Data

Object height (h_o) = 35mm (3.5cm)
 Image height (h_i) = 2m (200cm)
 Image distance (v) = 10m (1000cm)
 Focal length (f) = ?

$$\text{From } \frac{1}{f} = \frac{1}{u} + \frac{1}{v} \quad (1 \text{ mark})$$

$$= \frac{1}{1000} + \frac{1}{200} \quad (2 \text{ marks})$$

$$= 17.19$$

$$\approx 17.2 \text{ cm}$$

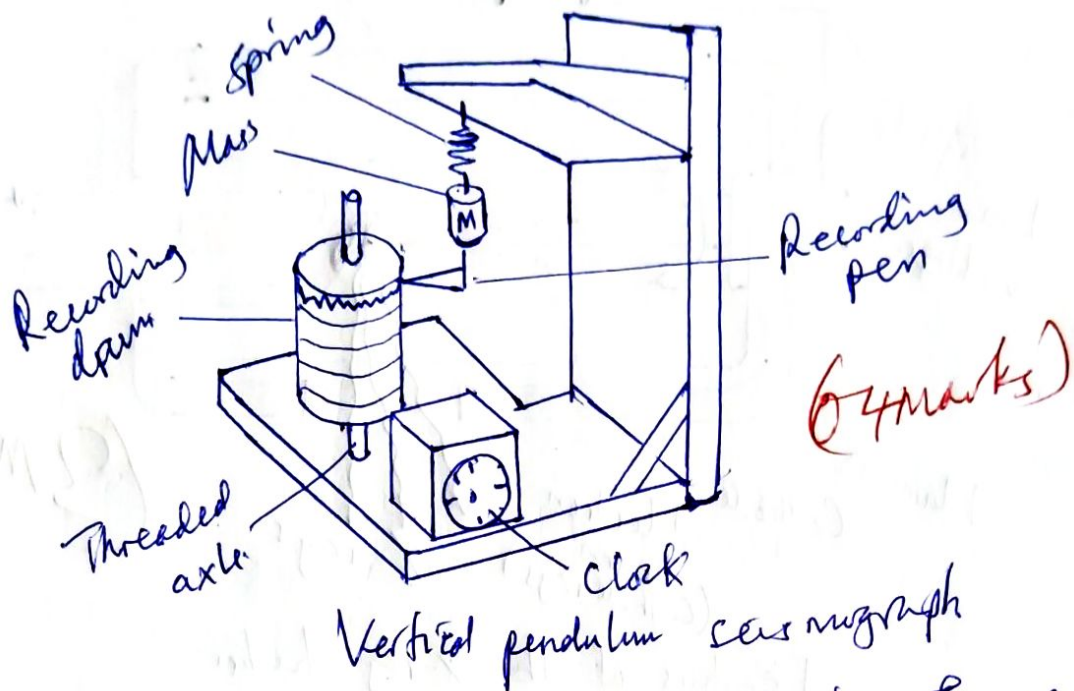
The focal length is 17.2 cm (2 marks)

8 (a) The difference between Rocky Terrestrial and Jovian planets.

Rocky terrestrial planet	Jovian planet.
i They are mostly made up of solid materials	They are mostly made up of gases or ice.
ii They are smaller in size compared to Jovian planets	They are larger in size than the rocky terrestrial planets
iii They are closer to the sun	They are far away from the sun
iv They are denser than Jovian planets	They are less dense.
v They have fewer moons	They have many moons

Any four
 (2 mark @)
 Total 4 marks

8(b) The type of a seismograph is a vertical pendulum seismograph.



In vertical movement of the ground, the frame and the pendulum move up and down while the mass (M) remains stationary due to inertia. The pen which presses against the drum draws the chart of the earth's motion. (1 mark)

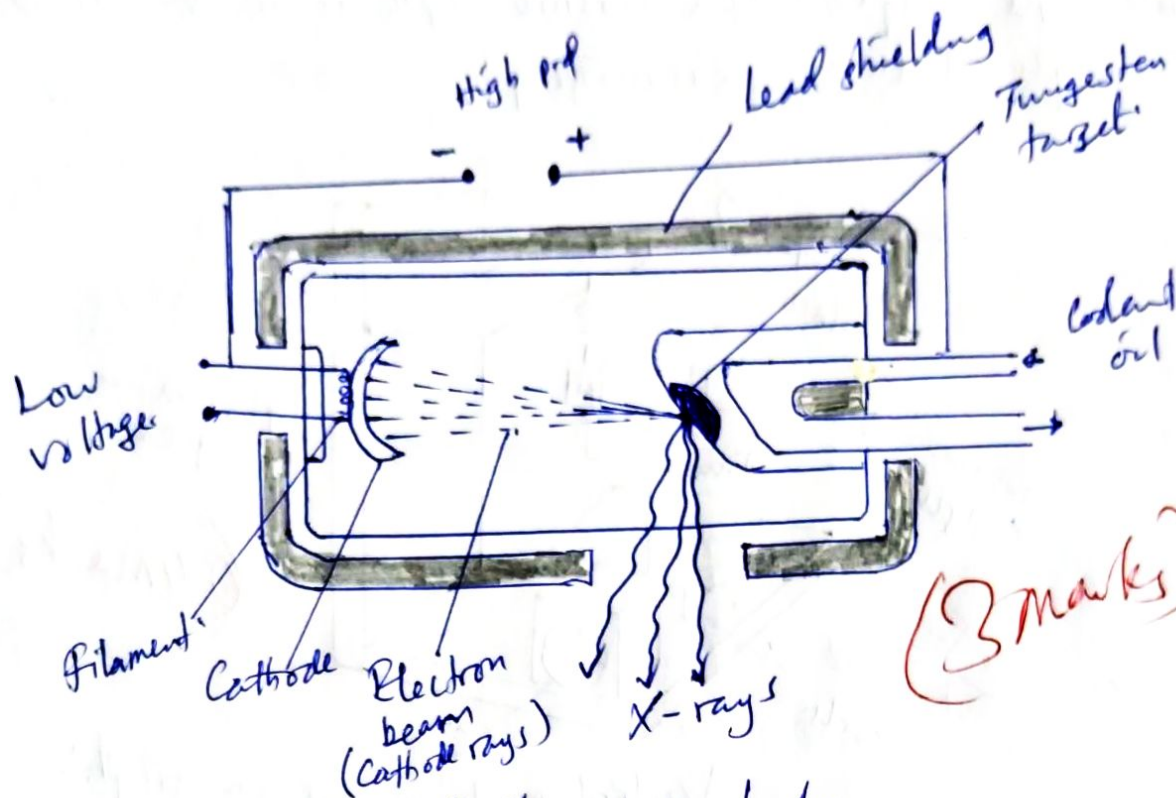
SECTION C

9 (a) Production of X-rays

The electrons from the Filament experience the potential difference and are accelerated towards the anode. When they hit the anode (Target) they are stopped and thereby transfer their energy to the electrons of the target causing them to be excited. When the electrons of the target return to their ground state, they emit radiations in the form of X-ray.

(02 marks)

9 (a)



(3 marks)

Features of the x-ray tube

(b)

Answer

The type of radiation is Beta (β) Particles (2 marks)

Reasons

- (i) Beta particles are moderate penetrating which can be stopped by a thin aluminium foil. (2 marks)
- (ii) Beta particles have limited travelling range in air, that is why beyond 30cm air itself absorbs them leaving only the background count of 30C/min (2 marks)

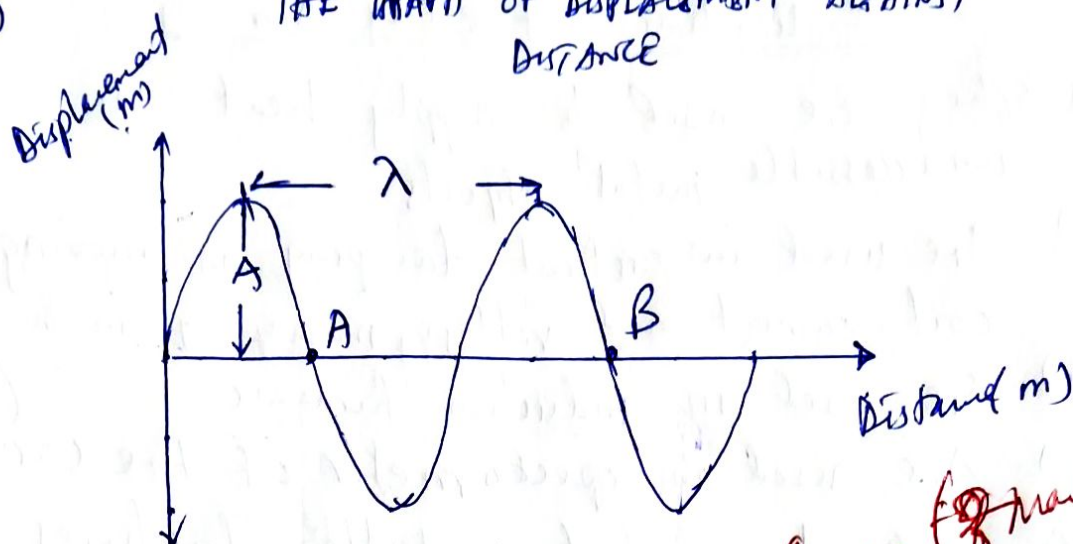
(c)

Advantages of digital signals

- (i) Noise immunity. Digital signals do not mix up with noise. (2 marks)
- (ii) More than one signal can be sent in a single channel (multiplexing) without interference since each signal is decoded independently. (2 marks)

(a)

THE GRAPH OF DISPLACEMENT AGAINST DISTANCE



- Where
- (i) λ = wavelength (2 marks) (3 marks)
 - (ii) A = Amplitude (2 marks)
 - (iii) Points A and B are out of phase by 180° (2 marks)

(b)

Solution

Data:

Radius of the wheel (r) = 3 m.

No. of spokes (N) = 8

Speed of camera = 16/sec.

For cart to be seen not moving means that no of spokes per sec is 16 i.e. 2 revolutions (2 marks)

$$= 2 \times 3 \text{ m}$$

$$= 6 \text{ m.}$$

The cart covers 6 m/s. (2 marks)

$\therefore$ The speed of the cart is 6 m/s

~~or~~ an integer multiple of 6 m/s (eg 12 m/s, 18 m/s and so on for its wheel to be seen stationary. (2 marks)

11 (a)

Applications of eddy currents

- (i) They are used to supply heat in inaccessible metal objects
- (ii) Are used in critical damping in moving coil current and voltage measuring instrument.
- (iii) Are used in induction furnace. (mark 1)
- (iv) Are used in speedometer of the car. Any four
- (v) Used to detect invisible fractures cracks in rails

(b) (i) Secondary coil must be thicker because the transformer is step down (240V-5V), conserving power means the the current the secondary coil surges much higher. Thicker wire provides low resistance. (this avoid melting of the wire) (3 marks)

(ii) The transformer will not work on D.C since magnetic flux is not changing, rather it burn out due to the heating of the primary coil. (4 marks)

(iii) The primary current will increase due to the load of the ringing bell which draws more current. (4 marks)