PHYSICS FORM - III - MID TERM
MARKING GUIDE

(01)

I	II	III	IV	V	VI	VII	VIII	IX	X
A	C	C	A	B	B	C	D	D	D

(10 marks)

(02)

I	II	III	IV	V	VI
F	E	D	C	B	A

(06 marks)

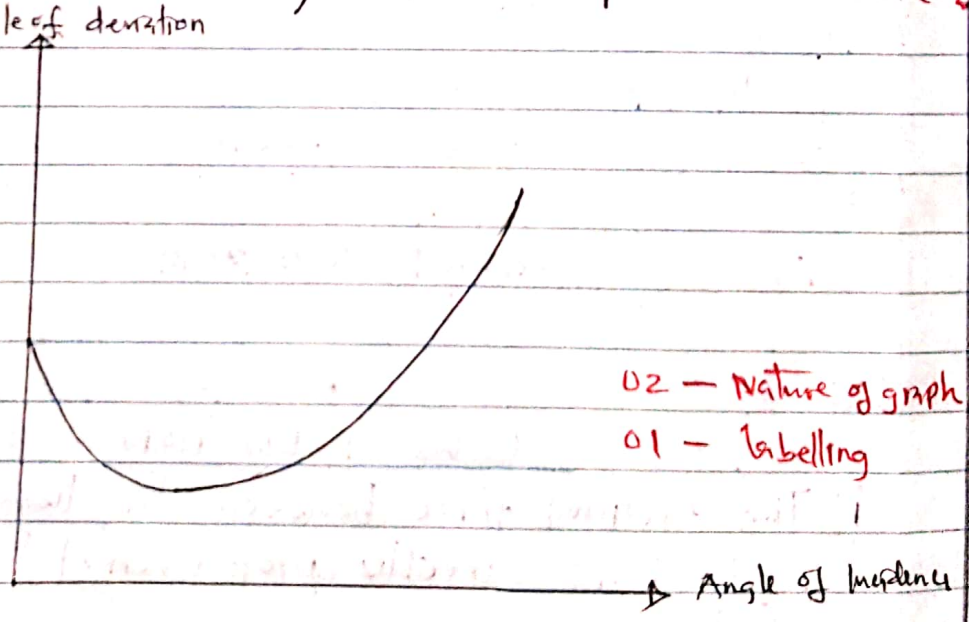
(03)

(a) Prism is a solid piece of glass that has at least two planes inclined towards each other through which light is refracted (02 marks)

(b) i) Rectangular prism (0½)
→ Is a polyhedron with two congruent and parallel base (01½ marks)

ii) Triangular prism (0½ mark)
→ Is a wedge-shaped piece of glass material or any other transparent material (01½)

(c)



02 — Nature of graph
01 — labelling

(04) (a)

(i) Force applied (0½ mark)
→ The large the Force applied, the larger the

Magnitude of moment of force and vice versa {N.B, This is when perpendicular distance kept constant} (01 mark)

ii) Perpendicular distance (01/2 mark)

→ The longer the perpendicular distance the larger the magnitude of moment of force (01 mark)
{N.B, This is when the applied force kept constant}

b)

i) $A = 20N \times AX$

But

$AX = AP \sin 30°$ (01 mark)

$= 15 \times \sin 30°$

$= 7.5\ cm$

$= \underline{0.075M}$

Then

$A = 20N \times 0.075M$

$= 1.5\ NM$

∴ Moment about A = 1.5NM (03 marks)

ii) $A = 20 \times AP$

$= 20N \times 0.15M$

$= 3NM$

∴ Moment about A = 3NM. (02 marks)

(05) a)

LAWS OF FRICTION

i) The frictional force between the two surfaces in contact is directly proportional to the normal force.

ii) Frictional force is independent of the contact surface area as long as the normal force is the same.

iii) Coefficient of static friction is larger than the coefficient of kinetic friction.

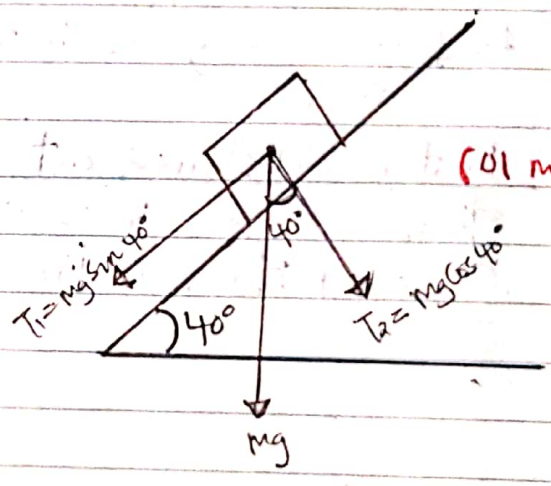
iv) Frictional force is independent of the velocity once an object has been set in motion.

v) Frictional force depends on the nature of the surface in contact. (05 marks)

(b) Parallel Component is given by

$T_1 = mg \sin 40$

$T_1 = 20 \times \sin 40$



(01 mark)

$T_1 = 20 \times 0.6428$

$T_1 = 12.865 N$

→ The Component parallel to the plane is 12.856 N

Perpendicular Component (T_2)

$T_2 = mg \cos\theta$

$T_2 = mg \cos 40^\circ$

$= 20 \times 0.7660$

$= 15.32 N$

∴ The Component perpendicular to the plane is 15.32 N.

(03 marks)

(06)

(a) Radiant energy from hot body may be detected by converting it into electric energy.

(03 marks)

(b) @ 02 marks

i) Electric Current
ii) Galvanometer
iii) Thermoelectric effect

(07) a) Because it has got high specific heat capacity. (04 marks)

b)

By using principle of Conservation of energy

Heat given out by steam = Heat received by ice, water and can (01 marks)

Heat in Joules given out by

Steam Condensing to water at 100°C = $m \times 2260$

Condensed Steam Cooling from 100°C to 20°C

$= m \times 4.2 \times 80$

$= m \times 2956$

(0½)

Heat in Joules Received by

Ice melting to water at 0°C $= 50 \times 336$

Melting ice warming from 0°C to 20°C $= 50 \times 4.2 \times 20$

Water warming from 0°C to 20°C $= 250 \times 0.4 \times 20$

Total $= 56600\,J$

(0½)

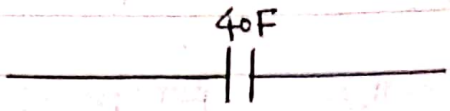
Thus

$$\frac{m \times 2956}{2956} = \frac{56600\,J}{2956}$$

$m = 21.8\,g$.

∴ Mass Condensed $= 21.8\,g$ (03 marks)

(08) a)

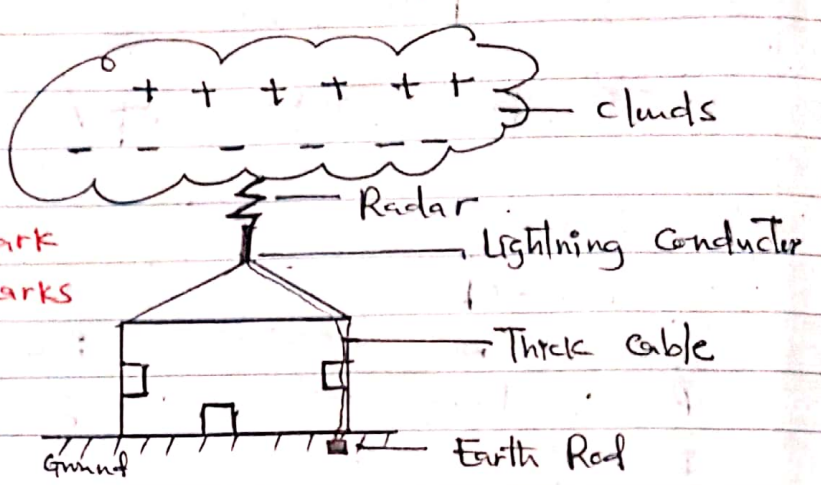


(01½ marks)

Capacitor

→ Used to store electric charge. (01½ marks)

b)



Diag – 01 mark
Lab – 02 marks

MODE OF ACTION OF LIGTNING CONDUCTOR

→ The lightning Conductor is placed above the highest point of the building because lightning tends to hit the highest object within its region or path. When lightning strikes the Conductor, electric flow along the wire and dissipated to the ground there by protecting the building. (03 marks)

SECTION-C (30 MARKS)

9 (a)

Mistake – Brown (live wire) is Connected to the earth Pin (01 mark)

Remedy – It should be connected to the fuse pin (01 mark)

Mistake – Blue (Neutral) is connected to the live pin (Fuse) (01 mark)

Remedy – It should be Connected to the neutral pin (01 mark)

Mistake – Green/Yellow (Earth) is connected to the neutral pin. (01 mark)

Remedy – It should be connected to the earth pin (01 mark)

(b) The Fuse will blow out/burn (04 marks)

(c) Given

Case – I

$i = 0.6A$

$R = 2$ ohms

$E = ?$

$r = ?$

Case – II

$i = 0.2A$

$R = 7$ ohms

$E = ?$

$r = ?$

From

$E = I(R+r)$ (01 mark)

In case I, $E = 0.6(2+r)$ and in case II, $E = 0.2(7+r)$, but E is the same for both cases. So Comparing the two equations

$0.6(2+r) = 0.2(7+r)$ (01 mark)

$\frac{0.4r}{0.4} = \frac{0.2}{0.4}$

$r = 0.5$ ohms

From

$E = 0.6(2+r)$, since $r = 0.5$

Now we have

$E = 0.6(2+0.5)$

$E = 1.5V$

∴ Emf of the cell is 1.5V and Internal resistance, r is 0.5 ohms (03 marks)

(10)

a) For the same direction

$V_A - V_B = 5$ ——— (i) (02 marks)

For the opposite direction

$V_A - V_B = 15$ ——— (ii) (02 marks)

→ Solving eqn (i) and (ii) simultaneously we have

$V_A = 10\ m/s$ (03 marks)

$V_B = 5\ m/s$ (03 marks)

b) Given

$Ho = 3cm$

$V = 12\ m$

$HI = 1.5m$

Required object distance, u (01 mark)

From

$\frac{HI}{Ho} = \frac{V}{u}$ (01 mark)

$u = \frac{V \times Ho}{HI}$

$= \frac{12m \times 3\ cm}{1.5\ m}$

$= 24cm$ (03 marks)

→ From the lens, the slide must be at 24cm

(11)

(a) Electrical cables are left sagging during installation on the hot day and taught during cold day so as to allow expansion and contraction (04 marks)

(b) The way that can be applied to allow iron rivet to fit on brass hole is heating brass plate in order to expand. (05 marks)

(c)

From

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$ (01 mark)

$$V_2 = \frac{P_1V_1T_2}{P_2T_1}$$

$$V_2 = \frac{76 \times 0.001 \times 290}{273 \times 72}$$ (01 mark)

$$V_2 = \frac{22.04}{19656}$$

$$V_2 = 1.12 \times 10^{-3}\ m^3$$

∴ Final Volume of mercury is $1.12 \times 10^{-3} m^3$ (04 marks)