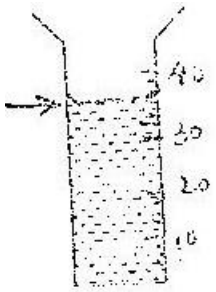
PHYSICS PAPER 232/1 K.C.S.E 2003 MARKING SCHEME.

1. 

$\frac{39\ cm^3}{Dr}$

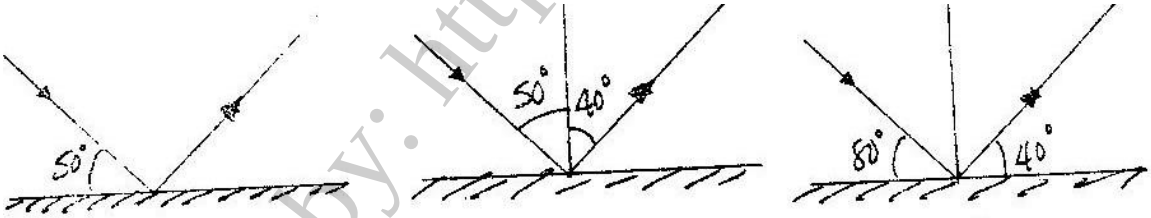
2. 30.0 + 0.5 = 30.5 (No mark if working not shown)

3. Low density / weight / mass lowers Cog Lower Cog increases stability. Or higher mass / weight / density raises Cog. Higher Cog. reduces stability.
   $P = \int hg$ / $p = dhg$
   $= 1.36 \times 10^4 \times 0.7$
   $= 9.52 \times 10^4$ or $95200\ Nm^{-2}$ Allow $g = 9.8 m/s^2$ (follow through working)

4. Air molecules are in continuous random motion. They bombard / knock / collide with smoke particles

5. Glass flask initially expands / Heating increases the volume of the flask; hence the lignin level drops. Eventually water expands more than glass, leading to the level rising.

7. Initially the wire gauze conducts heat away so that the gas above does not reach the ignition temp/point. Finally the wire gauze becomes not raising the temp of the gas above ignition point.

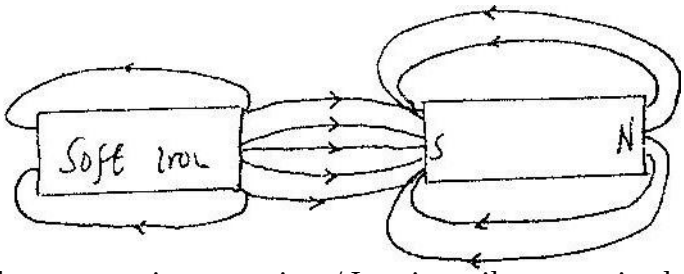
8. 

   R = I = 90 = 40o
   Or
   $R = \frac{180}{2} - 100 - \frac{80}{2} = 40^o$

9. The negative charges on the rod initially neutralize the positive charges on the leaf and the plate / A the road is moved towards the cap electrons are repelled to the leaf, making it to fall.
   As the road is brought nearer, the excess negative charges on the leaf and the plate.
   Current for a longer (Do not accept cheaper)

11. Temperature

12.

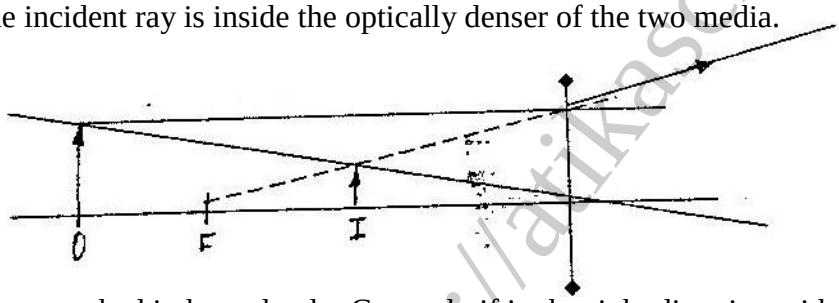


13. It does not retain magnetism / Iron is easily magnetized / demagnetized / Iron enhances / strengthens magnetism.

14. Clock wise moments about pivot = Anticlockwise moments about pivot.
F x 2.5 Sin 30 = 2.5 x 20 F = 40N
Acc. F cos 60o = 20.
F = 20
Cos 60 = 40N (Do not accept symbols for principle.)

15. Light travels from optically an optically denser to a less dense / rarer medium / the incident ray is inside the optically denser of the two media.

16.



Rays marked independently: Correctly if in the right direction with arrows. Object distance is 9.1cm + 0.2 (8.9 – 9.3). No arrow on the virtual. Any through optical centre.
Other rays to principal axis and dotted through F.

17. $P = V^2 / R$ $P = VI = I^2R$
$75 = \frac{240 \times 240}{R}$ or Do not accept p = VI alone without I^2R
$R = {}^{p}/_{1}{}^{2}$
$= 768\ \Omega$ $R = 75 \times {}^{240}/_{75} \times {}^{240}/_{75} = 168\ \Omega$

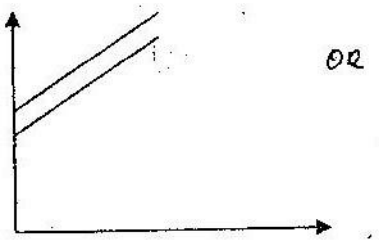
18. Beta particle β (Do not a ward for beta ray) Beta radiation Beta emission

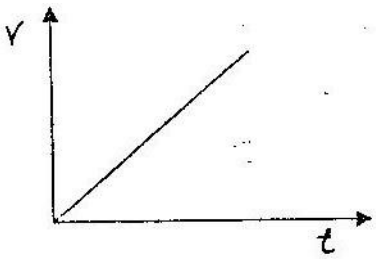
19. Dope with group III element (e.g. Boron, Al, Ga). Three silicon electrons pair up with impurity atom electrons. One electron of silicon has no electron to pair up; hence a hole is created(For correct structure without explanation but showing a group three element.

20. Piece of metal does not displace own weight but the two together displace their own weight/ weight of water displaced is less than the weight of metal while weight of water displaced equals the weight of the tow/up thrust equal to combined weight.

21. Speed = distance / time speed = 600m/s
= 1200 1.75
3.5 =343 m/s
= 343m/s (Range 342.8 - 343 m/s)

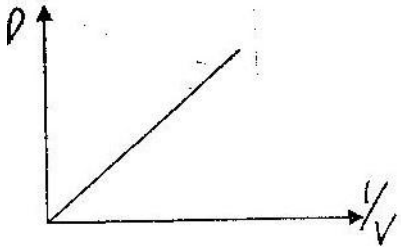
22.





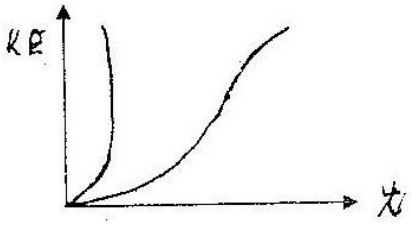
23. Circuit A
Current draw from each cell is less than in B / In A there is les internal resistance.

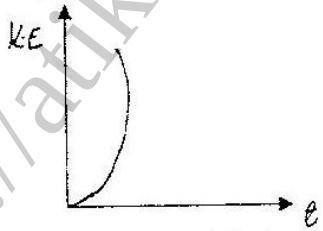
24.

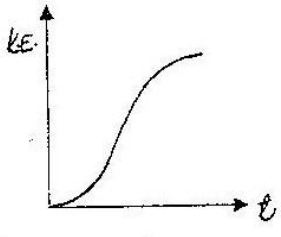


25. To with stand high temperature / high melting point.

26.



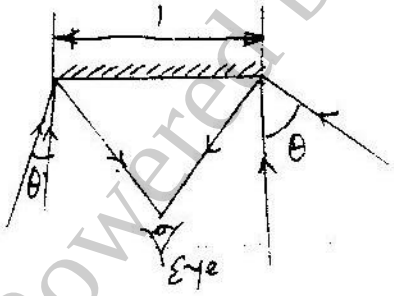


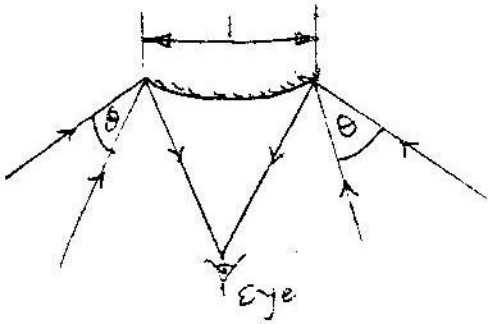


27 Fringes will be closer together / more fringes of violet light has a shorter wavelength Red light has longer wavelength.

28. Do not accept: Heat loss = heat gain
Pt = mcθ or VIt = mc△θ
2500t = 3.0 x 4200 x 50
T = 252s / 4.2min / 4 min 12s.

29.



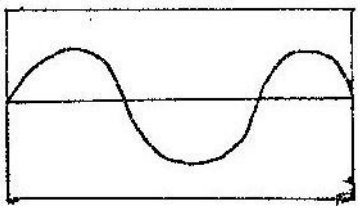
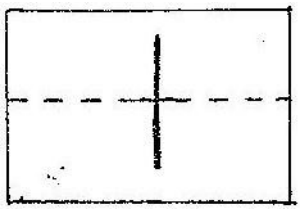


30. F = ma a2 = $\frac{a_1}{2}$ Accept F = ma for formula mark
F = 2 ma_2 a2 = $\frac{a1m}{2m}$
$2ma_2$ = maf

31. Radio waves, Infrared, visible light, U.V light, X-rays (accept correct order)

32. Galvanometer deflects; Changing flux produced in p is linked to Q causing an e.m.f to be induced / by mutual inductance an emf / current is induced in Q.

33. Maximum deflection of G will be double; flux linkage doubles when the turns are doubled.

34.  

35. Q = hf0 =W_o or & = hfco
= 6.63 x 10^{-34} x 9.06 x 10^{14}j
= 6.01 x 10^{-19} J or 6.0061 x 10^{-10} or 6.0 x 10^{-19} if working is shown.

36. Fast air causes low / - reduced pressure at the top. So there is net force upwards on pith ball / pressure difference pushes pith ball upwards.

37. Parallel C = (1.3 + 0.7 0)μF = 2.0 μF or 2 x 10^{-6}F
Series 1 = 1 + 1 =1
C_T 2.0 / 2.0
C_T = 1.0 μF // 1.0 x 10-6 F.

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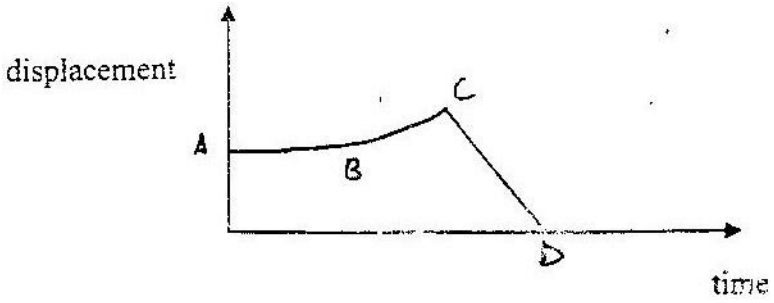


(i) Velocity equal zero; (ii) body is uniformly accelerated;
(iii) Body is uniformly decelerated to origin

(b i) S = ½ at 2 a = 10 ms -2
$45 = ½ \times 10 \times t^2$ t= 3 s; (3mks)

(ii) the initial horizontal velocity of the ball.
S –V at; 50 Va x 3; VA = 16.7 ms -1
(iii) V = U + at;
V = O + 10 x 3; = 30ms-1 (total 13 marks)

2ai) work= force x distance;
= 2000 x 3.0 x 10;
6000J;

ii) Power = $\frac{\text{work done}}{\text{time}}$

$= \frac{60000}{6}$

= 10000w;

iii) 12.5 kW
% efficiency = work output = power output
= work input = power input

= 12.5 x 103

iii) Force is centripetal $= \frac{mv^2}{r}$

$= \frac{20 \times 4.24}{4}$

= 89.9V Total 14 marks

3 a) Specific latent heat of vaporization is the quantity of heat required to change 1 kg of a liquid at boiling point completely to vapour at the same temperature and atmospheric pressure

B i) I Mass of condensed steam = 123- 120 =3g;

II Heat gained by water
= 0.070 x 4200 x 25J;
Heat gained by calorimeter
= 0.05mx 390 x 25; = 487.5J;
= 7837.5J;

ii) Q = mL;

II Q= 0.003 x L
0.003 x L = 7837.5;
L= 2.61 x 10^6 J kg -1

4. a i) I 4cm; II A= 2cm;

ii) I 0 to A- 9cm containing 2 ¼ waves
time for 1 wave = 0.04 s
f=$^1/_7$; = $^1/_{0.04}$ f= 25Hz;

II V = f; 15 x 0.04 = 1 ms^{-1}

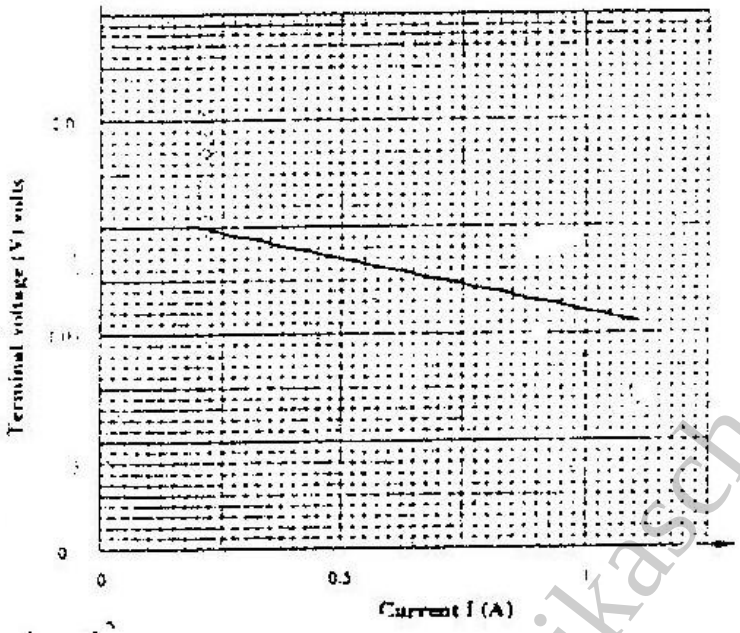
Ai to allow all radiations to penetrate;

(ii) On entry radiation ionizes argon gas
Avalanche of ions flows between terminal causing condition;
Pulse of current flows; Pulse registered as particle;

iii) Quenching the tube;

5. a) e.m.f is total work done in transferring unit charge from on terminal of battery to the other;

b)



(ii) i) E = V + Ir;

(iii) From the graph determine the; current (A)

I internal resistance = slope of graph

Slope = 1.2= 0.90
1.0-0.5
= 0.3

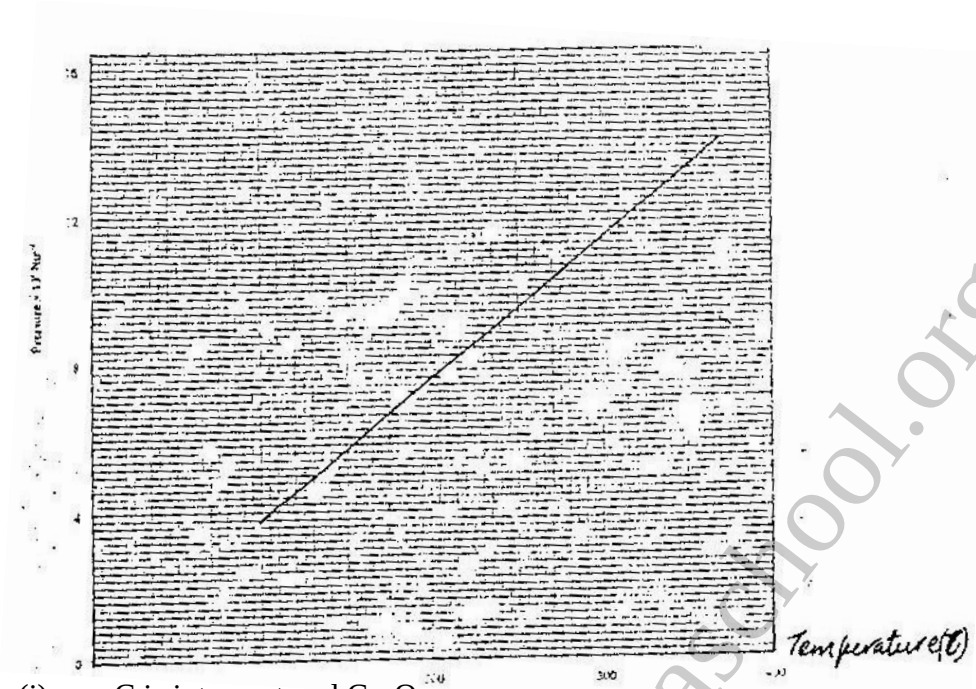
0.53
= 0.6Ω

(c) Current through shunt = 3.0 -0.03 = 2.97a;
Pd across g= Pd across shunt = 10x 0.03; 4 marks
Resistance of shunt Ir = 10 x 0.03
= 2.97 x r= 10 x 0.03
R = 0.101 Ω

SECTION II

6 a) Water is heated and gently stirred;
Values f pressures and temperature are recorded to intervals;
Temperature is converted to K and atmospheric pressure p added to P;
Graph of pressure p against (K)
Plotted giving straight line;

b)



(i) C is intercept and C= O;
K is gradient given by
Gradient = 15.2 x 10-4 x 10
400-105
= 11.2 x 103
295
= 37.97 pak-1

(ii) Gas would liquidify;

(c) 270C = 300k
3270C = 600k
P1=p2
T1=T2
2.1 x 105m= p2
300 600
P2 = 4.2 x 105 Pa

7. a) i) The candle is placed at a distance u from lens and screen position adjusted until sharp image is obtained; the distance v between lens and screen is measure;
Process is repeated for other values of V;
For each set of u, v, f is found 1/f = 1/u + 1/v; average f determined;
(ii) Image is virtual and so not formed on screen

c) m = v= 2
$^{v}/_{15} + {}^{1}/_{30}$;

$={}^{1}/_{f} = {}^{1}/_{15} + {}^{1}/_{30}$
F= 10cm