BURETI SUB-COUNTY JOINT EVALUATION TEST
PHYSICS
Paper 1
July/August 2016
MARKING SCHEME
SECTION A :

1. $20.3cm^3 - (0.1 \times 50)cm^2$
$20.3 - 5$
$= 15.3cm^3$

2. $K_1 = \frac{F}{e} = \frac{5}{2} = 2.5Ncm^{-1}$
$F = 2k_1e$
$e = \frac{F}{2k_1} = \frac{5}{2 \times 2} = 1cm$

3. $A_1V_1 = A_2V_2$
$\pi r^2V_1 = \pi R^2V_2$
$6 \times 3 = 9^2V_2$
$V_2 = \frac{6 \times 6 \times 3}{9 \times 9}$
$= 1.333ms^{-1}$

4. Unstable
When displaced slightly it occupies a new position which is totally different from the original position

5. Clockwise moments = anticlockwise moments
$1.2 \times 0.5 = (U \times 0.5) + (1.2 \times 0.4)$
$0.6 = 0.5U + 0.48$
$0.5U = 0.6 - 0.48 = 0.12$
$U = \frac{0.12}{0.5} = 0.24$

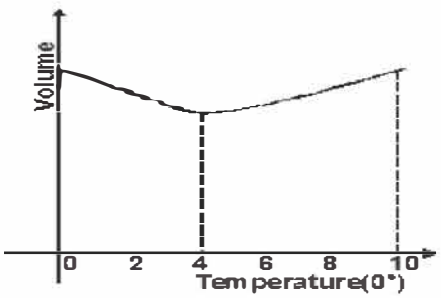
$U = V\rho g$
$0.24 = 13.5 \times 10^{-6} \times \rho \times 10$
$= \frac{0.24}{13.5 \times 10^{-6} \times 10}$
$= 1777.78kgm^{-3}$

6. Has no constriction Mercury thread contract and go back to bulb before readings are taken

7. Readings of thermometer A is higher than that of thermometer B
Black surfaces are better absorbers of radiant heat

8. Glass expand creating for space thus the fall. Water expands at a higher rate than glass

9.



curve with 4° being lowest
labelling of axes

10. $h_{Hg}\rho_{Hg}g = h_{air}\rho_{Hg}g$

$\frac{750 - 748}{1000} \times 13600 = h_{air} \times 1.25$
$h_{air} = \frac{0.002 \times 13600}{1.25}$
$= 217.6m$

11. Transformation of heat to and from other forms of energy

SECTION B

12. a) Gas that perfectly obey gas laws at all conditions
b) i) When pressure is changed some time is allowed for temperature to adjust to room temperature before pressure and volume are read
ii) $k = \text{slope} = \frac{\Delta P}{\Delta^1/_V} = \frac{(3.0 - 0.6) \times 10^5}{(3.6 - 0.7) \times 10^6}$
$= \frac{2.4 \times 10^5}{2.8 \times 10^6}$
$= 8.571 \times 10^{-2}Nm$
iii) Work done in compressing the gas
iv) The gas should be free from dust / particles

c) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
$\frac{4000}{310} = \frac{V_2}{340}$
$V_2 = \frac{4000}{310} + 340$
$= 4387.10l$

13. i) Work done = mgh
$= 30 \times 10 \times 10$
$= 3000J$

ii) Work done by force = force x distance
$= 100 \times \frac{10}{\sin 15^o}$
$= 3864J$

iii) $\eta = \frac{\text{work done on load}}{\text{work done by effort}} \times 100\%$
$= \frac{3000}{3864} \times 100\%$
$= 77.64\%$

iv) Work done to overcome friction
$= 3864 - 3000$
$= 864J$

v) $M.A = \frac{L}{E}$
$= \frac{300}{100} = 3$

14. i) CD - uniform deceleration
DE - the body is at rest
EF - uniform acceleration in the opposite direction

ii) $a = \frac{\Delta V}{\Delta t} = \frac{20 - 0}{10 - 0} = \frac{20}{10} = 2m/s^2$

iii) Average velocity = $\frac{\text{total displacement}}{\text{time taken}}$
$\frac{\frac{1}{2}(25 + 10)20 + (\frac{1}{2} \times 5 \times -10)}{40}$
$= \frac{350 - 25}{40} = \frac{325m}{40} = 8.125m/s$

b) i) $\frac{mv^2}{r} - mg = 0$

$\frac{0.25V^2}{1.6} - 0.25 \times 10 = 0$

$0.15625V^2 - 2.5 = 0$

$V = \sqrt{\frac{2.5}{0.15625}} = \sqrt{16}$

V = 4m/s

ii) V = rw

4 = 1.6w

$w = \frac{4}{1.6} = 2.5 rads^{-1}$

iii) $F = \frac{mv^2}{r} + mg$

$= \frac{0.25 \times 4^2}{1.6} + 0.25 \times 10$

= 2.5 + 2.5= 5.0N

15. a) The ball has the same horizontal velocity as the truck

b) Impulse is the change in momentum

c) i) $M_1V_1 + M_2V_2 = (M_1 + M_2)V$

$30,000 \times 20 + 0 = (30,000 + 10,000)V$

$V = \frac{600000}{40000} = 15ms^{-1}$

ii) S = Vt

= 15 x 15 = 225m

iii) Ft = m (v - u)

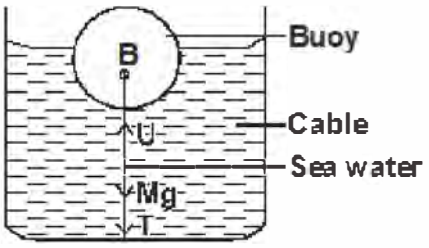
$f = \frac{m(v - u)}{t}$

$= \frac{30000 (15 - 20)}{0.5}$

= -300,000N

d) This is due to the passengers reaction force on the boat which acts backwards

16.



where u - upthrust

mg - weight

T - tension

ii) T + mg = U

$T + 10 \times 10 = {}^3/_4 \times 0.04 \times 1040 \times 10$

T = 312N - 100

T = 212N

c) i)Law of floatation - a floating object displaces its own weight of fluid in which it floats

ii) Weighted bulb - to make the hydrometer float upright and narrow to increase its sensitivity

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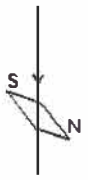
PHYSICS
Paper 2
July/August 2016
MARKING SCHEME
SECTION A

1.



Using ampere's swimming rule, the N-pole is deflected to the right

2. - sound waves require a material medium to travel while microwaves do not require a material medium to travel / for transmission

- sound waves travel with slower speeds while microwaves travel with the speed of light ($3.0 \times 10^8 m/s$)
- sound waves are longitudinal waves while microwaves are transverse in nature

3. Initially the rod attracts electrons / negative charges from the leaf to the cap, so the leaf falls. As the rod gets closer to the cap, more electrons are attracted to the cap so the leaf and the plate become positively charged hence deflection

4. A - North pole

B - South pole

1 1mk (tied)

5. 30Ah → 1h = 30A

$10min = \frac{10}{60} \times 30$

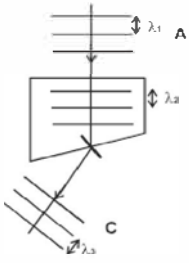
= 5A

6. $n = \frac{\text{real depth}}{\text{apparent depth}}$

$1.33 = \frac{2.4}{\text{apparent depth}}$

$\text{apparent depth} = \frac{2.4}{1.33} = 1.805cm$

7.

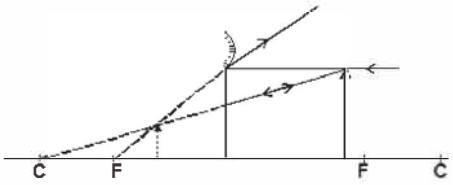


correct wavefronts in A $\lambda_1 > \lambda_1$
correct wavefronts in C
$\lambda_3 = \lambda_1 > \lambda_2$ and refracted away from the normal

8. $C_p = 5 + 2.5$
$= 7.5\mu F$

$v = \frac{d}{c} = \frac{1.4 \times 10^{6}}{7.5 \times 10^{-6}}$
$v = 0.1867V$

9.



each ray incident and reflected
object position

10. $V - f\lambda \Rightarrow f = \frac{v}{l}$

$= \frac{3.0 \times 10^{8}}{7500/100}$
$= 4.0 \times 10^{6}Hz$

11.

$$^{234}_{92}U \longrightarrow {}^{a}_{b}X + 2({}^{4}_{2}He)$$

$$^{234}_{92}U \longrightarrow {}^{a}_{b}X + {}^{8}_{4}He)$$

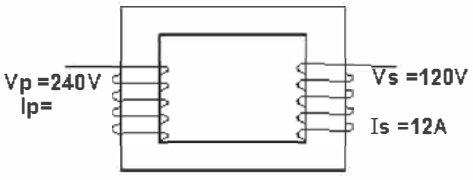
$a + 8 = 234$ $\quad a = 226$
$b + 4 = 92$ $\quad b = 88$

12. - replacing the screen with a photographic film
- placing a sliding card infront to act as a shutter
- painting inside black to avoid reflection

SECTION B

13. a) The magnitude of the induced e.m.f is directly proportional to the rate of change of magnetic flux linkage

b) i)



secondary power = 120 x 12
= 1440 watts
80% = 1440
100% = $\frac{100 \times 1440}{80}$
= 1800W

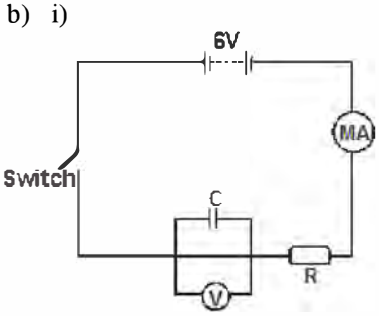
$1800 = 240 \times I_p$
$I_p = 7.5A$

ii) $P = I_2R$
$= 7.5^2 \times 2$
$= 112.5W$

c) i) Power = $\frac{60 \times 3 \times 2}{1000} \times 3hrs$
$= 1.08kwhr$
ii) cost = $1.08 \times 6.30 \times 7$
$=$ sh.47.628

d) To prevent electric shock

14. a) Capacitance increases
b) i)



ii) Negative charges flow from the negative terminal of the battery to one plate of the capacitor
Negative charges flow from the other plate of the capacitor to the positive terminal of the cell
Hence equal positive and negative charges gather on the plates opposing further flow of electrons when fully charged or p.d across the plates is equal to that of the battery

iii) To slow down the charging process so that current and voltage are observed

c) i) The leaf falls
When U.V falls on the zinc plate electrons are ejected / photoelectiric effect takes place
The negative charges in the zinc plate and cap of the electroscope <u>are repelled</u> hence leaf falls

ii) There is no effect on the leaf of the electroscope
The electrons liberated by the UV light are <u>attracted back</u> by the positive charges on the zinc plate / cap of electroscope hence no effect on leaf divergence

15. a) X-rays are produced when fast moving electrons hit a metal target (or excited electrons lose energy in form of X-rays)
Cathode rays are produced when a metal is heated (by thermionic emission)

b) i) - cathode should be connected to then negative terminal of a.c supply
- grid should be connected to the negative terminal
- the anode plates should be connected to the positive terminal
- Y-plates should arranged to come before the X-plates

ii) By making the grid less negative w.v.t to the cathode

iii) To conduct away electrons / cathode rays on hitting the screen / reduce the accumulation of electrons on the screen

iii) C.R.O - deflection system done by electrons held while in the T.V tube deflection is done by the

magnetic field

In a C.R.O there is a single time base while in a T.V tube there are two time bases

c) i) K.e = eV
$= 1.6 \times 10^{-19} \times 100{,}000$
$= 1.6 \times 10^{-14}$J

iii) 100% = 1.6×10^{-14}
0.5% = $\frac{0.5 \times 1.6 \times 10^{-14}}{100}$
$= 8.0 \times 10^{-17}$J
$8.0 \times 10^{-17} = \frac{hc}{\lambda}$
$= 2.486 \times 10^{-9}$m

16. a) Temperature is kept constant physical conditions are kept constant
Length of wire is constant
Thickness of wire is constant

b) i) E = I (R + r)
R = 10 + 12 = 22Ω

12 = I (22 + 2)
I = $\frac{12}{24}$ = 0.5A

ii) $R_T = \frac{24 \times 12}{24 + 12}$
= 8Ω

R_{series} = 8 + 10
= 18Ω

12 = I (18 + 2)
I= $\frac{12}{20}$
= 0.6A

c) i) Convex / converging lens
If focuses images on a screen or forms a real image

ii) U + V = 100cm ½
$\frac{h_I}{h_o} = \frac{v}{u} = 2$
v = 2u ½

u + 2u = 1w
u = $\frac{100}{3}$ = 33.33cm
v = 1w - 33.33
= 66.67cm

d) $p = \frac{1}{f}$ $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$= \frac{1}{22.47 \times 10^{-2}}$ $\frac{1}{f} = \frac{1}{33.33} + \frac{1}{66.67}$

= 4.45D f = 22.47cm

BURETI SUB-COUNTY JOINT EVALUATION TEST
PHYSICS
Paper 3
July/August 2016
MARKING SCHEME

1. a) D_1 = 0.32mm ½ D_2 = 0.32mm ½

b) D = $\frac{0.32 + 0.32}{2}$ ½
0.32×10^{-3}m ½

c) x = 40cm ½ y = 60cm ½

d)

L (cm)	45	40	35	30	25	20
X (cm)	43.2	49	51.2	55	58.7	63.7
Y (cm)	56.8	51	48.8	45	41.3	36.3
Y	1.31	1.04	0.95	0.82	0.70	0.57
$\frac{y}{x}$ (2 dp)						

e) ii) $= \frac{0.95 - 0.57}{35 - 20}$ = 0.02533

iii) K = $\frac{100 \times 0.32 \times 10^{-3}}{0.02533}$ = 1.263

f) outline
d_1 = 2.1cm
d_2 =3.6cm
$d = \frac{2.1 + 3.6}{2}$ = 2.85cm

2. a) (V) L_o = 56cm (or any other value)
V (b)

Length L (cm)	10	20	30	40	50
Extension e (cm)	8.8	7.7	6.6	5.6	4.5
Time for 20 oscillation (sec)	0.088	0.077	0.066	0.056	0.045
Periodic time T (sec)	12.22	11.21	1.12	9.15	8.20
T^2 (sec)^2	0.611	0.561	0.506	0.458	0.410
	0.37	0.31	0.26	0.21	0.17

labelled axes and unit 1mark
appropriate scale 1mark
plotting 4 or 5 correct by transferred values 2marks
3 correctly transferred 1mark
best line 1mark
vii) Gradient $\frac{\Delta e}{\Delta T^2}$ 1mark

Slope = $\frac{(86 - 2.5) \times 10^{-2}}{(3.6 - 0.5) \times 10^{-1}}$

$= \frac{6.1 \times 10^{-2}}{3.1 \times 10^{-1}} = 0.1968 m/s^2$

viii) Gradient = $\frac{R}{4\pi^2}$

R = gradient x $4\pi^2$

$= 0.1968 \times 4 \times 3.142 \times 3.142 = 7.771$

b) ii) table

Object	Distance X, (cm)
1	10.1
2	9.9

iii) Average value of X

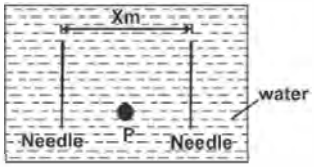
$= \frac{10.1 + 9.9}{2} = 10.9cm \pm 0.1cm$

iv) Physical significance of X = 10.0cm is the focal length of the lens used

GEM SUB-COUNTY FORM 4 JOINT EVALUATION
Kenya Certificate of Secondary Education
232/1
PHYSICS
Paper 1
July/August 2016
Time: 2 Hours

1. Figure 1 below shows a top view of two steel needles floating on water surface at a distance x metres apart.

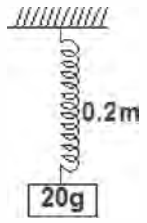
Fig. 1



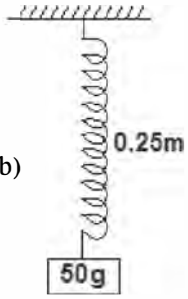
Very hot water is now poured at point P between the two needles. Explain any change in the distance x. (2 marks)

2. Figures 2a and 2b show a spring when carrying different masses.

(2a)



(2b)



Determine :

i) the elastic constant of the spring. (1 mark)
ii) the length of the unloaded spring. (2 marks)

3. Figure 3 below shows an air balloon and a wooden block at equilibrium on a hot day.