GATUNDU SOUTH SUB-COUNTY FORM FOUR 2015 EVALUATION EXAM

PHYSIC 232/1
JULY/AUGUST 2015

Marking scheme

Section A

1 Diameter of wire=$\frac{0.6cm}{25}$ = 0.0024cm

Radius =$\frac{0.0024cm}{2}$ = 0.0012cm

=1.2×10^{-3}cm

2 a) 1/100mmor 0.01mm

b) Initials reading =16.32mm
1revolution =100division =1mm
2 ½ rev =2 ½ x 1mm=2.50mm
Diameter =16.32-2.50=13.82mm

3. Water in a container B cold water from the melted ice in container A sinks to the bottom setting up convectional current.

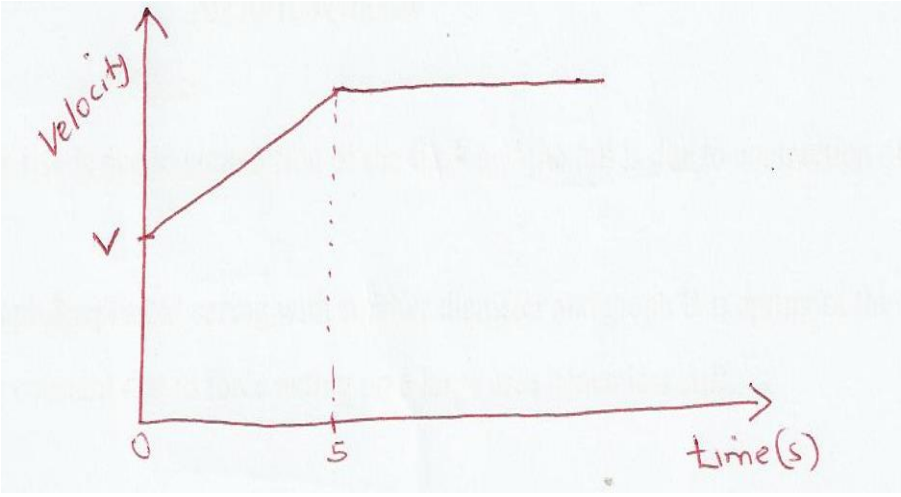
4. The centre of gravity of bus is lower when the goods are in lower carrier than when the goods are at the top carrier.

5 W=21πF

T=960rev/min=$\frac{960}{60}$=16rev

W=2x16π=32π rad/s
(100.5rd/s)

6



7. When air is blown over the mouth of the container, the pressure above the container reduces and its atmospheric pressure pushes the pith ball upwards.

8. Cohesive forces between mercury molecules are much stronger than adhesive force between mercury and glass.

9. $1.2F = 2.7 \times 500N$

$F = \frac{2.7 \times 500N}{1.2M}$

$F = 1125N$

$P = \frac{F}{A}$

$= \frac{1125N}{15x10^{-4}M^2}$

$750,000N/M^2$

10 the potassium permanganate collides with the water molecules hence diffused from high concentration to low concentration.

11 $300m = 0.5gt2$

$300 = 5t2$

$60 = t2$

$t = \sqrt{60} = 7.746$ sec

$R = Ut$

$= 400x\sqrt{60}$

$= 400 \times 7.746m$

$= 3098.4m$

12 $t = \frac{MC\Theta}{p}$

$= 5.\frac{0x10\_3x1000Kgm\text{-}3 \times 4200Jk\_1x77k}{20x70/100x1000W}$

$= 115.5sec$

13 The rise is due to contraction of the flask and the fall is due to contraction of water.

14 Graph A represent spring with smaller diameter and graph B is spring of the larger diameter the smaller the spring constant due to force acting on a large area hence less stiff.

15 a) When a body is in equilibrium, the sum of clockwise moments about the point is equal to the sum of anticlockwise moments about the same point

b)i) Mass=density x volume

=2.7gcm3x0.6x3x100cm3

=486grams

Weight $= \frac{486}{1000} \times 10$

=4.86N

ii) Taking moment about pivot ,

$F = \frac{0.15 \times 4.86}{0.2}$

F = 3.645N

Upward force =downward force

R=3.645+4.86

R=8.505N

16 i) Work output =60kgx100kgx20

12,000 J

ii)Work input=force effort distance

$= 200N \times \frac{20}{\sin 14^o}$

=200Nx82.671

= 16,534.2J

iii) Frictional force=work input –work output

= 16534.2 - 12000

=4,534.2J

(iv) Efficiency $= \frac{\text{work done}}{\text{Work input}}$

$= \frac{1200}{16534.2} \times 100\%$

=72.577%

v)Velocity ratio= $\frac{1}{\sin 140}$

=4.13

Or

V.R = $\frac{MA}{Efficiency} \times 100$

$= \frac{600/200}{72.5777} \times 100$

=4.13

17a)i) $P_1V_1 = P_2V_2$

$24 \times 750 = (750+150)v_2$

$V_2 = \frac{24x750}{900}$

V_2= 20cm

ii) $P_1V_1 = P_2V_2$

$24x750 = (750-150)v_2$

$V_2 = \frac{24x750}{600}$

V_2=30cm

iii)The mercury does not run out because the upward atmospheric pressure in the mercury column is greater than downward pressure due to the enclosed air and its own mass.

b) At the bottom of the lake the bubble is under the pressure of water column plus the atmospheric pressure on the surface of water as the bubbles rises the depth of the water column decreases as so does the pressure decreases results in increase in volume.

i.e. pv=a constant

c) Low temperature reduces the kinetic energy of molecule which lead to lower rate of collision which result to reduction of pressure.

d)$\frac{P_1V_1}{T_2} = \frac{P_2V_2}{T_2}$

$\frac{1.5x105x1.6}{300} = \frac{8x104xV_2}{273}$

$V_2 = \frac{240000 \times 273}{24000000}$

$= 2.73cm^3$

e) Pressure of fitted mass of a gas is directly proportional to its absolute temperature provided volume is kept constant.

18a) A floating body displaces its own weight of fluid in which it float.

Bi) Volume displaced $= 0.8 \times 0.5 \times 1.2m^3$

$= 0.48m^3$

Weight $= 0.48 \times 1000 \times 10N$

$= 4,800N$

ii) Average density of water $= \frac{\text{Total mass}}{\text{Total volume}}$

$1000 = \frac{480kg + \text{extra mass}}{0.8 \times 0.5 \times 2}$

$1000 = \frac{480 + \text{extra mass}}{0.8}$

$800 - 480 = \text{extra mass}$

$= 320kg = \text{Extra mass}$

Force $= 320 \times 10N$

$= 3200N$

c) Volume $= \frac{\text{mass}}{\text{Density}}$

$= \frac{0.25kg}{13600kg/m^3}$

$= 1.8382 \times 10^{-5}m^3$

d) Apparent loss in weight $= 3.0 - 0.22$

$= 2.78N$

Volume displaced $= \frac{\text{mass displaced}}{\text{density}}$

$= \frac{0.278}{1000}$

$= 2.78 \times 10^{-4}$

Density $= \frac{\text{mass}}{\text{Volume}}$

$= \frac{0.3kg}{2.78 \times 10^{-4}m^3}$

$= 1079.1367kg/m^3$

e) Upthrust = weight of air displaced
=V x ℓ x g
=2x1.3x10
=26N

Weight of balloon=0.1x2x10N+10N
=2N+10N
=12 N
Resultant force =26N-12N
=14N

19a) Speed is scalar quantity while velocity is a vendor quantity
b)T=$\frac{1}{F}$= $\frac{1}{100}$= 0.01seconds √

i) VAB = $\frac{12}{2 \times 0.01}$ =600cm/s or 6m/s √√

Vpq= $\frac{32}{2 \times 0.01}$ =1600cm/s or 16m/s √√

ii) a=$\frac{V_{pq} - V_{AB}}{t}$

=$\frac{16m/s-6m/s}{6x0.01}$= $\frac{10m/s}{0.06s}$

=166.7m/s^2

GATUNDU EVALUATION FORM FOUR 2015 EXAMINATION

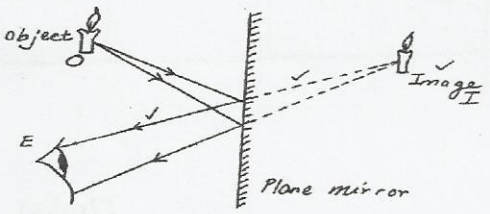
Kenya Certificate of Secondary Education 2015

MARKING SCHEME

PHYSICS
Paper 2
July/August 2015

SECTION A

1.



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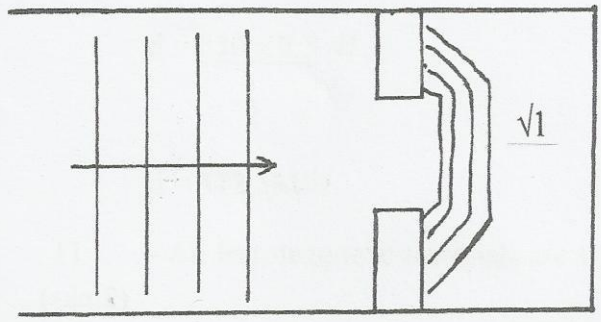
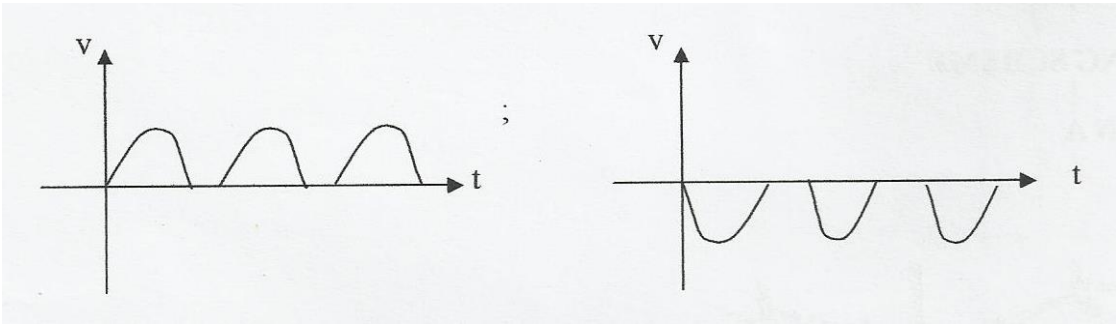


3. X-rays are produced due to electron transition while gamma rays are produced due to energy changes in the nucleus.

4. V= 1R;
   (6-4) = 40R;
   1000

R = 50Ω

5. a) Forward bias



6. $X = 2\Theta$

= 2 x 15√ (2 marks)
= 30° √

7. $P = \frac{V^2}{R}$

$= \frac{240^2}{950}$

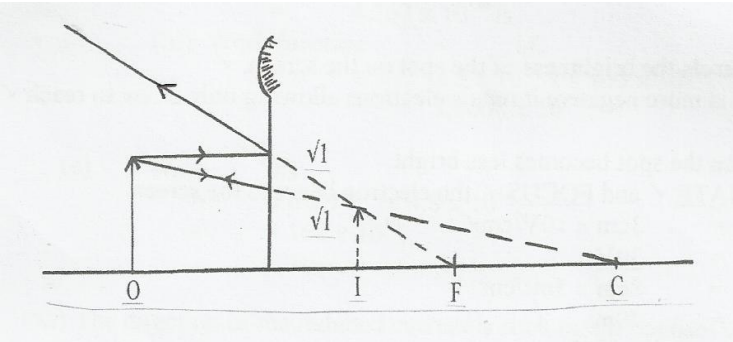
= 60.63W (2 marks)

8. $N = \frac{1}{\sin c}$

$= \frac{1}{\text{Sin } 42.5^o \sqrt{1}}$

n = 1.48√

9.



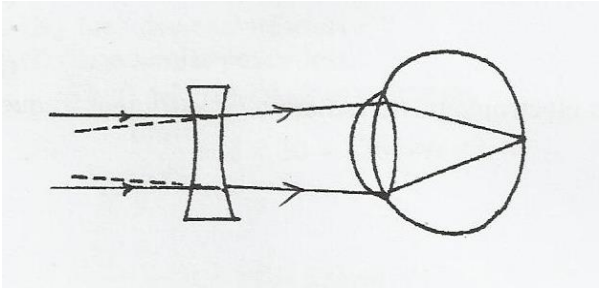
10. $S = \frac{2d}{t}$

$d = \frac{330 \times 2.5}{2}$ √ 1

d = 412.5M √ 1

11. –All ferromagnetic materials are attracted by magnets √ 1

12.



13. – They are transverse waves
- They obey the wave equation $v=\lambda f$
- They travel in vacuum
- They can be plane polarized
- Can be reflected, diffracted, refracted and exhibit interference (any 2)

14. a) C are UV radiations

- Produced by hot bodies such as the sun, mercury vapour lamps and electric arc sparks√

b) - are x-rays
- used in treatment of cancer
- used in study of crystal structure
- used to detect flaws in metal castings and welded joints

SECTION B

15. a) (i) A: Cathode√
B: Grid√

(ii) B(Grid) – controls the brightness of the spot on the screen. √
When the grid is more negative it repels electrons allowing only a few to reach √the screen hence the spot becomes less bright. (2 marks)

(iii) To ACCELERATE and FOCUS √the electron beam to the screen.

b) (i) Peak voltage Vo = 3cm x 10V/cm√
=30V

(ii) Period T = 8cm x 5ms/cm

= 40ms

T = 0.040S

Therefore frequency $f = \frac{1}{T}$

$= \frac{1}{0.040}$ Hz√

f = 25Hz√

16. a) (i) Time for half of atoms present to decay in a radioactive element. (1 mark)

b) (i) 20 minutes

(ii) $80 \rightarrow 40 \rightarrow 20 \rightarrow 10$
3 half-life's (2 marks)

(iii) a = 232
b = 89 (2 marks)

17. a) (i) Emission of electrons when an electromagnetic radiation of sufficient frequency is radiated on a metal surface.

b) (i) 2.5×10^{14} Hz

(ii) gradient $= \frac{h}{e}$

Gradient $= \frac{1.8 - 0.2}{(7.5 - 3.0) \times 10^{14}}$

$\frac{h}{e} = \frac{1.8 - 0.2}{(7.5 - 3) \times 10^{14}}$

$h = \frac{1.8 - 0.2}{(7.5 - 3) \times 10^{14}} \times 1.6 \times 10^{-19}$

$= 4.267 \times 10^{-34}$Js

(iii) Work function $= hf_o$

$= 2.5 \times 10^{14} \times 4.265 \times 10^{-34}$

$= 1.0668 \times 10^{-19}$ J

18. a) The direction of the induced current is such that it opposes the change producing it √

b) (i) $\frac{V_p}{V_s} = \frac{N_p}{N_s}$√ ; $\frac{800}{V_s} = \frac{2000}{150}$

$Vs = \frac{800 \times 150}{2000} = 60V$√

(ii)Power input = power output

$I_p = \frac{1000}{800} = 1.25A$√

(iii) $I_s = \frac{\text{power output}}{\text{Output voltage}} = \frac{1000}{60} = 16.67A$√

(iv) Step-down transformer

c) (i) To minimize power loss.

Thick cables minimizes resistance.

(ii) $\frac{2000}{1000} \times 2 \times 30 = 120kwh$√

$\frac{75}{1000} \times 10 \times 30 = 22kwh$√

$\frac{1500}{1000} \times 1 \times 30 = 45kwh$

Cost 187 x 9.50 = kshs.1776.50 √

19.(a) Capacitance is charge per unit volt

(b) (i) 2μF + 6μF = 8 μF

Effective capacitance = $\frac{\text{Product}}{\text{sum}}$

$= \frac{8 \times 3}{8 + 3}$

$= \frac{24}{11}$

$= 2.182\ \mu F$

(ii) Total charge $Q = CV = 2.18 \times 10^{-6} \times 12$
$= 26.16 \times 10^{-6} C$

(iii) p.d across the 2 $\mu F = \frac{26.16 \times 10^{-6}}{8 \times 10^{-6}} \sqrt{1}$
$= 3.27V$

c) Ohm's law – The amount of current flowing through a metallic conductor is directly proportional to the p.d across its ends so long as temperature and other physical conditions remain constant.

(ii)Effective resistance

$RE = 4 + \frac{6 \times 3}{3 + 6}$

$= 4 + \frac{18}{9}$

$= 6\Omega$

$V = IR$

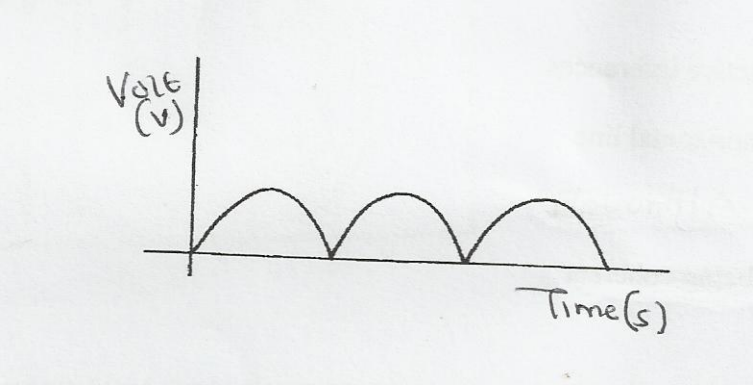
$I = \frac{12}{6} = 2A$

$\therefore V = 2 \times 4 = 8V$

(ii) $V = 12 - 8 = 4V\sqrt{}$

$\therefore V = 1R$
$I = \frac{4}{6} = \frac{2}{3} = 0.667\ A\sqrt{}$

20.A) (i)

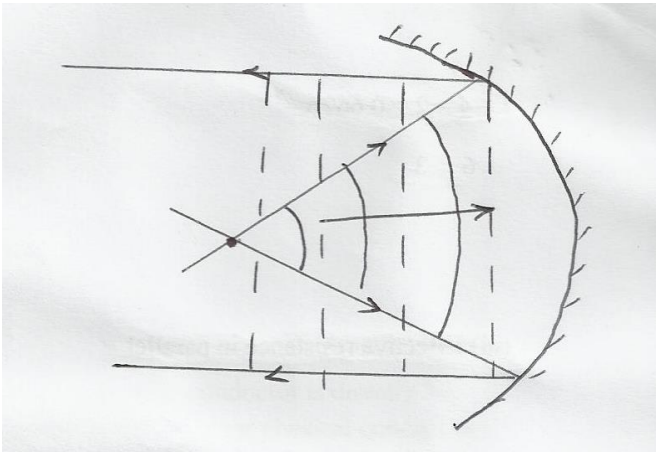


(ii) During the first half-cycle D_1 is forward biased while D_2 is reverse biased. Hence, current takes the path A, D_1 RT.

During the next half-cycle, D_2 forwarded biased while D_1 is reverse biased and the path of the current is BD_2RT.

(iii) – Protect a circuit from damage

- As a switch √ any 2
- In charging a battery using solar panels.



b\) Mark for incident ray √

mark for correct reflected ray √

C) (i) Destructive and constructive interference

(ii) Maximum amplitude or horizontal line

(iii) Loud sound all through