

NAME \_\_\_\_\_ ADM NO \_\_\_\_\_

**TIME: 2 HOURS**

**ALLIANCE HIGH SCHOOL FORM IV PHYSICS END OF TERM I EXAM 2016**

**INSTRUCTIONS TO CANDIDATES**

Answer all questions in both sections in the spaces provided in this paper

Mathematical tables and electronic calculators may be used.

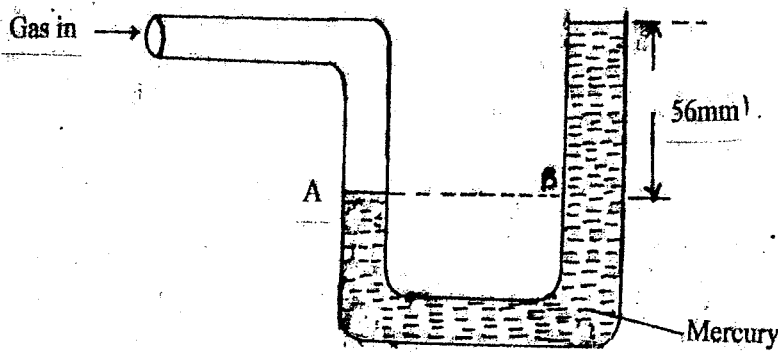
**For examiner's use only**

Section	Question number	Maximum score	Candidate score
A	1 – 15	40	
B	16	16	
	17	13	
	18	11	
	19	10	
	20	10	
<b>Total</b>		<b>100</b>	

**Section A (40 mks)**

1. A drop of olive oil is released from a burette. If the volume of the drop is  $3 \times 10^{-6} \text{ m}^3$  and that it forms a circular patch of diameter 14 cm on a water surface, estimate the diameter of the oil molecule  
3mks

2. Use the figure below to answer the questions that follow.



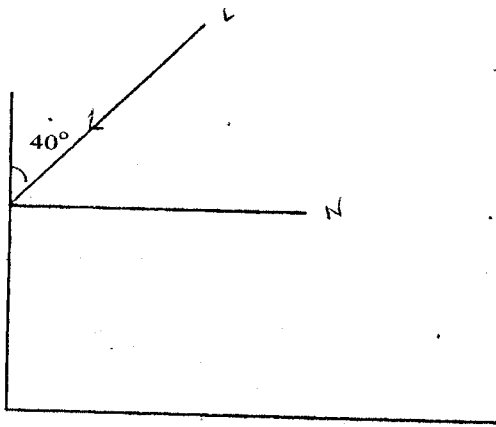
Given the atmospheric pressure to be 76cmHg, calculate the pressure of the gas in mmHg

3mks

3. State the reason why platinum is used to reinforce glass

2mks

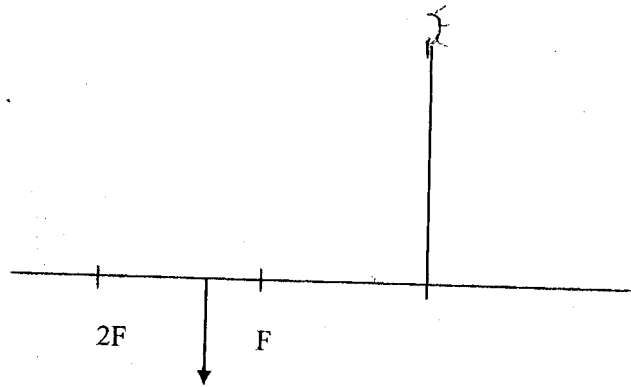
4. The diagram below shows a ray incident on a mirror placed at an angle of  $90^\circ$  to another mirror. Trace the reflected ray clearly labeling the angle of incidence and the angle of reflection 3mks



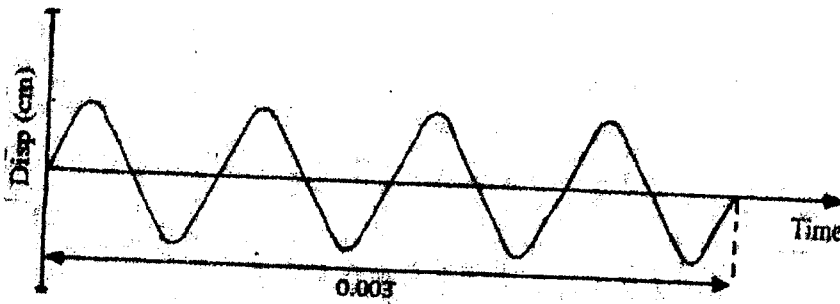
5. State a reason why repulsion is considered as the only sure way to test for magnetism 2mks

6. A uniform metal rod of length 160cm and mass 6.4kg is supported horizontally by two vertical spring balances A and B. Balance A is 40cm from one end and balance B is 60cm from the other end. Find the reading on each balance 3mks

7. The Figure below shows the image formed by a concave mirror. Using appropriate rays locate the position of the object. (Image height = 1.5cm;  $f = 3\text{cm}$ ) (3mks)



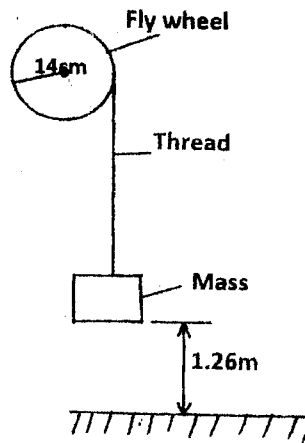
8. The diagram below shows a displacement time graph of a wave



What is the frequency of the wave form shown

(3mks)

9. The figure below shows a flywheel of radius 14cm suspended about a horizontal axis through its centre so that it can rotate freely about the axis. A thread is wrapped round the wheel and mass attached to its loose end so as to hang at a point 1.26m above the ground.



When the mass is released, it accelerates at  $0.28\text{m/s}^2$  determine the angular velocity of the wheel just before the mass strikes the ground. (4mks)

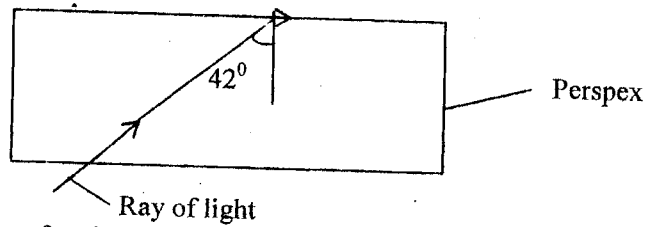
10. Salano's house has ten bulbs each rated 100w, five security lights rated 50w and an electric cooker with a resistance of  $1000\Omega$ . They operate from a mains supply of 240V. If the cost of the power is kshs 10 per unit. Calculate the cost of using the gadgets above for two hours a day for 7 days.

4mks

11. A pipe of radius 6cm is connected to another pipe of radius 9cm. if water flows in the wider pipe at the speed of 2m/s, calculate the flow rate of water in the narrow pipe 3mks

12. Draw a block and tackle system with a velocity ratio of 5 3mks

13. The figure below shows a path of a ray of light through a rectangular block of Perspex placed in air



Calculate the refractive index of Perspex

(3mks)

14. State the name and use of the radiation marked N

( 2 marks )

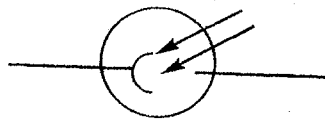
Radio waves	Micro waves	I.R	Visible light	N	X-rays	Gamma rays
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15. State two reasons why the CRO is a better instrument in measuring voltage than the Normal voltmeter

2mks

**SECTION B (60 mks)**

16. The diagram below shows a photocell



(i) Label the cathode and the anode

1mk

(ii) How are electrons produced in the cell

2mks

(iii) Draw a simple circuit including the photocell to show the direction of flow of current

2mks

(iv) The table below shows the relationship between the stopping potential  $V_s$ , and the corresponding frequency,  $f$ , of the emitted electrons

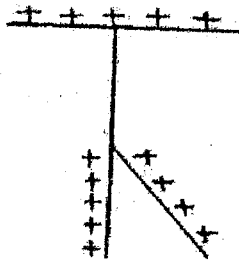
Stopping potential $V_s$ (V)	1.35	1.15	0.93	0.62	0.36
Frequency, $f$ ( $\times 10^{15}$ HZ)	7.95	7.41	6.88	6.10	5.49

a) Plot a graph of stopping potential  $V_s$ , against the frequency,  $f$ , of the emitted electrons  
5mks

b) Calculate the planks constant from the graph  
3mks

c) Determine the work function  $W_0$  of the surface used  
3mks

17. (a) The figure below shows a highly positively charged electroscope.

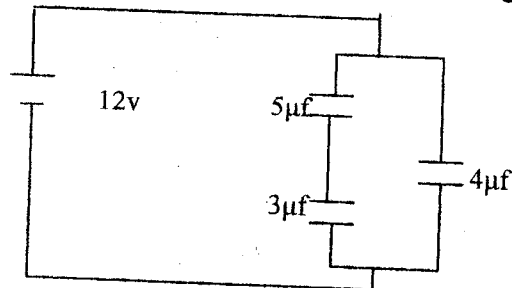


What would be observed when a neutral sharp pointed conductor A is brought near .but not touching the cap of the electroscope. Explain  
(2mks)



(b) State two factors that affect the capacitance of a parallel plate capacitor. (2mks)

(c) Figure 3 shows capacitors connected to a 12 DC voltage supply



Determine

(i) The total capacitance of the system.

(3mks)

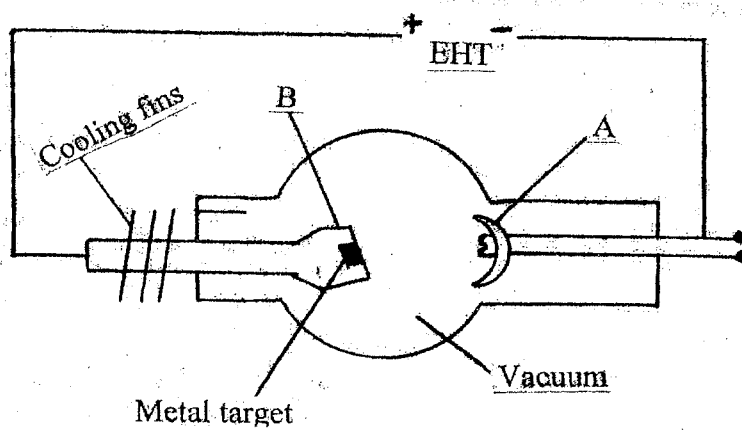
(ii) Calculate the charge stored by the  $4\mu\text{f}$  capacitor

(2mks)

(iii) Calculate the voltage drop across the  $3\mu\text{F}$  capacitor

(4mks).

18. The fig shows apparatus used to produce x – rays



Name the parts A and B

(2mks)

(b) Briefly explain how x – rays are produced in the x – ray tube. (2mks)

(c) An x – ray tube is operating with an anode potential of 10kv and a current of 10m A

(i) Explain how the intensity of x – rays from such a tube may be increased. (1mk)

(ii) Explain how the penetrating power of x – rays from such a tube may be increased.(1mk)

(iii) Calculate the number of electrons hitting the anode per second. (3mks)

(iv) Determine the velocity with which the electrons strike the target.

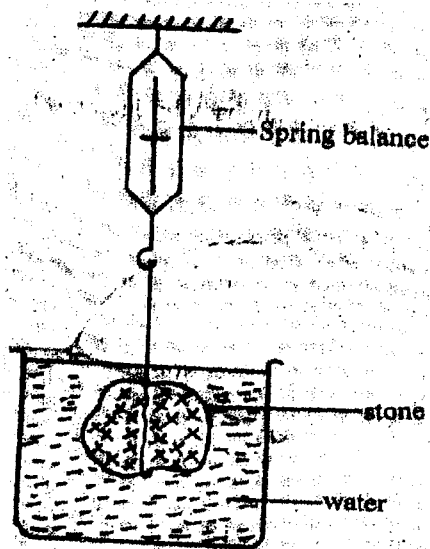
Take  $e = 1.6 \times 10^{-19}$  and  $m_e = 9.1 \times 10^{-31}$ kg.

(3mks)

19 a) state the Archimedes principle

1mk

(b) The figure below shows a stone of mass 6kg immersed in water and suspended from a spring balance with a string.



The density of the stone was  $3000\text{kg/m}^3$  while the density of water was  $1000\text{kg/m}^3$ .

Determine the:

(i) Volume of water displaced by the stone

(4mks)

(ii) Upthrust on the stone.

(3mks)

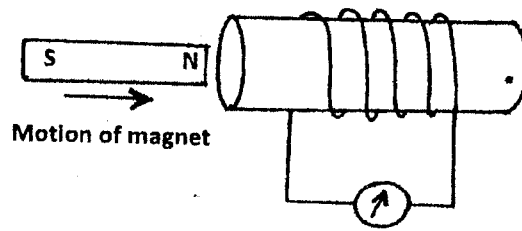
(iii) Reading of the spring balance.

(2mks)

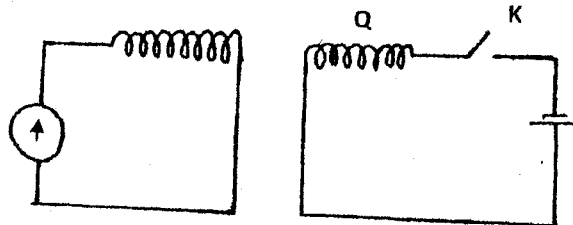
20. (a) (i) State the Lenz's law of electromagnetic induction.

(1mk)

(ii) Use the law to determine the direction of the induced current in the circuit below  
(1mk)



(b) Two identical coils P and Q are placed close to each other as shown.



(i) indicate the deflection on the galvanometer made when the switch K is closed  
1mk

(ii) Explain the reason for the deflection when the switch is closed (2mks)

(c) A student designed a transformer to provide power to an electric bell marked 48W, 12V from a 240V mains. He wound 200 turns and N turns on an iron ring. When he connected the coil of 50 turns to the bell and the N turns coil to an a.c, he found that the transformer was only 80% efficient. Find:

(i) The value of N (2mks)

(ii) The power output of the transformer

(3mks.)