Name.....Adm.No.....

Index No.....Class.....Signature.....Date.....

232/2
PHYSICS
Paper 2
MAY, 2016
2 hours

ALLIANCE HIGH SCHOOL
PHYSICS PAPER 2
PRE-TRIAL EXAMINATION

INSTRUCTION TO CANDIDATES

1. Write your name and index number in the space provided.
2. This paper consists of two sections A and B.
3. Answer **ALL** questions in section A and B in the space provided below each question.
4. Non programmable silent electronic calculators and KNEC mathematical tables may be used.
5. Where necessary take;
   Electronic charge, e = 1.6×10^{-19}C
   Velocity of light, c = 3.0×10^{8}m/s

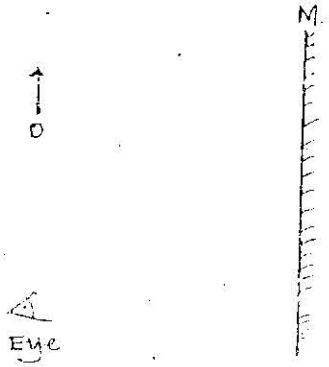
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
A	1-13	25	
B	14	12	
	15	12	
	16	11	
	17	10	
	18	10	
	Total score	80	

SECTION A (25 MARKS)

Answer All questions in this section

1. Figure 1 shows an object placed infront of a plane mirror drawn to scale.



By use of appropriate rays, draw rays to show the exact location of the image as seen by the eye (2marks)

2. In an experiment on static electricity, the gold leaf of a negatively charged electroscope was observed to fall then rise when a strongly positively charged polythene rod was gently lowered towards it. Explain this observation (2marks)

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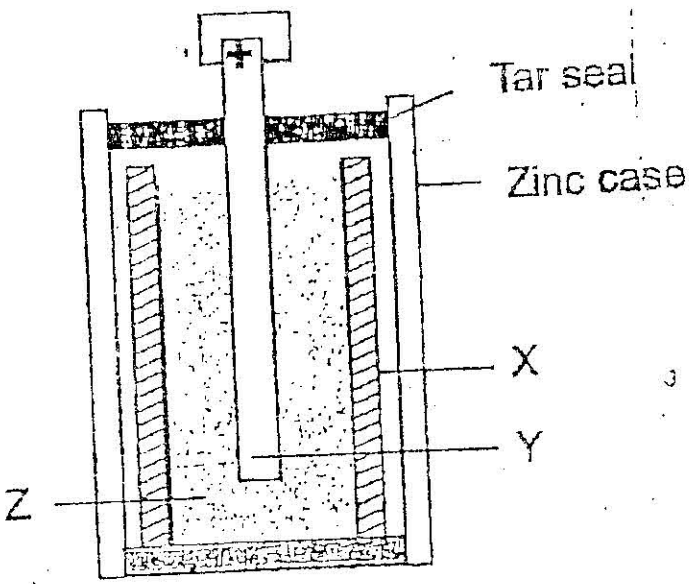
Figure 2 below shows a Leclanche cell



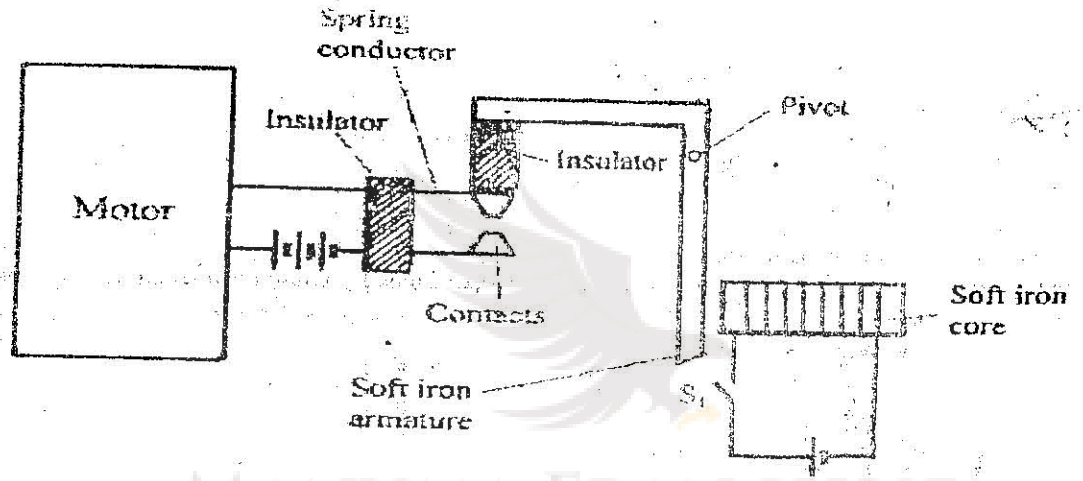
Name the parts labelled X, Y and Z

X ..... (1mark)

Y ..... (1mark)

Z ..... (1mark)

3. Figure 3 shows a schematic representation of one of the applications of an electromagnet



Briefly describe how the circuit works (2marks)

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4. Distinguish between X-rays and Gamma rays (1mark)

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5. One of the primary ways in which power is lost in transformers is through hysteresis loss. Describe how the power is lost in this way and how it can be minimized (2marks)

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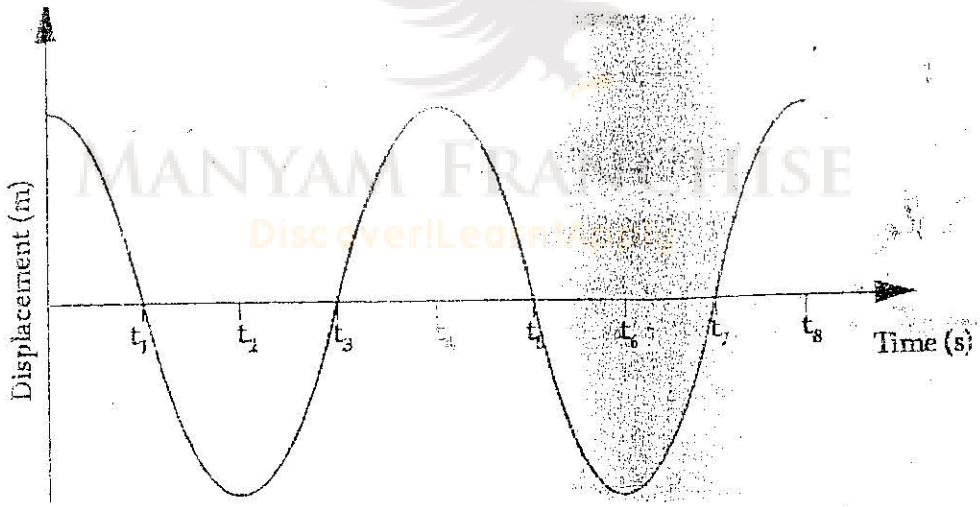
6. Figure 4 shows a wave profile for a wave whose frequency is 2Hz.



Determine the numerical value of t_5 (1marks)

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7. The half-life of a radioisotope is 5.27 years. Calculate the number of years it will take for 75% of a given mass of the isotope to decay (2marks)

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8. Figure 5 below shows an a.c signal fed across the Y- plates of a cathode ray oscilloscope (CRO). The time base is set at 100ms/cm and the Y- gain at 120V/cm.

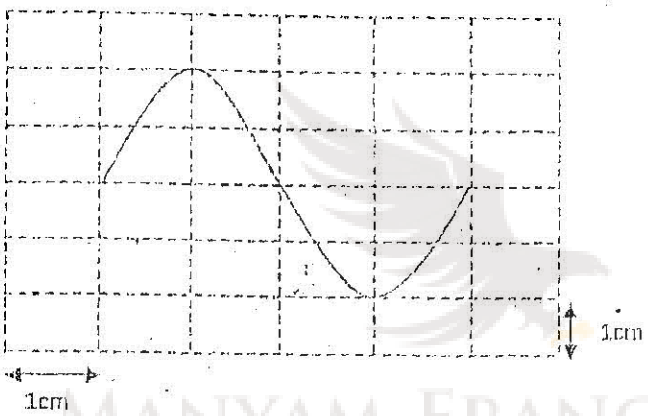

Figure 5

Determine the:

i. The frequency of the a.c signal (2marks)

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ii. Peak voltage (1mark)

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10. An accelerating potential of 10kV is applied across the terminals of an X-ray tube. Calculate the velocity of the ejected electrons (2marks)

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11. The circuit in figure 5 below consists of a source of electromotive force, a switch, two bulbs and two devices D_1 and D_2.

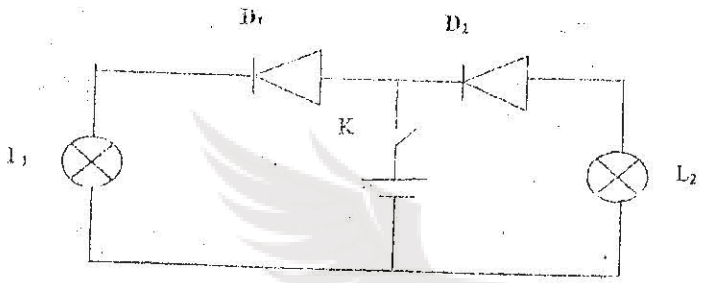

Figure 5

i. Identify the devices D_1 and D_2 (1mark)

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ii. State and explain the observation made when the switch K is closed (2marks)

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11. Figure 7 shows an image of an object placed infront of a convex lens drawn to scale.

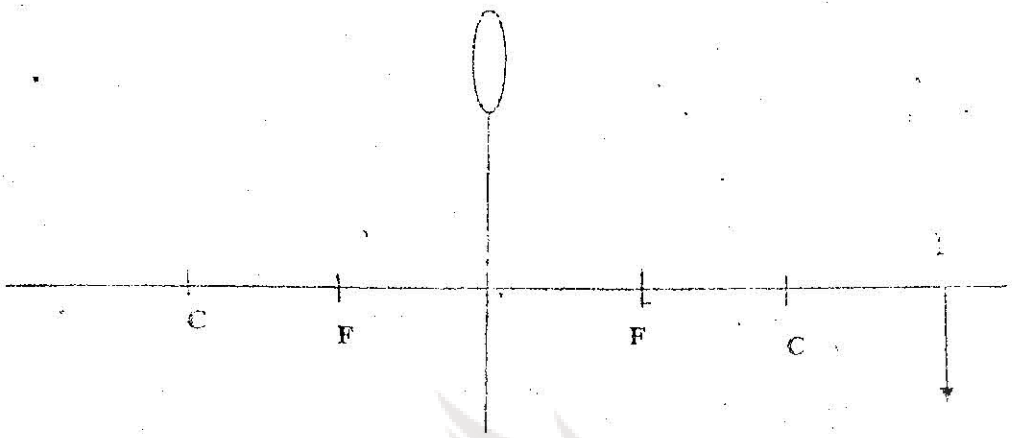

Figure 7

By using appropriate rays, locate the position of the object (2mark)

12. In figure 8 below, the total charge in the circuit is 2.0×10^{-4}C.

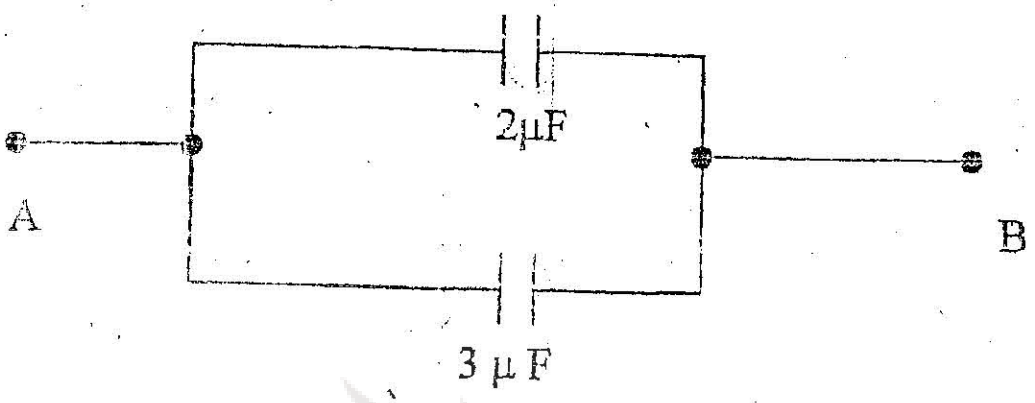

Figure 8

Determine the potential difference across AB (2marks)

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SECTION B (55 MARKS)

Answer ALL questions in this section

13. a) Define the term electromotive force as used in current electricity (1mark)

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b) In the circuit diagram of figure 9 below, the total internal resistance of the battery is 0.5Ω and the ammeter has a resistance of 1Ω.

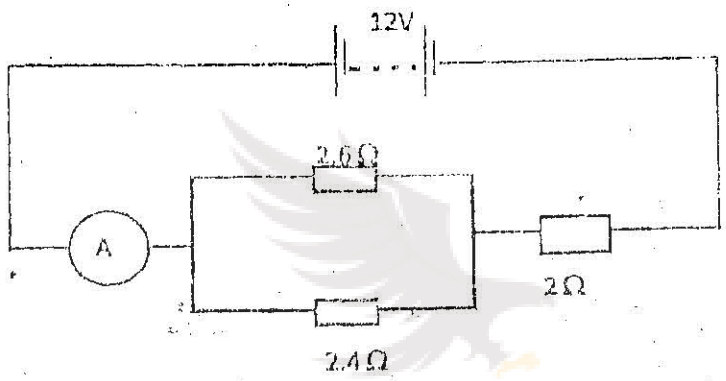

Figure 9

Determine

i. the total resistance in the circuit (2marks)

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ii. the current flowing in the circuit through A (2marks)

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iii. the current through the 2.4Ω resistor (3marks)

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iv. the reading on a voltmeter of infinite resistance placed across the battery (1mark)

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14. a) Define the term activity of a sample as used in radioactive decay study (1mark)

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b) Figure 10 below is a schematic diagram of Geiger-Muller tube used in radioactivity experiments.

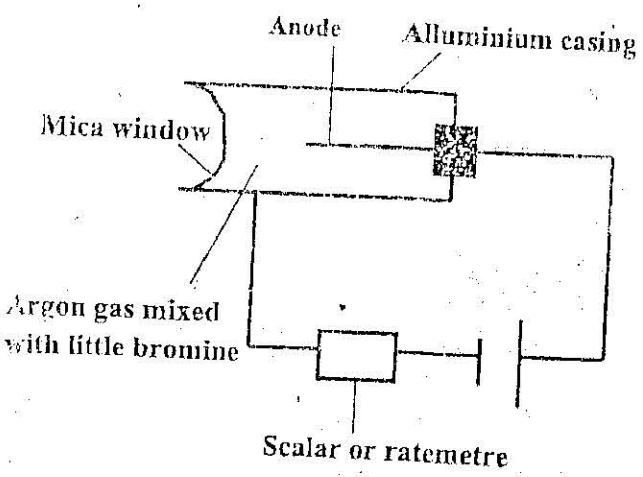

Figure 10

i Give a reason for making the mica window thin (1mark)

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ii. Describe how the radiations entering through the mica window in the tube is detected (3marks)

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iii. State the function of the resistor R (1mark)

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c) The tracks in figure 11 were observed in a Diffusion cloud chamber.

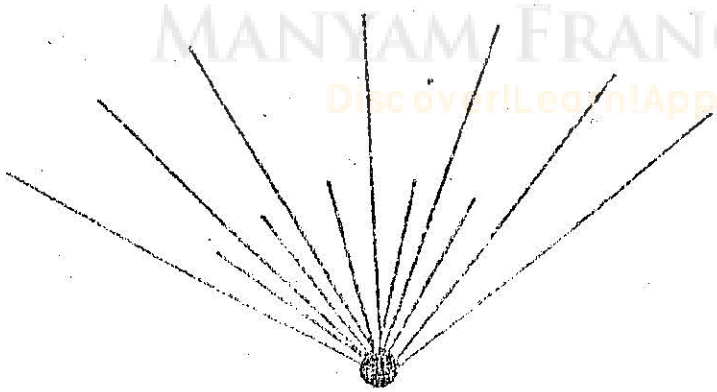

Figure 11

Identify the radiation giving a reason for your answer (2marks)

Radiation .....

Reason

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d) Figure 12 shows a graph of the rate of decay of a radioactive isotope

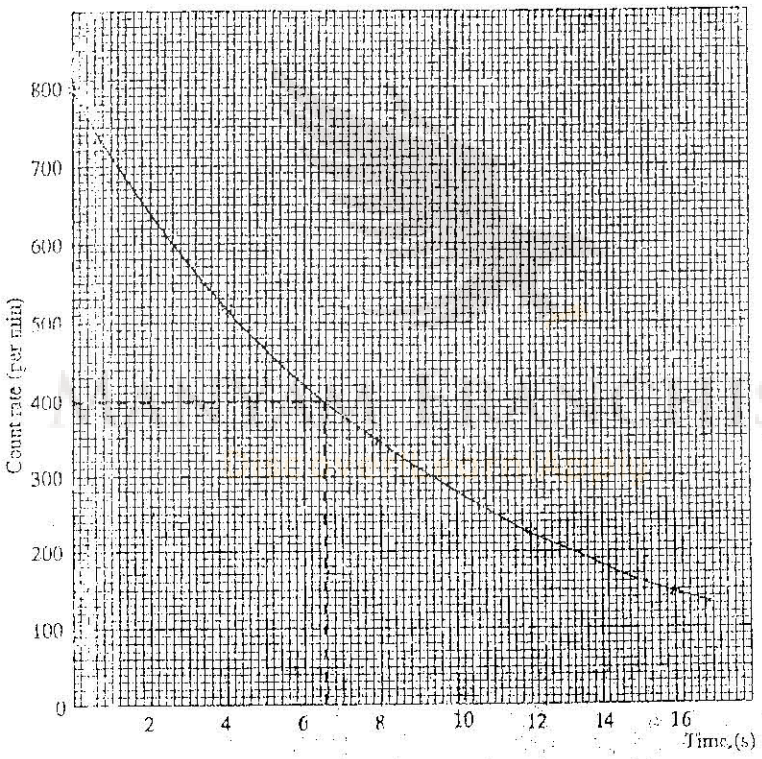

Figure 12

i. determine the half-life of the sample (1marks)

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ii. Given that the background radiation is 15 counts per minute, determine the activity of the sample at the 8th second (2marks)

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15. a)Define capacitance (1mark)

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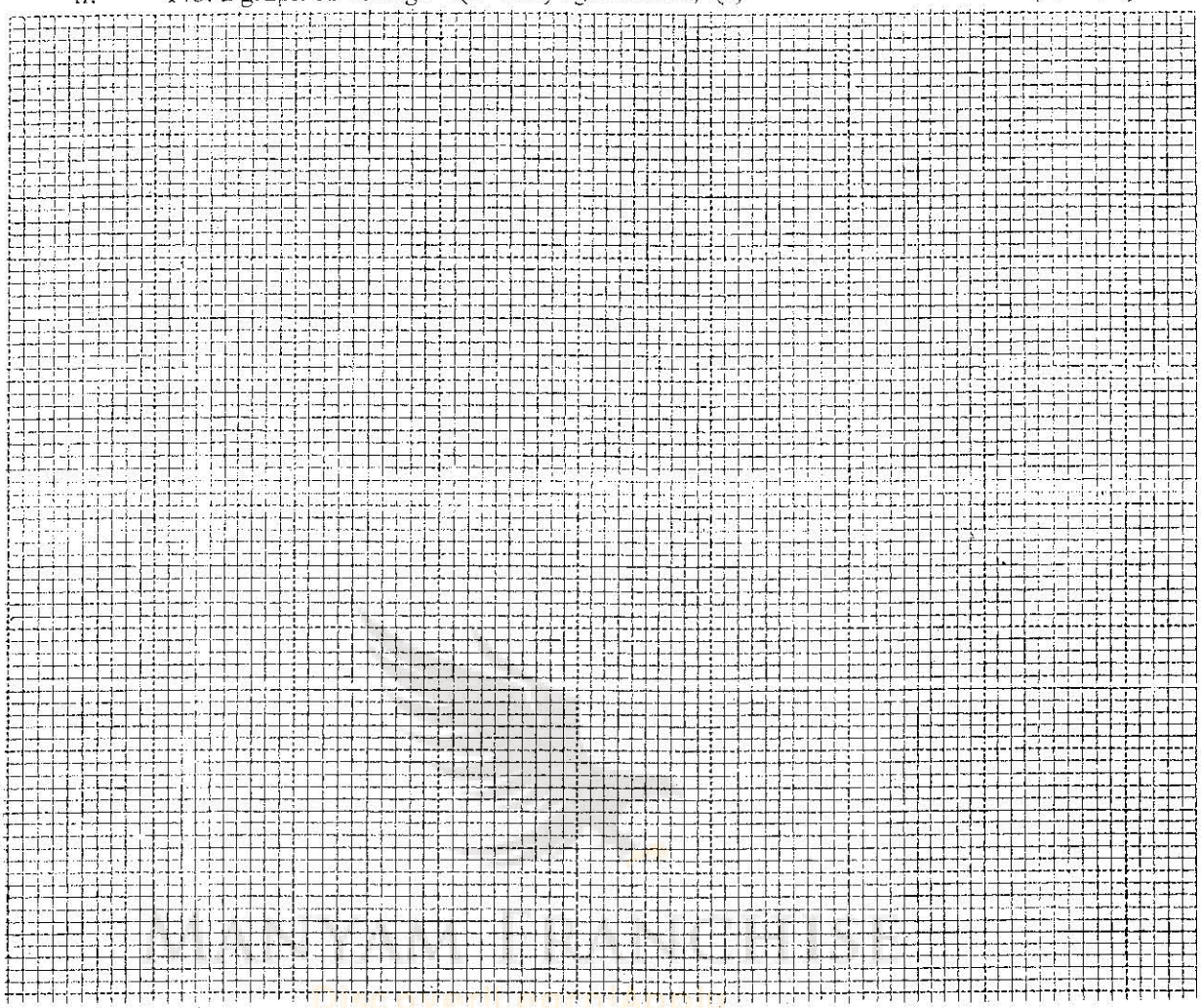
b) In an experiment to determine the relationship between the voltage V, and time t, for a capacitor of capacitance C=2200μF to discharge, the results in table 1 were obtained.

Table 1

Voltage, V (v)	2.5	2.25	2.0	1.75	1.50	1.25
Time, t(s)	**2.49**	3.51	5.12	5.90	7.48	9.12

i. Draw a possible circuit that could have been used to obtain the results in table 1 (2marks)

ii. Plot a graph of voltage V(Y-axis) against time, t(s) (5marks)



From the graph determine

I. The maximum voltage V_0 across the capacitor (1marks)

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II. The half-life $t_{1/2}$ of the voltage decay (1marks)

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III. The resistance R of the voltmeter given that t=0.693CR (2marks)

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16. a) State Faraday's law of electromagnetic induction (1mark)

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b) Figure 13 shows a coil in a magnetic field. The coil rotates in the direction shown to produce a current.

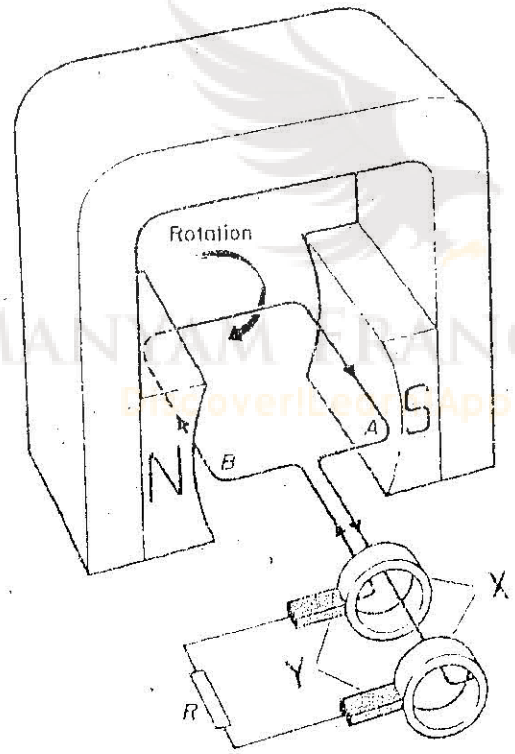

Figure 13

i. name the parts labelled X and Y (2marks)

X .....

Y .....

ii. On the axes of figure 14 below, sketch a graph of electromotive force (e.m.f) produced with time assuming the coil was initially in a vertical position and rotates in the direction shown.
(2marks)

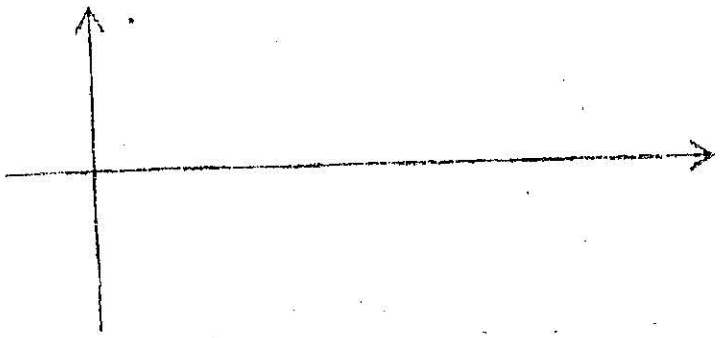

Figure 14

iii. Suggest the modifications recommended if the set up was to be used to produce direct current
(2marks)

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c) A transformer supplies a current of 13.5 A at a voltage of 48 V to a motor from a.c mains supply of 230V. Given that the transformer is 80% efficient, calculate

i. The power loss (2marks)

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ii. The current in the primary (2marks)

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17. a) Define stopping potential as applied in photoelectric effect (1mark)

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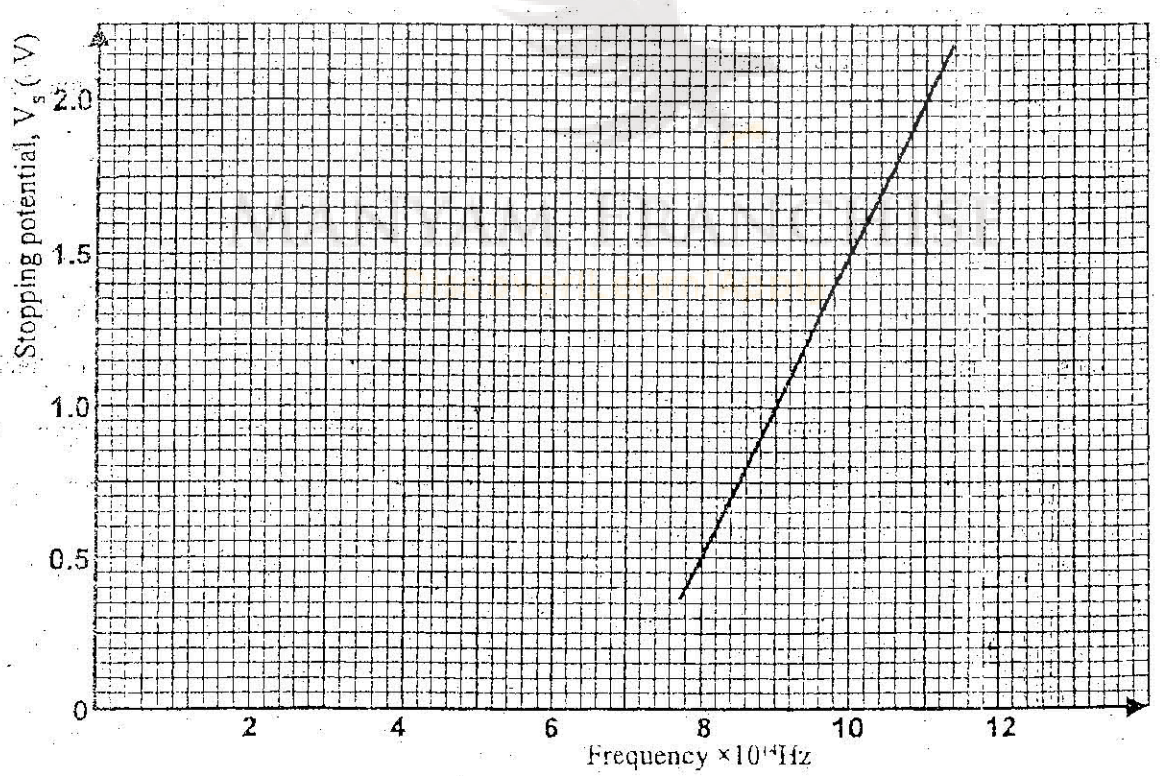
b) The graph in figure 15 shows the relation between the stopping potential V_s and the frequency, f, when a certain metal surface is irradiated with light of different frequencies.



i. draw a circuit diagram that was used to obtain the results used to plot the graph (3marks)

ii. from the graph determine

I. the threshold frequency (1mark)

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II. Planck's constant h given that electronic charge e = 1.602×10^{-19}C (3marks)

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III. The work function of the metal used (2marks)

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THE END