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232/2

Physics

Paper 2

March / April 2017

# MOI HIGH SCHOOL - KABARAK

## END OF TERM ONE EXAMINATION - 2017

Kenya Certificate of Secondary Education (KCSE)

Physics Paper 2

### Instructions to candidates

- This paper consists of two sections *A* and *B*.
- Answer **all** the questions in the two sections in the spaces provided after each question
- All working **must** be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers **should be expressed** in the **decimal** notations.

### For Examiner use only

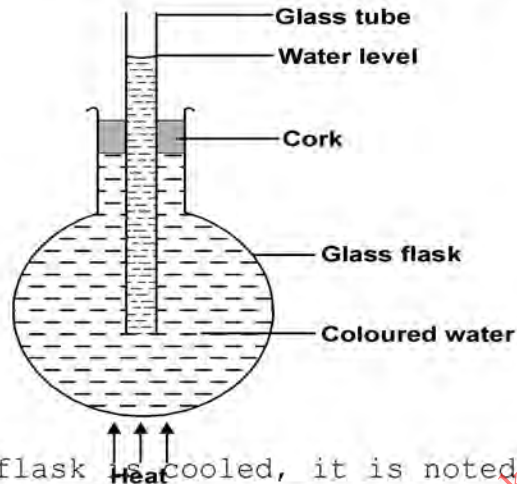
SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
<b>A</b>		<b>25</b>	
<b>B</b>		<b>55</b>	
<b>TOTAL</b>		<b>80</b>	

*This paper consists of 13 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION A (25 MARKS)**

**Answer all questions**

1. The **FIGURE 1** below shows a flask filled with coloured water. The rubber cork is pushed in until the water rises a short distance in the glass tube.



When the flask is cooled, it is noted that the level of water first rises before it starts to drop. Explain this observation. (1 mark)

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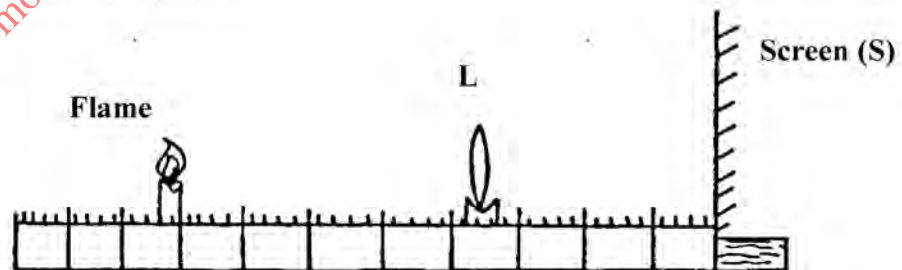
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2. **FIGURE 2** below shows an experimental set up consisting of a mounted lens, L, A screens, a metre rule and a candle



- i) Describe how the set up may be used to determine the focal length  $f$ , of the lens.

(3 marks)

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ii) State why the set up would not work if the lens were replaced with a diverging lens.  
(1 mark)

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3. The receiving part of a TV aerial should have a length equal to half the wavelength of the incoming waves. What is the ideal aerial length for reception of TV transmission of frequency 400MHz. (Speed of radio waves =  $3 \times 10^8$ m/s)  
(3 marks)

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4. An uncharged metal rod brought close but not touching the cap of a charged electroscope causes a decrease in the divergence of the leaf. Explain. (1 mark)

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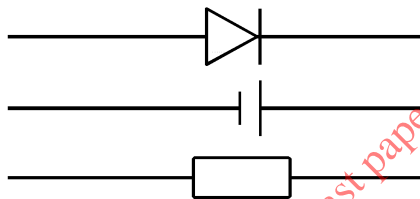
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5. Using the components symbols shown in the **FIGURE 3**, sketch a series circuit diagram for a forward biased diode. (2marks)



6. Explain how polarization reduce current in a simple cell (1 mark)

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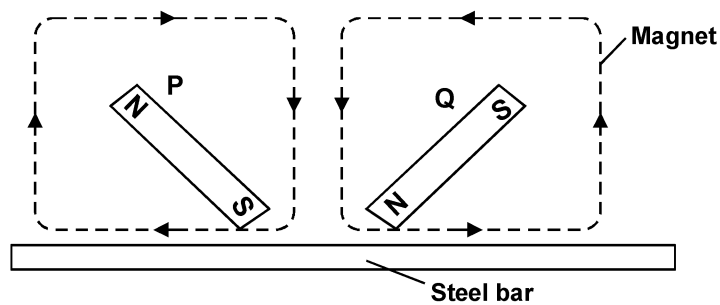
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7. The **FIGURE 4 below** shows two magnets being used to

strike a steel bar.



Identify the method of making magnets represented by the diagram. (1 mark)

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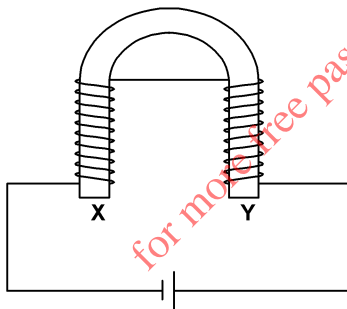
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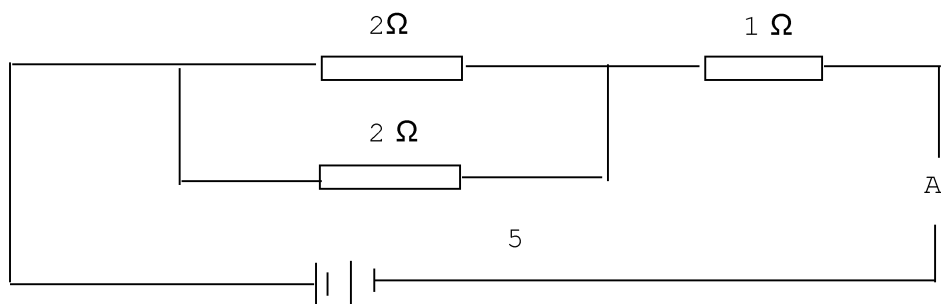
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8. The **FIGURE 5** shows an electromagnet. State the polarities at X and Y. (2 marks)

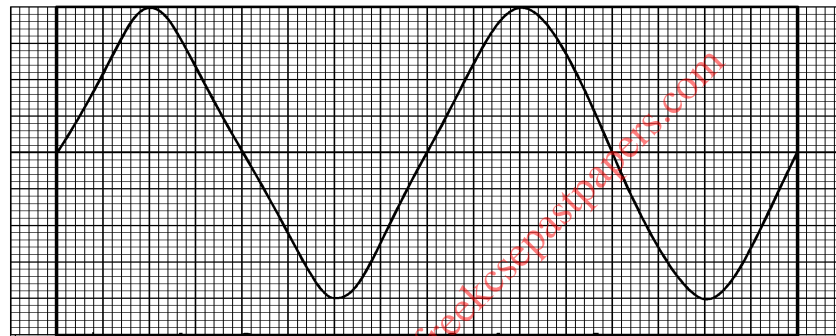


9. Determine the ammeter reading in the **FIGURE 6** below assuming the cell has a negligible internal resistance. (3 marks)



3V

10. The graph in **FIGURE 7** shown was obtained on a cathode ray oscilloscope (CRO) screen when the output of an a.c. generator was connected to the input of the CRO. The time-base calibration of the CRO was set at 20 milliseconds per centimetre and the y-gain at 5 volts centimetre.



Determine the frequency of the voltage  
(2 marks)

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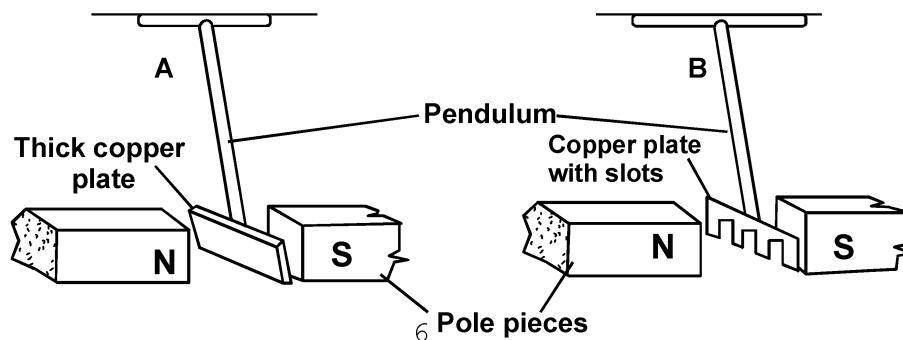
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11. Pendulum A and pendulum B are freely suspended between the poles of identical magnets. Pendulum A is made of thick copper plate while B is made a copper plate with slots.



**Fig 8**

**Fig 9**

When the two are set to swing, it is observed that A slows down faster than B. Explain this observation.

(2 marks)

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12. Give a reason why theatre halls are covered with soft perforated materials. (1mark)

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13. A boy watching fireworks display sees the light from an explosion and hears the sound 2.5 seconds later. Determine how far is the explosion. (Speed of sound in air 330m/s).

(2 marks)

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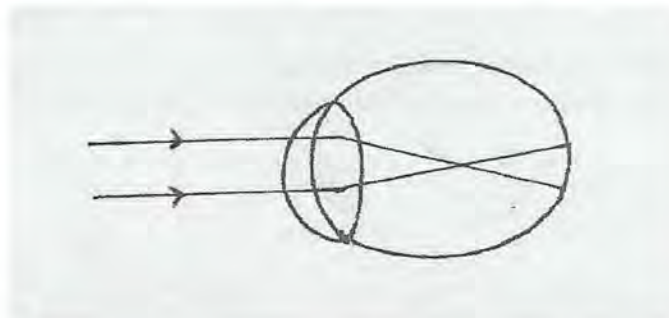
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14. **FIGURE 9** below shows an eye defect



Use a ray diagram to show how the defect above could be corrected. (2 marks)

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**SECTION B ( 55 MARKS)**

15. Water waves are produced in a ripple tank. The following is an example of the wave from that was observed.



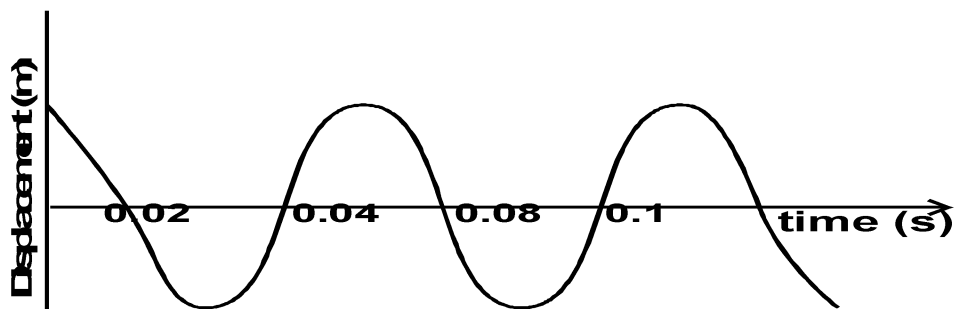


Fig 10

- (a) (i) From the graph determine the frequency of the wave. (2 marks)

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- (ii) Derive an equation relating velocity of a wave, frequency and wavelength. (2 marks)

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- (b) Ultrasound scanning can be used by doctors to obtain information about internal structure of human body without the need of surgery.

Pulses of ultrasound are sent into the body from the transmitter placed on the skin.

(i) The ultrasound used has a frequency of 4.5MHz.

State why waves of this

frequency are called ultrasound.

(1 mark)

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(ii) A pulse of ultrasound enters the body and its reflection returns to the

transmitter after a total time of  $1.6 \times 10^{-4}$ s.

Calculate how far the reflecting

surface is given that the average speed of

ultrasound in a body =  $1500 \text{ms}^{-1}$

(3 marks)

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(iii) State why the ultrasound sources are transmitted in pulses. (1 mark) ----

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16. a) An object O placed in front of a converging lens  $L_o$  forms an image I on the other side of the lens. Another converging lens  $L_e$  is placed such that the two lenses form a compound microscope.

(i) Draw a ray diagram of the set up and sketch the rays to show how the final image is formed.

(5 marks)

(ii) What is meant by virtual image?  
(1 mark)

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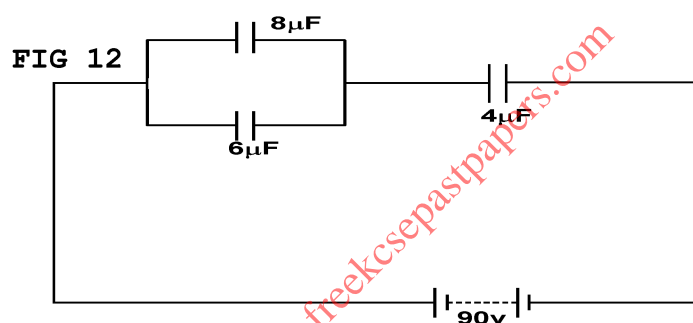
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(c) Three capacitors A, B and C are connected as shown in the figure.



Calculate

- (i) the charges on each capacitor.  
(2 marks)

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- (ii) the potential difference across each capacitor  
(2 marks)

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18. (a) (i) State the Lenz's law.  
( 1 mark)

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- (ii) State Faraday's law.  
(1 mark)

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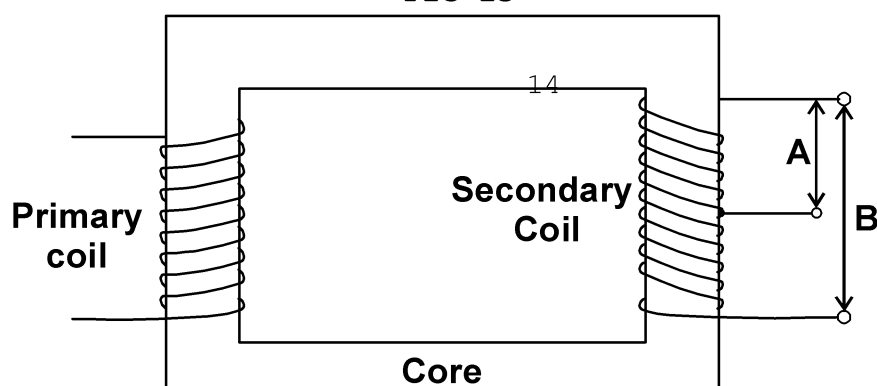
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- (b) The transformer has two outputs labelled A and B on the right hand diagram.  
Complete the table below to show number of turns and output voltage of each coil.  
( 2marks)

**FIG 13**



Input voltage	Primary turns	Secondary turns	A or B	Output voltage
230V	5000	2500		
230V	5000	5000		

(c) In a laundry four electric irons each rated 750W, 240V are connected to the 240V mains supply using a 13A fuse.

- (i) Can the 13A fuse be suitable for the circuit when all the electric irons are being used (support your answer) (3 marks)

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- (ii) Calculate the cost of using all the electric irons everyday for 3 hours. If the cost of

electricity is shs 15.00 per kilowatt hour.  
(3 marks)

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19. a) State the conditions necessary for total internal reflection to occur.  
(2 marks)

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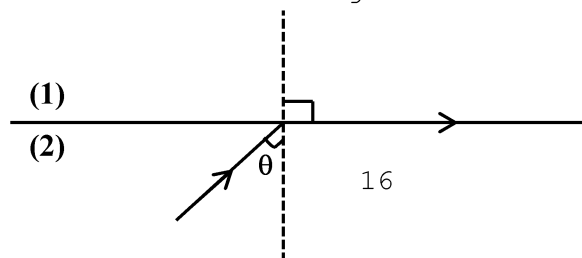
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- b) The **figure 14** below shows a ray of light incident on the boundary between two media 1 and 2 at an angle  $\theta$ .





Show that the refractive index for a ray of light travelling from medium 1 and medium 2 is given by  $n = \frac{1}{\sin \phi}$  (3 marks)

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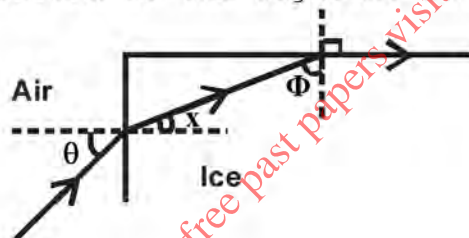
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- c) The **figure 15** below shows a ray of light incidence on one face of a block of ice of refractive index 1.31 and totally reflected at the adjacent face.



Determine:

- i) Angle  $\theta$   
(2 marks)

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ii) Angle  $x$  (2 marks)

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iii) Angle  $\theta$ , the greatest angle for which the total internal reflection is possible. (2 marks)

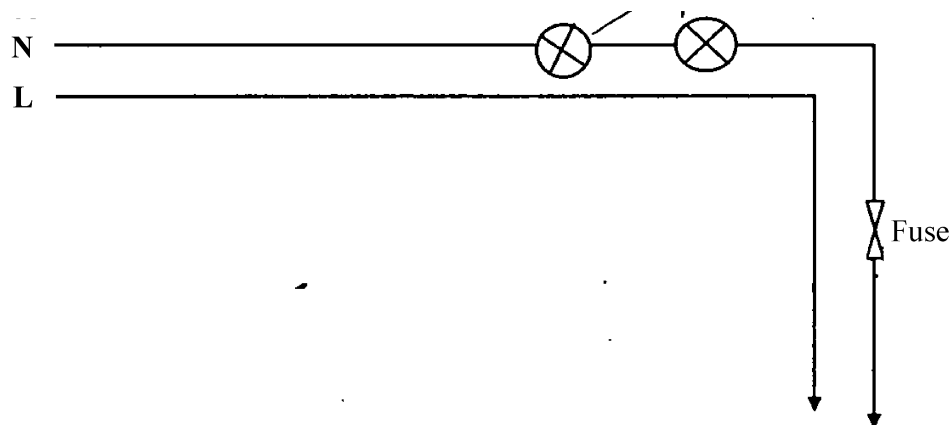
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20. a) The mains electricity is transmitted through high tension voltage (H.T). State **one** danger of this transmission. (1 mark)

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b) The **figure 16** shows a section of a domestic wiring. **Bulbs**





- i) Identify **two** serious mistakes in the circuit.  
(2 marks)

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- ii) Explain why the circuits in domestic wiring should be connected in parallel with the main supply.  
(1 mark)

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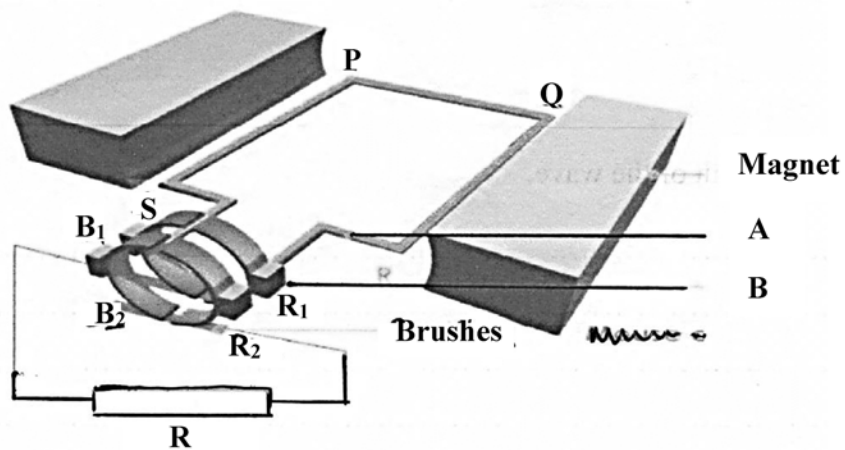


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- c) Study the **figure 17** shown below



- i) State the name of the machine shown in **figure 17** above. (1 mark)

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- ii) What are the names of the parts labelled A and B? (2 marks)

A 

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B 

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- d) What would be the effect of doubling the number of turns of the coil if the speed of rotation remained unchanged? (1 mark)

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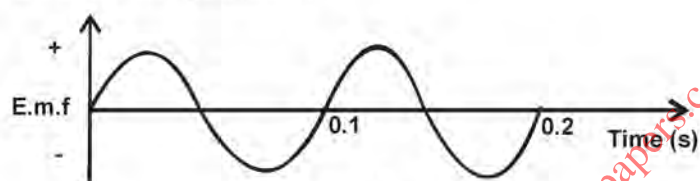


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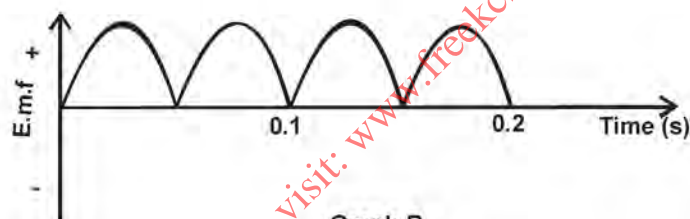


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d) The voltage-time signals obtained is as shown in the **figure 18** below in graph A



Graph A



Graph B

i) Find the frequency of the alternating E.m.f shown by graph A. (2 marks)

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ii) What alterations have been made to the machine in c) above to produce the emf represented by graph B? (1 mark)

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