

## PHYSICS PAPER 232/2 K.C.S.E 1999.

- 1 a) Distinguish between longitudinal and transverse waves  
 Longitudinal waves -                      Transverse waves -
- b) In the Young's double slit experiment, an interference pattern of bright and dark fringes was formed as shown in figure 1 by light of wavelength  $\lambda$  coming from two narrow slits X and Y.

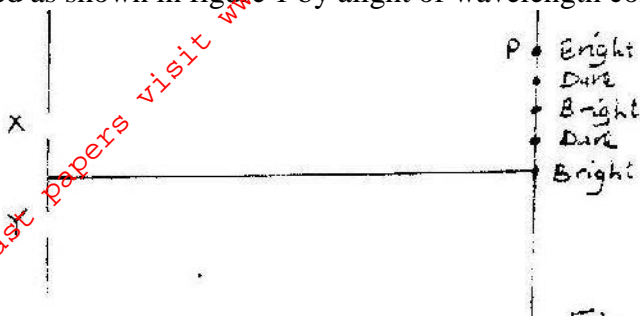


Fig. 1

- i) Write an expression for the path difference between XP and YP where corresponds to the 2<sup>nd</sup> bright fringe.
- ii) Explain how the dark and bright fringes are formed.
- iii) State and explain what would be observed on the screen if the slits X and Y were made large.
- c) Figure 2 represents a displacement – time graph for a wave.

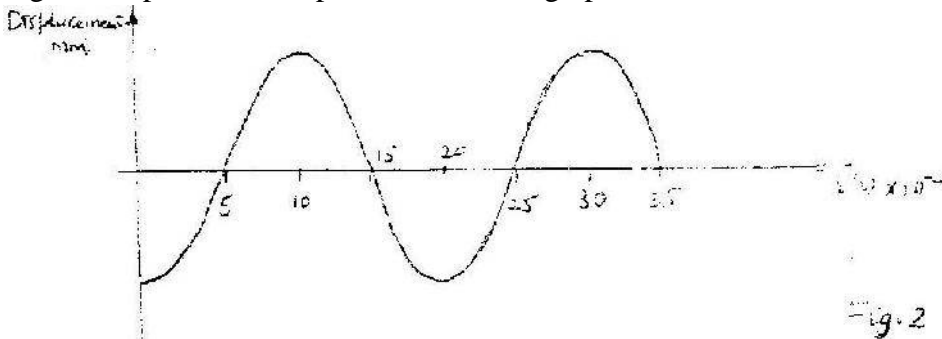


Fig. 2

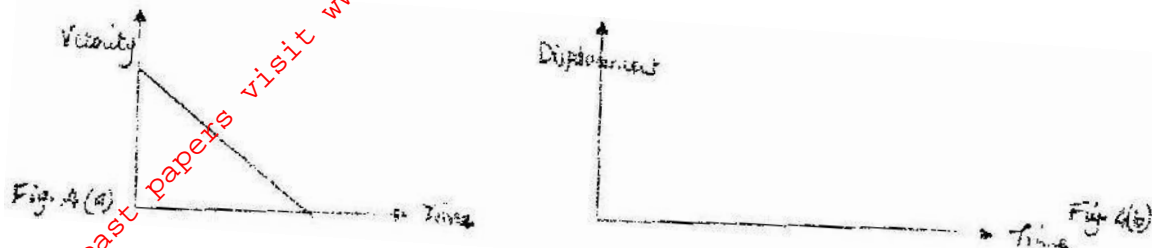
- i) Determine the frequency of the wave.
- ii) Sketch on the same axes, the displacement – time graph of a wave of the same frequency but 180° out of phase and with a smaller amplitude.
- 2 a) An object O placed in front of a converging lens L<sub>o</sub> forms an image I on the other side of the lens. Another converging lens L<sub>c</sub> 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.
- ii) Give a reason why the focal length of L<sub>o</sub> must be greater than that of L<sub>c</sub>.
- b) An object is placed 30cm from a converging lens. A focused image is formed on a screen placed 30cm from the same lens on the other side. The screen is now moved 5cm towards the lens. Determine the distance the object must be moved so that a focused image is formed on the screen.
3. A tape attached to a moving trolley is run through a ticker timer. Figure 3 shows a section of the tape after running.



**Figure 3.**

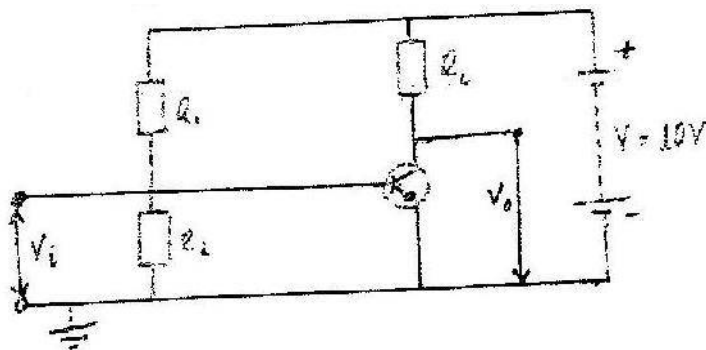
If the frequency of the ticker – timer is 50Hz, determine the:

- i) Average velocity at intervals AB and CD.
  - ii) A average acceleration of the trolley.
- b) A stone is released from a height, h. if the acceleration due to gravity is g, derive an expression of the velocity of the stone just before hitting the ground.
- c) Figure 4 (a) shows a velocity – time graph of an object in motion.



Sketch on the axes provided in figure b4 (b), the displacement – time graph of the Motion (Motion upwards is taken as positive.

4. Figure 5 represents a simple voltage amplifier circuit.



**Figure 5**

- a)
  - i) Identify the transistor in the circuit.
  - ii) Explain how the base bias is produced.
  - iii) Describe how an alternating signal that is fed in the input  $V_1$  is amplified.
- b) When a signal is fed in the input, the collector current is 2.5mA. If the current gain is 62.5 and the voltage across the transistor ( $V_{CE}$ ) is 4.5V determine the :
  - i) Power rating of the heater
  - ii) Current flowing in the circuit.
- 5a) A circuit consists of a battery, a metal wire, an ammeter and a switch connected in series. The switch is closed and the ammeter reading noted. The metal wire is now heated. State the observations made on the ammeter reading and give a reason for your answer.
- b) An electric heater is made of a wire of resistance  $100\Omega$  and connected to a 240V mains supply. Determine the:
  - i) Power rating of the heater
  - ii) Current flowing in the circuit.
  - iii) Time taken for the heater to raise the temperature of 200g of water from  $23^\circ\text{C}$  to  $95^\circ\text{C}$ . (Specific heat capacity of water is  $4200\text{J K}^{-1}$ )
  - iv) Cost of using the heater for two hours a day for 30 days. (The power and lighting company charges Kshs 5.00 per kilowatt – hour).

## SECTION II

- 6a) Explain the following observations: ice cube float on water and solid

benzene sinks in liquid benzene.

- bi) You are provided with the following:
- An overflow can
  - A beaker
  - A spring balance
  - A metal block
  - Water and
  - String

Describe an experiment to verify Archimedes principle.

- ii) A block of wood weighing 2.0N is held under water by a string attached to the bottom of a container. The tension in the string is 0.5N. Determine the density of the wood.
- ci) Define half – life of a radioactive material.
- ii) Figure 6 shows a graph of the variation of the number of atoms of a certain radioactive material with time.

Figure 6: Determine the half – life of the material

- 7a) Figure 7 shows a photoelectric cell circuit:

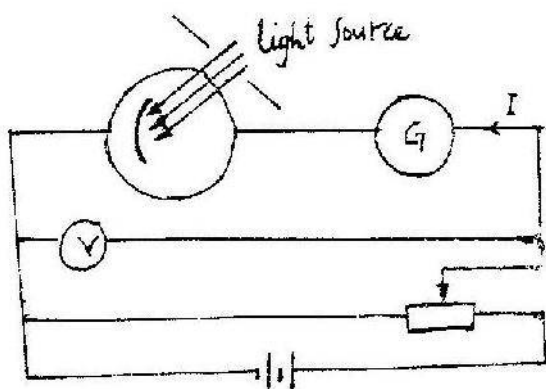


Fig. 7

The intensity of the light can be varied.

- i) Describe how the circuit may be used to show how the current  $I$  varies with the potential difference  $V$  across the cell.
- ii) Sketch on the same axis graphs of  $I$  versus  $V$  for three different values of light intensity  $E_1, E_2$  and  $E_3$  such that  $E_3 > E_2 > E_1$
- b) Using a circuit similar to the one in figure 7. with the polarity of the batteries reversed, the frequency, of the light was varied at constant intensity. For each frequency, the potential difference was varied until the current was equal to zero. The value of this voltage,  $V_{co}$  was noted. The graph in figure 8 shows the relation between  $V_{co}$  and the frequency, of the incident light. From the graph, determine the:
- i) Value of planks constant,  $h$  (charge an electron  $e = 1.6 \times 10^{-19}$  Colubomb)
- ii) Work function,  $\phi$ , of the cathode surface of the cell . (Give your answers to 2 decimal places.)