REVISION K.C.S.E PHYSICS
PAST PAPERS AND MARKING SCHEMES

PHYSICS PAPER 1 1995

1. Name the instrument that would be most suitable for measuring the thickest of one sheet of this question paper. (1 mk)

   Figure 1 shows a worker ready to lift a load wheelbarrow

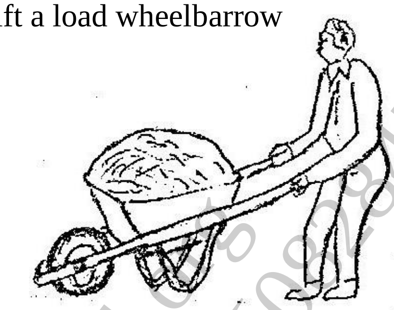


Fig.1

   Use the figure to answer questions 2 and 3

2. Indicate and label on the diagram three forces acting on the wheelbarrow when the person is just about to lift the handlebars (2 mks)

3. Suppose the handle bars of the wheelbarrow in question 2 were extended, which force(s) would change and how? (2 mks)

   Figure 2 shows a liquid being siphoned from one beaker to another. Refer to this diagram where answering questions 4, 5 and 6

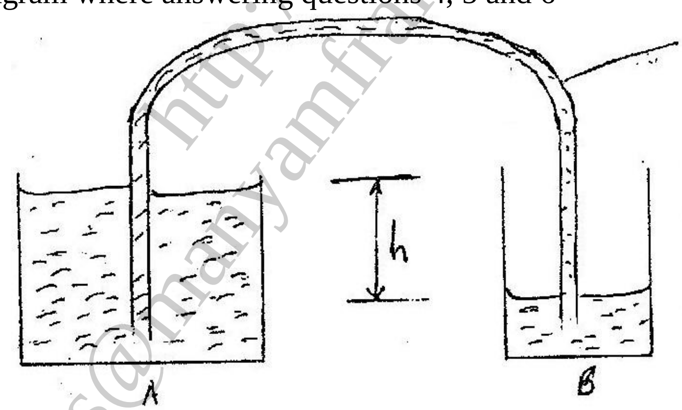


Fig. 2

4. Indicate on the diagram the direction of flow of the liquid (1 mk)

5. Show that the force driving the liquid through the U – tube is proportional to the height, h (3 mks)

6. State what would happen to the flow if the system in figure 2 were put in vacuum (1 mk)

7. State the assumption made when calculating the size of a molecule in the thin oil film experiment (1mk)

8. One property of a liquid that is considered while construction a liquid – in – glass thermometer is that the liquid expands more than the glass for the same temperature change. State any other two properties of the liquids that are considered (2 mks)

9. What property of light is suggested by the formation of shadows? (1 mk)

10. In the set up shown in figure 3, water near the top of the boiling tube boils while at the bottom it remains cold.

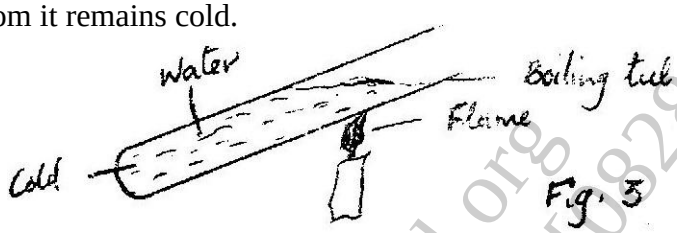


Fig. 3

Give a reason for the observation (1mk)

11. You are provided with a charged electroscope, an insulator and a conductor. Describe how you would use these apparatus to distinguish in the insulator from the conductor (2 mks)

12. State two advantages of an alkaline battery over a lead acid battery (2 mks)

13. The diagram in figure 4 shows two glass tubes of different diameters dipped in water

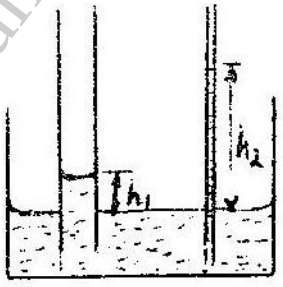


Fig. 4

Explain why h_2 is greater than h_1 (3 mks)

14. The force on a conductor carrying a current in a magnetic field can be varied by changing, among others, the magnitude of the current and the magnetic field strength. Name two other factors that can be changed to vary the force. (2 mks)

15. Give a reason why attraction in magnesium is not regarded as a reliable method of testing for polarity. (1 mk)

16. State two ways by which the frequency of a note produced by a given guitar wire may be increased

17. The diagram in figure 5 shows a beam negligible weight balanced by constant forces P and Q.

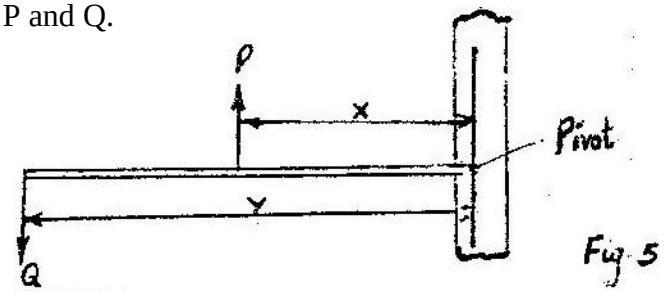


Fig 5

Derive the relationship between x and y (2 mks)

18. Light travels through glass of refractive index 1.5 with a speed v. Calculate the value of v (speed of light in air = 3.0×10^8 m/s) (3 mks)

19. In an experiment using a ripple tank the frequency, f, of the electric pulse generator was reduced to one third of its value. How does the new wavelength compare with the initial wavelength? Explain your answer. (3 mks)

20. A ray of light incident on the surface of a glass prism is observed to behave as represented in the diagram in figure 6

Fig. 6

Explain this observation (3 mks)

21. State Newton's first law of motion (1mk)

22. Distinguish between heat capacity and specific heat capacity of a body (1 mk)

23. Figure 7 represents a tube through which a liquid is flowing in the flowing in the diagram shown by the arrow

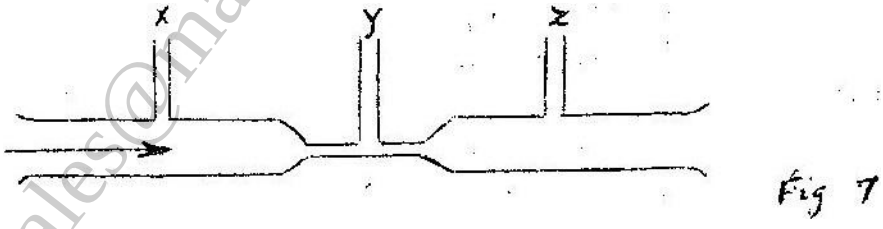


Fig 7

Show on the diagram the relative positions of the levels of the liquid in section marked x, y and z

24. Figure 8 represents two parallel plates of a capacitor separated by a distance d. Each plate has an area of A square units

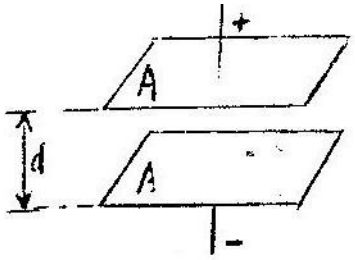


Fig. 8

Suggest two adjustments that can be made so as to reduce the effective capacitance

25. Name the property of light that shows that it is a transverse wave

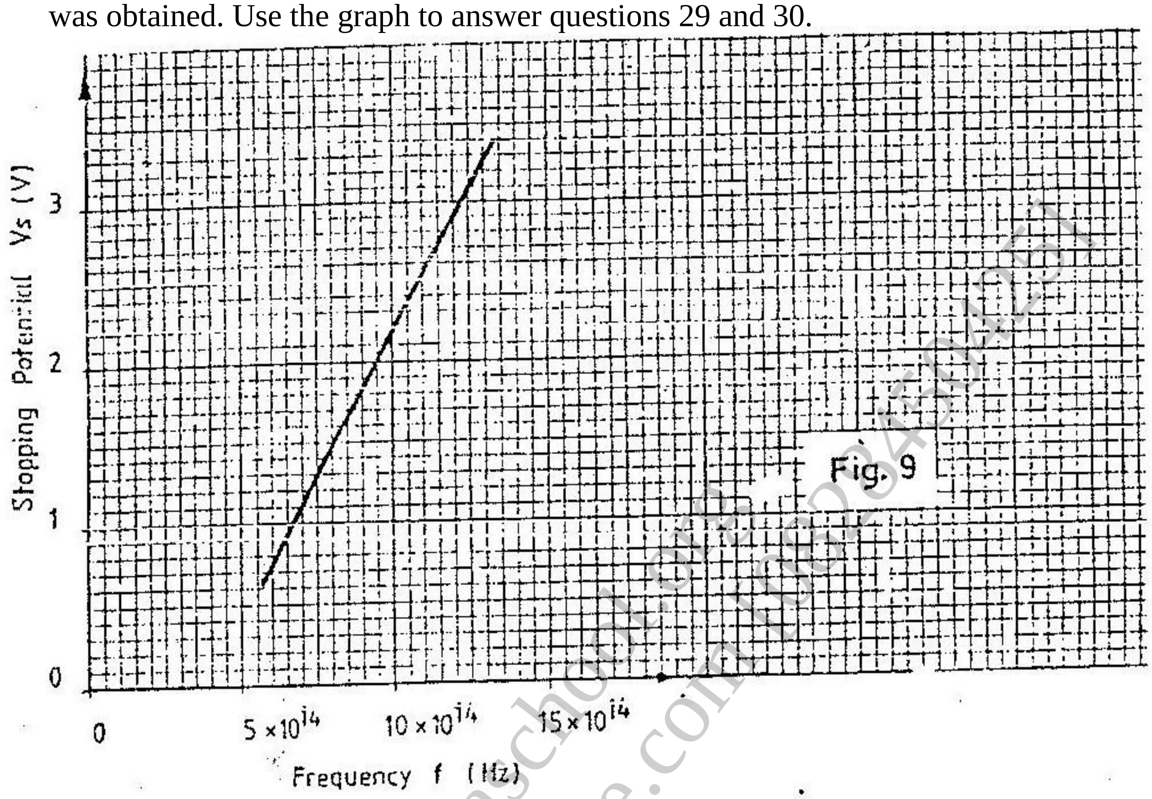
26. The table below shows the type of radiation, detection methods and uses of electromagnetic radiations. Complete the table.

Type of radiation	Detector	Uses
Ultra violet	Photographic paper fluorescence material	----------
----------	Phototransistor blackened thermometer	Warmth sensation
Radio waves	----------	Communication

27. An electron in an excited atom falls from energy levels E2 to energy level E1. Write an equation relating the energy change to the frequency f, of the radiation emitted. Explain why new symbols used. (2 mks)

28. Name the metal used to shields X – rays operators from the radiation. Give a reason why it is used. (2 mks)

In an experiment on photo- electricity using metal X, the graph shown in figure 9 was obtained. Use the graph to answer questions 29 and 30.



29. Determine the minimum frequency f_0 below which no photoelectric emission occurs (2 mks)

30. Sketch on the same axes, a graph for a metal, Y hose work function is higher than metal X (1mk)

31. State a characteristic of sound, which is determined by overtone (1 mk)

32. A radioactive carbon 14 decay to Nitrogen by beta emission as below

$$^{14}_{6}C \longrightarrow \, ^{x}_{7}N + \, ^{0}_{y}e$$

Determine the values of x and y in the equation (2 mks)

33. What is meant by the centre of gravity of a body? (1mk)

34. State two variables that must be controlled in an experiment for comparing the thermal conductivities of different metal rods of the same diameter (2 mks)

35. Figure 10 represent a signal being fed into a demodulator of a radio receiver. Sketch in the space provided, the output signal (1 mk)

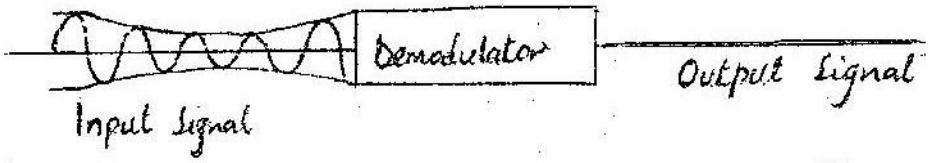


Fig. 10

36. Explain with the aid of a labeled ray diagram the wide field of view of a convex mirror (2 mks)

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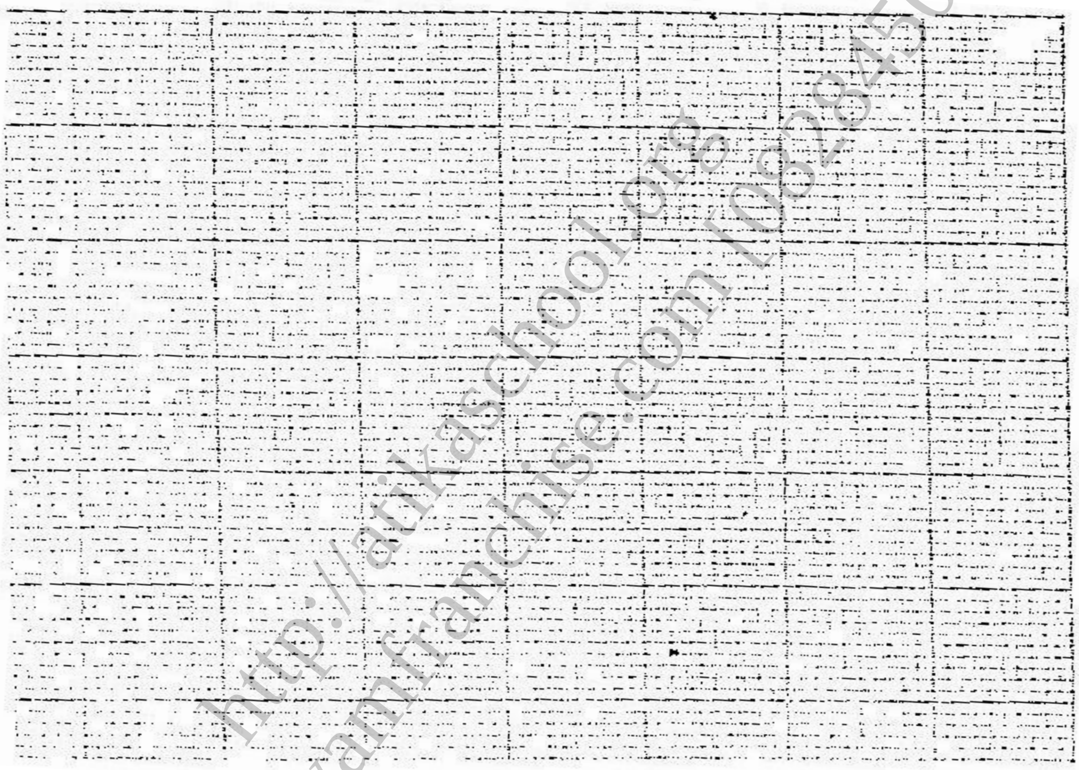
SECTION 1 (65 MARKS)

Answer all the questions in this section in the spaces provided

1. The data in the table below represents the motion of vehicle over a period of 7 seconds

Time (sec)	0	1	2	3	4	5	6	7
Displacement	0	20	40	60	80	95	105	110

(a) plot on the grid provided, a graph of displacement (y- axis) against time (5 mks)



(b) Describe the motion of the vehicle for the first 4 s (1 mk)

(c) Determine the velocities at 4.5s and 6.5s. Hence or otherwise determine the average acceleration of the vehicle over this time interval

2. Study the circuit diagram in figure 1 and answer the following questions

Fig.1

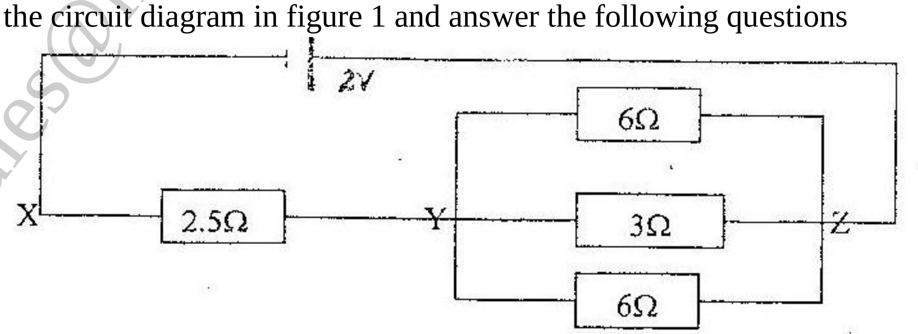


Fig 1

(a) Calculate the effective resistance between Y and Z (3 mks)

(b) Determine the current through the 3 Ω resistors (6 mks)

(c) One of the 6Ω resistor has a length of 1.0m and cross –section area of 5.0×10^{-6} m^2 (3 mks)

Calculate the resistivity of the material

3. (a) An object O is placed in front of convex mirror as shown in figure 2

Fig.2

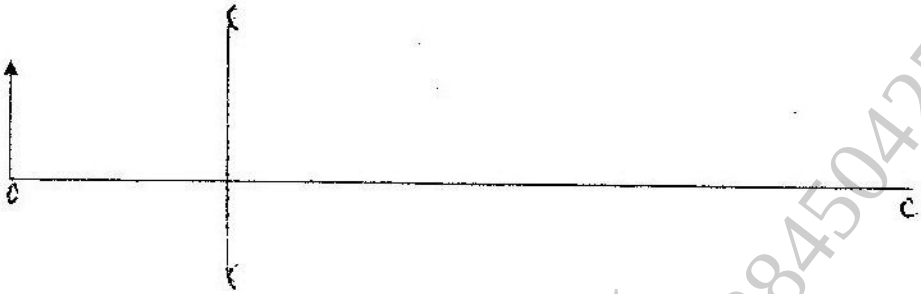


Fig. 2

(i) Draw to scale a ray diagram to show the position of the image (5 mks)

(ii) Determine the magnification (3 mks)

(b) An object placed in front of a convex lens of focal length 10 cm produces an image at a distance of 15 cm from the lens and on the same sides as the object

Determine the position of the object (4 mks)

4. (a) Draw a ray diagram to show how a convex lens works as a magnifying glass (5 mks)

(b) The diagram in figure 3 shows a certain eye defect

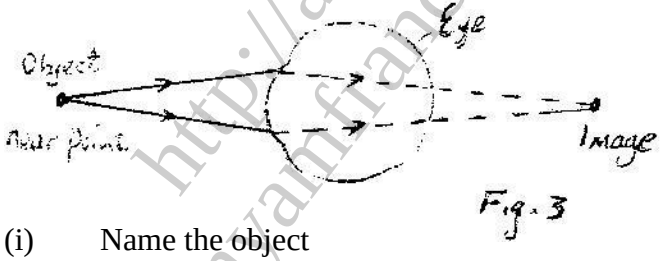


Fig. 3

(i) Name the object

(ii) Draw on the same diagram an arrangement to correct the defect (1 mk)

(c) (i) Explain why a pail of water can be swung in vertical circle without the water pouring out (3 mks)

(ii) A car of mass 1200kg is moving with a velocity of $25ms^{-1}$ around a flat bend of radius 150m. Determine the minimum frictional force between the tyres and the road that will prevent the car from sliding off. (4 mks)

5. (a) (i) State the law of electromagnetic induction (2 mks)

(ii) Describe an experiment to demonstrate Faraday's law (4 mks)

(b) (i) A researcher studying the behaviour of step- up transformer made the following observations:
"More joules per coulomb and fewer coulombs per second at the output than at the input terminals

Explain why the observation does not imply a violation of the principle of conservation of energy (4 mks)

(ii) A transformer of 480 turns in the primary coil is used to connect a 9 volt a.c electric device to a 240 v.a.c mains power supply. Calculate the number of turns in the secondary coil. (3 mks)

SECTION II (15 MARKS)

Answer one question from this section

6. (a) Distinguish between stationary and progressive waves (1mk)
   (b) (i) describe how a young's double slit may be made in a laboratory (2mks)
   (ii) State the condition for a minim to occur in an interference pattern (1mk)
   (c) The sketch graph in fig 4 shows the results of an experiment to study diffraction patterns using a double slit.

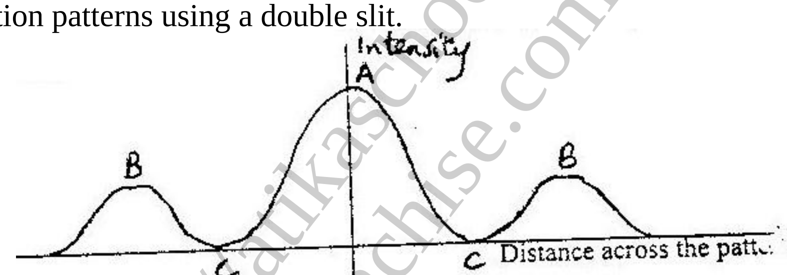


Fig. 4

   (i) Sketch an experimental set up that can be used to obtain such a pattern (4 mks)
   (ii) Name an instrument for measuring the intensity (1 mk)
   (iii) Explain how the peaks labeled A and B, and troughs labeled C are formed (6 mks)

7. (a) Describe how a p- type semi conductor is formed (3 mks)
   (b) Distinguish between p- n- p and n – p – n transistors (1 mk)
   (c) The sketch in the fig 5 shows the results of an experiment where a transistor was used as a voltage amplifier

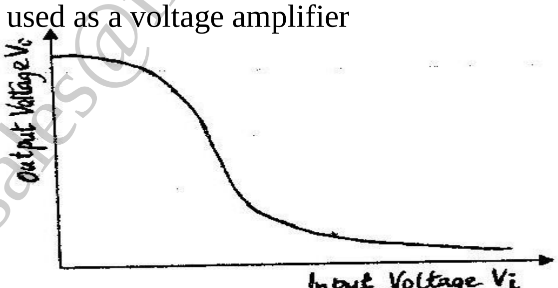


Fig. 5

Explain hw the voltage amplification factor, β, may be obtained from the sketch graph (4 mks)

(d) (i) Draw a circuit diagram of p – n – p transistor operating in the common emitter (C-E) mode indicate on the diagram the directions of the collector current I_c the base current I_B the emitter current I_E (4 mks)

(ii) Write the equation relating I_C I_B I_E (1mk)

(e) Identify the type of biasing in each of the junctions of a transistor in operation (2 mks)