

Name ..... Index Number.....

232/2

Candidate's signature .....

PHYSICS

Date .....

Paper 2

(THEORY)

march/April 2011

2 hours

## MOKASA JOINT EVALUATION EXAMINATION

Kenya Certificate of Secondary Education

PHYSICS

Paper 2

(THEORY)

2 hours

### Instructions to Candidates

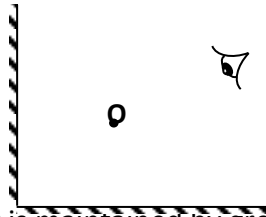
- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided above.
- (c) Answer **ALL** the questions in the spaces provided.
- (d) Mathematical tables and silent electronic calculators may be used.
- (e) All working **MUST** be clearly shown where necessary.
- (f) **This paper consists of 11 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

### For Examiner's use only

Question	Maximum score	Candidate's score
1-8	25	
9	9	
10	9	
11	11	
12	9	
13	9	
14	8	
<b>Total score</b>	<b>80</b>	

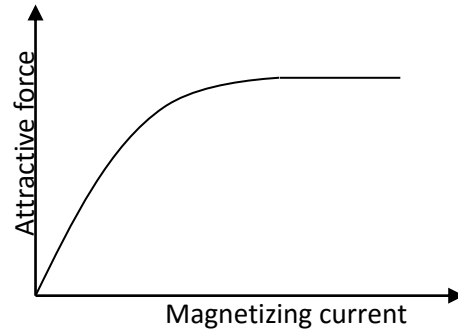
**SECTION A (25 MARKS)**

- Two plane mirrors  $M_1$  and  $M_2$  are placed at an angle of  $90^\circ$  to each other as shown in figure 1 below. An object  $O$  is placed at some point between the two mirrors. By use of a ray diagram, show how the eye sees the images formed by the plane mirrors. (3 marks)



**Figure: 1**

- A lead acid accumulator is maintained by greasing the terminals. Explain the importance of this maintenance. (2 marks)
- A convex mirror forms an image 50cm from its optical centre. If the image is magnified 3.5 times, determine the focal length of the mirror. (3 marks)
- The sketch below (figure 2) shows the relationship between the attractive force of an electromagnet made of steel and the magnetizing current.



**Figure.2**

Give two reasons for the shape of the curve in terms of the domain theory. (2 marks)

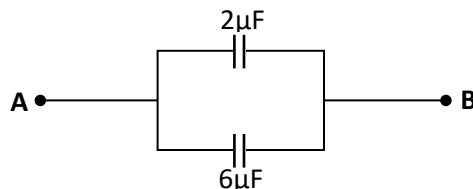
On the sketch above draw a graph of the attractive force for a iron metal. (1 mark)

- (a) Sketch magnetic field round the current carrying conductors below. The conductors are straight and carry an equal amount of current. (2 marks)



(b) Show the forces acting on the conductors above. (2 marks)

- A  $2\mu\text{F}$  capacitor is charged to potential of 200V and then disconnected from the power supply. The  $2\mu\text{F}$  capacitor is then connected to a  $6\mu\text{F}$  capacitor as shown in figure 3 below.



**Figure.3**

- Calculate the initial charge stored by the  $2\mu\text{F}$  capacitor. (2 marks)

- (ii) Determine the final p.d across AB. (2 marks)
7. An immersion heater is designed using a nichrome conductor. State **TWO** physical properties of the conductor that will determine the amount of heat dissipated by the heater. (2 marks)
8. The following table shows part of the electromagnetic spectrum.

Ultraviolet rays
Microwaves
X-rays
Red light

- (a) Arrange the electromagnetic waves in the order of decreasing energy. (1 marks)
- (b) Give an application of each of the following electromagnetic waves. (2 marks)
- Ultraviolet rays:
  - Microwaves:
- (c) Give one way of detecting x-rays? (1 mark)

### SECTION B (55 MARKS)

- 9.
- (a) Define frequency. (1 mark)
- (b) Distinguish between electromagnetic waves and mechanical waves giving an example. (2 marks)
- (c) The figure below (figure 4) shows an open tube.

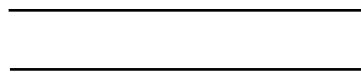
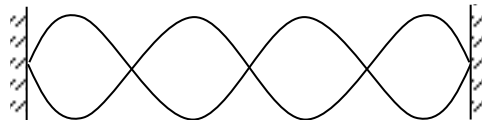


figure.4

- Sketch on the tube the wave form that gives the fundamental frequency. (1 mark)
- (d) A pulse-echo sounder is used by a fishing boat to locate a shoal of fish in water. The sounder sends sound of frequency 21KHz and wavelength 7.5cm. If the echo is received after 0.2 seconds, determine how far the shoal of fish is from the base of the boat. (3 marks)
- (e) The diagram below (figure 5) shows a stationary transverse wave on a string. Indicate on the diagram points of constructive and destructive interference. (2 marks)



10.

- a. Define dispersion of light. (1 mark)
- b. A student prepares to swim to the bottom of a pool to pick a coin on the bed. It is only while under the water that she realizes the presence of a sharp object beside the coin that she had not seen. Explain a possible reason why it was not visible in clear swimming pool water. (1 mark)
- c. Study the diagram below (figure 6).

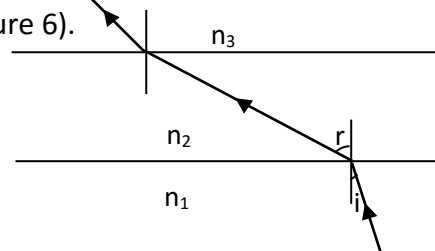


figure.6

Given that  $i = 25^\circ$ ,  $r = 38^\circ$ ,  $n_1 = 1.6$  and  $n_2 = 1.15$ , determine  ${}_3n_1$ . (4 marks)

d. Using a well-labeled diagram, describe how optic fibers are used for communication. (3 marks)

11.

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

(b) In what way can the eddy currents in the transformer core be reduced? (1 mark)

(c) What is hysteresis loss as applies to the working of a power transformer? (1 mark)

(d)

(e) A transformer steps down electrical power from 240V to 6V. if there are 1600 turns on the primary,

i. Determine the number of turns of the secondary coil. (2 marks)

ii. If the transformer has an efficiency of 85%, how much current is drawn from the 240V supply when the output is 2A? (2 marks)

e. The figure below (figure 7) shows a current carrying conductor at right angles to a magnetic field. When the conductor is moved, current flows in the straight conductor as indicated in the diagram.



Figure 7

Using an arrow, show the direction of motion of the conductor. (1 mark)

f. Describe the working of a moving coil microphone. (3 marks)

12.

(a) What is a diopter? (1 mark)

(b) Give the functions of the following parts of a lens camera. (3 marks)

i. Shutter: .....

ii. Film: .....

iii. Diaphragm: .....

(c) A compound microscope with objective lens  $L_1$  of focal length 0.8cm and an eyepiece lens  $L_2$  of focal length 2.5cm is shown in figure 7 below. An object  $O$  is placed in front of the objective lens at a distance  $u_1$  of 1.2cm. The system forms a final image  $I_2$  at a distance of 10cm from  $L_2$ . Determine the distance of separation of lenses  $L_1$  and  $L_2$ . (3 marks)

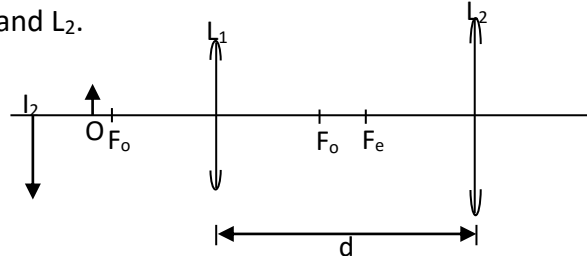
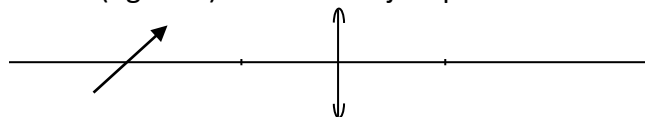


figure.8

(d) The figure below (figure 9) shows an object placed in front of a convex lens.



Complete the ray diagram to show the position of the image. (2 marks)

figure.9

13.

- (a) State the reason why power is stepped up at the generation station before transmission. (1 mark)
- (b) A student designed a transformer to supply a current of 10A at a potential difference of 60V to a motor from an a.c mains supply of 240V. If the efficiency of the transformer is 80%, determine the Power supplied to the transformer. (3 marks)
- (c) State the importance of an electric fuse and reason why it is fitted on the live wire. (2 marks)
- (d) An electric iron box is rated 2500W and uses a voltage of 240V. Given that electricity costs kShs. 1.10 per Kwh, what is the cost of using it for 6 hours? (3 marks)

14. The following data was obtained in an experiment to determine the electrical conductivity of a certain conductor.

Voltage, (V) (volts)	1.5	3.0	4.5	6.0	7.5
Current, (I) (amperes)	0.075	0.150	0.225	0.300	0.375

- (a) Plot a graph of voltage (y-axis) against current, I(A) (5 marks)
- (b) Use the graph to determine the conductance of the conductor. (3 marks)

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