THE PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
TOPICAL EXAMINATION SERIES No. 06
FORM THREE PHYSICS

TIME 3 :00 HOURS   **Year 2024**

SUB TOPIC: REFRACTION OF LIGHT THROUGH LENSES
INSTRUCTION
1. This paper consists of section A, B and C with a total of Eleven (11) questions
2. Answer ALL question in section A and B and Two (2) from section C
3. Section A carries sixteen (16) marks, Section B fifty-four (54) marks and section C Thirty (30) marks
4. Non-programmable calculators may be used
5. Cellular phones and any unauthorized materials are NOT allowed in the examination room
   Write your Examination name on every page of your answer sheet provided

SECTION A (16 Marks)
Answer **all** questions in this section

1.i) A lens is used to form an image of a bright object on a screen. The effect of converging the top half of the lens with a card is to:
  - a) Make the image less bright

  - b) Make the image go out of focus

  - c) Make the image disappear

  - d) Remove the top half of the image

  - e) Remove the bottom half of the image

ii) is the geometric centre of a lens

  - a) Diverging lenses

  - b) Centre of curvature

  - c) Optical centre

  - d) Aperture

  - e) Converging lens

iii) The geometric centre of the sphere of which the lens surface is a part of

  - a) Centre of curvature

  - b) Optical centre

  - c) Focal length

  - d) Vertical axis

iv) An imaginary line which passes through the optical centre of the lens at a right to the lens

  - a) Radius of curvature]

  - b) Concave lens

  - c) Optical centre

  - d) Principle axis

  - e) Aperture

v) Is the distance between optical centre and the centre of curvature

  - a) focal point

  - b) Radius of curvature

  - c) Optical centre

  - d) Focal length

  - e) Principal focus

vi) A point through which all rays traveling close and parallel to the principal axis pass through the lens is called_____

   a) Centre of curvature
   b) Principal axis
   c) Vertical axis
   d) Focal point
   e) Focal length

vii) Is the width of the lens from one edge to another?

   a) Optical centre
   b) Aperture
   c) Plano concave
   d) Converging lens
   e) Radius of curvature

viii) is the distance between the optical centre and the principal focus.

   a) Focal length
   b) Radius of curvature
   c) Principal axis
   d) Principal focus
   e) Biconcave

ix) Is a transport or a translucent medium that alters the direction of light passing through it.

   a) Converging lens
   b) Aperture
   c) Lens
   d) Convex lens
   e) Focal length

x) Is the reciprocal of a focal length of a focal length of a lens

   a) lens formula
   b) Magnification of lens
   c) Spherical aberration
   d) Diverging lens
   e) Power lens

2. Match the parts of diagram in column A with corresponding answer in column B

LIST A	LIST B
	A. Rectangular block B. Object (key) C. Plane mirror D. Lens E. Image key F. Card body G. Ray box H. Dotted lines I. Light rays

SECTION B (54 Marks)

Answer **all** questions in this section

3. (a) An object is placed to the left of a 25cm size as the object. Determine the object and image location.

   (b) An object is set 20cm in front of a lens and the real inverted, magnified and at great distance image was formed. State the type of the lens used and determine the value of focal length.

4. (a) Describe how a convex lens could be used to make a magnifying lens?

   b) A converging lens produce an upright image four times the object high. If the focal length is 25cm, find the object distance.

5. (a) What physical characteristics of lens distinguishes a converging lens from a diverging lens?

   b) An object is 20 cm from a convex lens. The real image is three times smaller than object. Find the focal length of the lens.

6. (a) If you have a convex lens whose focal length is 10.0cm, where would you place an object in order to produce an image that is virtual?

b) A convex lens is used to project an image of the light source out a screen. The screen is 30 cm from the light source and the image is twice the size of the object. What focal length is required and how far from the source must be it placed?

7. (a) Give the meaning of the term magnifying (resolving) power of a lens.

   b) What is power of a lens of focal length 5cm

8. A small object is placed on the axis of a converging lens of focal length 10cm so that it is

a) 15cm and

b) 5cm from the lens

Show by ray diagrams, the nature of positions of the images formed and find their exact value (N.B write down all steps)

SECTION C (30 Marks)

Answer **two** questions in this section

9. (a) Briefly explain five rules that should be observed in "real-is-positive "sign convention"

   (b) A diverging lens produces an image which is diminished four times when an object is placed 36cm from the lens. Find the position of the image and the focal length of the lens.

10. (a) Prove the following formula as used in lens (Diagram is compulsory)

   i) $\frac{I}{f} = \frac{i}{u} + \frac{1}{v}$

   ii) $m = \frac{v}{f} - 1$

   iii) $m = \frac{f}{u-f}$

b) An object 5cm high is placed 25cm from a convex lens with a focal length of 20cm. using the lens formula, determine position, size and nature of the image formed.

c) When an object is placed 30 cm from a lens a virtual and erect image which is one-half the size of the object is formed.

i) Explain whether the lens is a concave or a convex lens

ii) What is the focal length of the lens

11. a) The way in which lenses form images of objects can be shown by means of ray diagram. Write the three important rules which are used in construction of ray diagrams. (Diagram are compulsory)

b) The diagrams below show some objects placed in front of or behind lenses

I)

II)

III)

IV)

V)

TOPICAL PAPER