



Uganda Advanced Certificate of Education.

PHYSICS SENIOR FIVE

END OF YEAR 2013

Paper 2(P510/2)

2hours 30 minutes.

INSTRUCTIONS.

Attempt **five** questions ,including at least **one** from each section but **not more than one** from either **Section A** or **Section B**.

Assume where necessary;

Acceleration due to gravity, g	$= 9.81ms^{-2}$.
Speed of light in a vacuum , c	$= 3.0 \times 10^8 ms^{-1}$
Electron charge, e	$= 1.6 \times 10^{-19} C$
Electron mass	$= 9.11 \times 10^{-31} kg$
Permeability of free space	$= 4.0\pi \times 10^{-7} Hm^{-1}$
Permittivity of free space, ϵ_0	$= 8.85 \times 10^{-12} Fm^{-1}$
The constant $\frac{1}{4\pi\epsilon_0}$	$= 9.0 \times 10^9 F^{-1}M$

SECTION A

- 1.(a) Define the term **focal length** of a concave mirror. (1)
- (b) An object is placed at a distance u from a concave mirror. The mirror forms an image of the object at a distance v . Draw ray diagrams to show the path of light rays when the image formed is
- (i) real (2)
- (ii) virtual (2)
- (c) Use geometrical ray diagram to derive the relation $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$ for a concave mirror. (5)
- (d) A concave mirror of radius of curvature 40.0cm contains a liquid to a height of 2.0cm. A pin clamped horizontally and viewed from above is observed to coincide with its image when it is 27.0cm above the surface of the liquid. Calculate the refractive index of the liquid.
- (e) Describe an experiment to determine the focal length of the concave mirror using an illuminated object. (4)
- 2.(a) Describe an experiment to determine the focal length of a concave lens using a convex lens of known focal length. (5)
- (b) A convex lens and a concave lens of focal lengths 17.5cm and 15cm respectively are mounted coaxially 7.5cm apart with the concave lens facing the distant object. Find
- (i) the final position of the image. (3)
- (ii) the magnification of the image produced by the concave lens. (2)
- (c) Explain why a parabolic mirror is used in search lights instead of a concave mirror. (3)
- (d) Define the terms refraction and refractive index. (2)
- (e) Describe how the refractive angle of a prism can be measured using a spectrometer. (5)

