

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN PHYSICS

PHYS 0111: PRINCIPLES OF PHYSICS

STREAMS: DIP (PHYSICS)

TIME: 2 HOURS

DAY/DATE: MONDAY 11/12/017

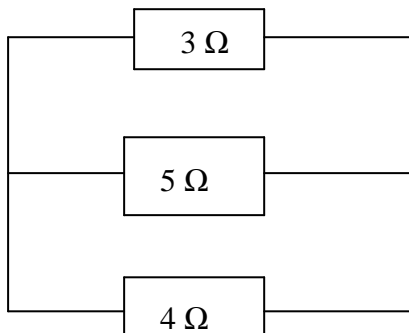
11.30 A.M-1.30 P.M

INSTRUCTIONS.

- Answer question one and any other two questions

QUESTION ONE (30MKS)

- 1 a) i) State the two types of errors [2mks]
ii) Explain how to minimise the errors above [2mks]
- b) i) Define refraction of light [2mks]
ii) A ray of light travelling through a liquid of absolute refractive index 1.4 is incident on the plane surface of a Perspex block at an angle of 55° . Calculate the angle of refraction in the Perspex if it has an absolute refractive index 1.5 [4mks]
- c) i) Define the following
Displacement
Velocity
Acceleration [3mks]
ii) A body of mass 50 kg initially moving at 20 m/s accelerates to a velocity of 30 m/s in 5 seconds. Calculate the force acting on the body. [3mks]
- d) A charge of quantity $9 \times 10^{-6} \text{C}$ flows through a conductor in 20 seconds, calculate the amount of current in the conductor [3mks]
- e) State Newton's laws of motion [3mks]
- f) i) Obtain the effective resistance in the figure below



[3mks]

- ii) If a voltage of 12 V is applied across the arrangement, calculate the total current the circuit [3mks]
- g) Differentiate between heat capacity and specific heat capacity [2mks]

QUESTION TWO (20MKS)

2 a) i) Define the following terms

Principle focus

Focal length [2mks]

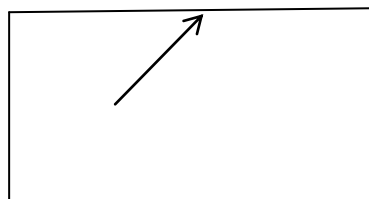
- ii) Show that image formed by a plane mirror is as far behind the mirror as the object is in front [6mks]
- b) An object is placed 20 cm from a concave mirror of focal length 15 cm, show using ray construction the location of the image, describe the characteristics of the image [6mks]
- c) By applying mirror formula, find the position of an object that gives an image located 15 cm in front of a concave mirror of focal length 10 cm. [6mks]

QUESTION THREE (20MKS)

- 3 a) Define specific latent heat of fusion [2mks]
- b) 5 kg of ice at a temperature of -4°C is converted to water at a temperature of 75°C . Calculate the quantity of heat used. (Take specific heat capacity of ice 2100 J/kg/k , specific latent heat of fusion of ice $1.7 \times 10^5\text{ J/Kg}$, specific heat capacity of water 4200 J/kg/k) [7mks]
- c i) Explain why heat transfer is faster in metal conductors than in non metals [2mks]
- ii) Explain the three modes of heat transfer [6mks]
- d) Differentiate between evaporation and boiling [3mks]

QUESTION FOUR (20MKS)

- 4a) Explain what is meant by refraction [1mark]
- b) A block of glass of refractive index 1.52 is surrounded by air. In an experiment, a beam of light is projected through the glass and strikes one of the faces (internally) at an angle of 30°



- i) Calculate the angle of refraction [3mks]
- ii) Show the refracted ray on the diagram marking the angle of refraction [2mks]

- c) the experiment is repeated with a film of water on the face of the block
- i) calculate the angle of refraction for the light passing into the water [3mks]
 - ii) Calculate the angle of refraction for the light passing in to the air from the water and comment on your answer [3mks]
 - iii) Continue the ray in the diagram, showing its path through the water and into the air [3mks]
- d) i) State any three types of lenses [3mks]
- ii) Explain how short sightedness eye defect is corrected [2mks]

QUESTION FIVE (20MKS)

5 a) Starting from Newton's second law of motion show that

$F=ma$ [3mks]

b) Define the following

- Electric potential
- Electric current [2mks]

c) State Kirchoff's law [2mks]

d) With the aid of a diagram, describe the use of diodes in full wave rectification [5mks]

e) Calculate the current through each resistor in the circuit diagram below [8mks]

