

**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**UNIVERSITY EXAMINATION FOR DIPLOMA IN BUILDING AND ENGINEERING**

**1ST YEAR 2ND SEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN**

**REGULAR**

**COURSE CODE: SPH 2121**

**COURSE TITLE: PHYSICS II**

**EXAM VENUE: STREAM: ENGINEERING**

**DATE: EXAM SESSION:**

**TIME: 2:00 HRS**

**Instructions:**

1. **Answer question 1 (Compulsory) and ANY other 2 questions.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**Useful constants: Speed of light in air **

***SECTION A***

***QUESTION 1(30 MARKS)***

(a) Explain the nature and propagation of light. **(3 marks)**

(b) Define the following terms.

(i) Wavelength **(1 mark)**

(ii) Frequency **(1 mark)**

(iii) Convex mirror **(1 mark)**

(c) Distinguish between the nature of focal length of a concave mirror and focal length of a

convex mirror. **(1 mark)**

(d) An object at the bottom of glass whose thickness is 3cm appears to be 2cm from the top side

of the glass. Determine the velocity of light in glass. **(4 marks)**

(e) State two types of lenses. **(2 marks)**

(f) (i) Distinguish between the inverse square law and Lambert’s cosine rule as used in

photometry. **(2 marks)**

(ii) Explain the application of photometry in building design. **(2 marks)**

(g) (i) Explain the Doppler effect. **(2 marks)**

(ii) A submarine (sub A) travels through water at a speed of 8ms-1 emitter a sound wave at a

frequency of 1400Hz. The speed of sound in water is 1533ms-1. A second submarine (sub

B) is located such that the two submarines are travelling directly towards each other. The

second submarine is moving at 9ms-1. Determine the frequency detected by an observer

riding on sub as the subs approach each other. **(3 marks)**

(h) State the difference between intensity and loudness of sound. **(2 marks)**

(i) Charge of 3000 coulombs flows through a wire in 5 minutes. Calculate the electric current.

**(2 marks)**

(j) Define electric potential difference. **(1 mark)**

(k) Calculate the value of a multiplier that can be used to convert 5mA milliameter into a 10v

voltmeter given that the resistance of its coil is 20. **(3 marks)**

**SECTION B**

***Answer any TWO questions in this section***

***QUESTION 2(20 MARKS)***

(a) Explain the light spectrum. **(4 marks)**

(b) State the laws of reflection of light. **(2 marks)**

(c) An object is placed 10cm in front of a concave mirror of focal length 15cm. Find the image

position , magnification and characteristics. **(10 marks)**

(d) By giving a reason in each case, state the use of concave and convex mirrors. **(4 marks)**

***QUESTION 3 (20 MARKS)***

(a) A light ray of wavelength 58nm traveling through air is incident on a smooth, flat slab of

crown glass at an angle of 30o to the normal. Given that the refractive index of glass is 1.52.

(i) Determine the angle of refraction. **(4 marks)**

(ii) Find the speed of light once it enters the glass. **(3 marks)**

(iii) Calculate the wavelength of light in glass. **(3 marks)**

(b) By constructing a ray diagram, determine the characteristics of the image formed by a concave mirror of radius of curvature 6 cm for an object placed 4 cm from the mirror. **(7 marks)**

(c) State three uses of lenses. **(3 marks)**

***QUESTION 4 (20 MARKS)***

(a) Explain three types of sound. **(6 marks)**

(b) Show that the fundamental frequency of a vibrating string is given by

 where the symbols have their usual meanings.

**(10marks)**

(c) Explain the importance of studying the acoustic properties of building materials. **(4 marks)**

***QUESTION 5 (20 MARKS)***

(a) State Ohm’s law. **(2 marks)**

(b) The radius of a copper wire is 1.63 mm. A potential difference of 60 V is applied across a 20 m length of wire. Given the resistivity of the wire , find

(i) its resistance. **(3 marks)**

(ii) the current through the wire **(3 marks)**

(c) (i) Derive the three alternative expressions for electric power. **(6 marks)**

(ii) An electric heater is constructed by applying a potential difference of 120v across a nichrome wire that has a total resistance of 8.00. Find the current curried by the wire and the power rating of the heater. **(6 marks)**