



**PAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH AND APPLIED SCIENCES**

**DEPARTMENT OF NATURAL AND APPLIED SCIENCES**

<b>QUALIFICATION: BACHELOR OF SCIENCE</b>	
<b>QUALIFICATION CODE: 07BOSC</b>	<b>LEVEL: 5</b>
<b>COURSE: GENERAL PHYSICS 1B</b>	<b>COURSE CODE: GNP502S</b>
<b>SESSION: JANUARY 2019</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 Hours</b>	<b>MARKS: 100</b>

<b>SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION PAPER</b>	
<b>EXAMINER(S)</b>	<b>Dr ONJEFU SYLVANUS</b>
<b>MODERATOR:</b>	<b>Prof DIPTI SAHU</b>

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Non-programmable Calculator

**THIS QUESTION PAPER CONSISTS OF 6 PAGES**

(Including this front page)

## SECTION A

### QUESTION 1

[40 MARKS]

**Suggested Question Types: Multiple Choice/Objectives**

**Each question in this section carries two marks**

- 1.1 A point in a standing wave, halfway between two nodes, at which the largest displacement occurs, is called ..... (2)  
a. node    b. antinode    c. trough    d. amplitude
- 1.2 The combination of two overlapping waves is called what? (2)  
a. aggregate    b. superposition    c. dispersion    d. wavelength
- 1.3 A hunter at a distance  $x$  from a cliff fires a gun. He hears the echo from the cliff after 2.4 seconds. If the speed of sound in air is 340 m/s, determine  $x$ . (2)  
a. 408 m    b. 209 m    c. 100 m    d. 501 m
- 1.4 One of these is not a wind instrument. (2)  
a. clarinets    b. trumpets    c. drums    d. flutes
- 1.5 A beam of polarized light is one constrained to vibrate in a ..... plane perpendicular to the beam. (2)  
a. multiple    b. triple    c. single    d. quadruplet
- 1.6 Sound wave below 20 Hz is called what? (2)  
a. ultrasonic wave    b. audible wave    c. infrasonic wave    d. critical wave
- 1.7 One of the following is not an example of electromagnetic waves. (2)  
a. beta    b. gamma    c. x rays    d. ultraviolet light

**Questions 1.8 and 1.9 are based on the statement below:**

The amplitude modulation (AM) radio band extends from  $5.4 \times 10^5$  Hz to  $1.7 \times 10^6$  Hz. If the speed of light is  $3 \times 10^8$  m/s;

- 1.8 What is the longest wavelength in meters? (2)  
a.  $1.8 \times 10^2$  m    b.  $5.6 \times 10^2$  m    c.  $6.5 \times 10^3$  m    d.  $0.9 \times 10^3$  m

- 1.9 Determine the shortest wavelength. (2)  
 a.  $1.8 \times 10^2 \text{ m}$     b.  $5.6 \times 10^2 \text{ m}$     c.  $6.5 \times 10^3 \text{ m}$     d.  $0.9 \times 10^3 \text{ m}$
- 1.10 Light reflecting off a flat mirror creates an image that appears to be ..... the mirror. (2)  
 a. in front    b. behind    c. lateral    d. tangential
- 1.11 ..... image cannot be projected on a screen. (2)  
 a. real    b. virtual    c. critical    d. principal
- 1.12 In the study of light waves the sign "R" denotes; (2)  
 a. refractive index    b. refractive curvature  
 c. refractive radius    d. radius of curvature
- 1.13 A light ray of wavelength 589 nm traveling through air strikes a smooth, flat slab of crown glass at an angle of  $30^\circ$  to the normal. Determine the angle of refraction. (2)  
 a.  $18.2^\circ$     b.  $20.1^\circ$     c.  $17.2^\circ$     d.  $19.2^\circ$
- 1.14 A type of aberration in which the wavelength is dependent on refraction is called what? (2)  
 a. spherical aberration    b. chromatic aberration  
 c. cubical aberration    d. sita aberration
- 1.15 The combination of rays gives rise to .....? (2)  
 a. beam    b. radiation    c. particles    d. incident rays
- 1.16 ..... is a device that transforms energy into a beam of coherent monochromatic light. (2)  
 a. lasers    b. slit order    c. path difference    d. diffraction gating
- 1.17 Suppose the real depth of a pond is 6 m and its apparent depth is 4.5 m. The refractive index of the water of the pond is given by? (2)  
 a. 1.35    b. 1.36    c. 1.47    d. 1.33

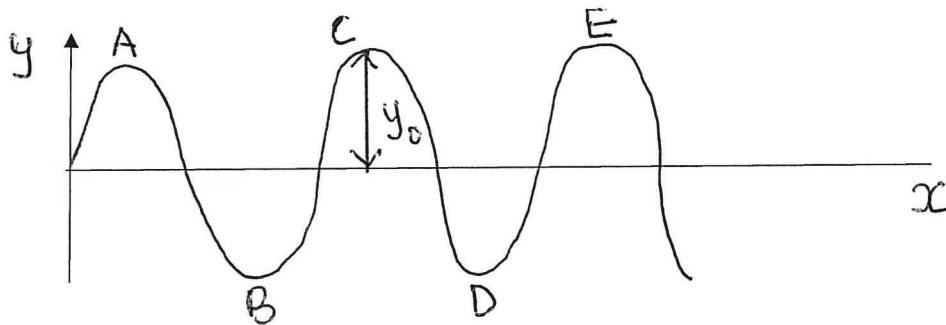
- 1.18 The change of direction of wave front because of a change in the velocity of the wave in another medium is called what? (2)
- a. Polarization    b. interference    c. diffraction    d. refraction
- 1.19 Which of the following statements about images formed by a plane mirror is false? It is; (2)
- a. The same size as the object    b. virtual    c. enlarged    d. lateral inverted
- 1.20 ..... is the unit of frequency. (2)
- a. decibel    b. meters    c. Hertz    d. seconds

## SECTION B

### QUESTION 2

[13 MARKS]

- 2.1 Suppose that the figure below represents a 50 Hz wave on a string. Take distance  $y_0$  to be 3.0 mm, and distance AE to be 40 cm. Find (a) the amplitude in cm (b) the wave length (c) the speed of the wave. (5)



- 2.2 Explain the term critical angle. (3)

Questions 2.3-2.4 are short answers

- 2.3 When a ray of light traveling in one transparent medium enters another transparent medium of different density, its direction is abruptly changed at the surface separating the two media. This change in the direction is known as what? (1)

- 2.4 The number of times an image is bigger than an object in a mirror is term what? (1)
- 2.5 If the angle of incidence for light traveling from air to glass is  $45^\circ$  and the angle of refraction in glass is  $28^\circ$ , Evaluate the refractive index of glass with respect to air. (3)

### QUESTION 3

[13 MARKS]

- 3.1 With the aid of a well labelled diagram illustrate how dispersion can affect light using a prism. Label colour in order of decreasing wavelength. (4)
- 3.2 Describe how a stationary wave is obtained. (2)
- 3.3 Briefly explain what happens when two light bulbs are placed side by side. (4)
- 3.4 Light source as explained in question 3.3 are known as what? (1)
- 3.5 Define the term monochromatic light. (2)

### QUESTION 4

[20 MARKS]

- 4.1 Illustrate with the aid of a diagram destructive interference. (3)
- 4.2 The distance between the two slits is 0.030 mm. The second-order bright fringe is measured on a viewing screen at an angle of  $2.15^\circ$  from the central maximum. Evaluate the wavelength of the light in nano meter. (4)
- 4.3 What is meant by 'a beam of polarized light'? (2)
- 4.4 With the aid of well labelled diagrams, illustrate the action of a Polaroid on beam of sunlight. (4)
- 4.5 Briefly explain one practical application of Polaroid in the optic industry. (4)
- 4.6 List three crystals that serve as light polarizing filter. (3)

### QUESTION 5

[14 MARKS]

- 5.1 Suppose a stationary siren emits a note of frequency 440 Hz as the train approaches it with a velocity of 30 m/s. Determine the frequency that is received on the train. [Take speed of wave to be 331 m/s]. (3)



- 5.2 Define resonance. (2)
- 5.3 Explain the term end correction. (2)
- 5.4 The length of air column at which the first resonance was observed, when a vibrating fork was placed on a resonance tube, was 30 cm. Determine the wavelength of the air column and the frequency of the fork. (Take speed of sound as 330 m/s.) (5)
- 5.5 Explain why a tuning fork sounds louder when its stem is pressed against a table top. (2)

**END**