ELIZADE UNIVERSITY
ILARA-MOKIN
ONDO STATE

FACULTY: Basic and Applied Sciences
DEPARTMENT: Physical and Chemical Sciences
SECOND SEMESTER EXAMINATIONS
2018/2019 ACADEMIC SESSION

COURSE CODE: PHY 204

COURSE TITLE: Waves and Optics

DURATION: 2 hours

HOD's SIGNATURE

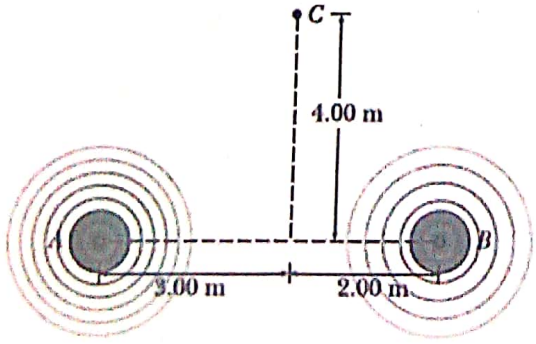
TOTAL MARKS: 60

Matriculation Number: _____

INSTRUCTIONS:

1. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
2. This question paper consists of 3 pages with printing on both sides.
3. Answer questions only in the exam booklet provided.
4. More marks are awarded for detailed solution than for the final numerical answer.
5. Box your final answers. Marks will be deducted for untidy work.
6. Attempt any (3) of the Five (5) questions. Each question is worth 20 points.
7. All approximations should be rounded up to 2 decimal places (2 d.p.)
8. Your final answers should be in S.I. units

QUESTION 1



Two small speakers emit sound waves of different frequencies equally in all directions. Speaker A has an output of 1mW, and speaker B has an output of 1.5mW. Determine the sound level in decibels of a point C in the figure above assuming

(a) Only speaker A emits sound,

(b) Both speakers emit sound.

QUESTION 2

A submarine (sub A) travels through water at a speed of 8.00 m/s, emitting a sonar wave at frequency of 1400 Hz. The speed of sound in water is 1533 m/s. A second submarine (sub B) is located such that both submarines are traveling towards each other. The second submarine is moving at 9.00 m/s.

(a) What frequency is detected by an observer riding on sub B as the subs approach each other?
(b) The subs barely miss each other and pass. What frequency is detected by an observer riding on sub B as the subs recede from each other?

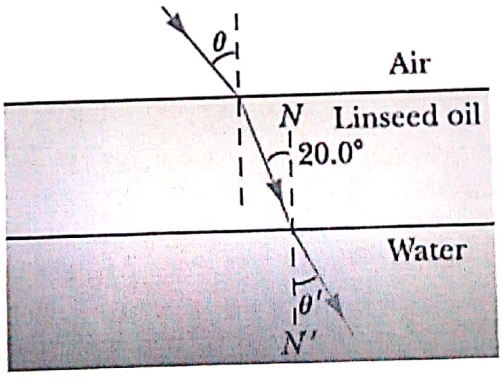
QUESTION 3

A standing wave pattern is observed in a thin wire with a length of 3.00m. The wave function is $y = (0.002m)\sin(\pi x)\cos(100\pi t)$, Where y and x are in meters and t is in seconds.

(a) How many loops does this pattern exhibit?
(b) If the original frequency is held constant and the tension in the wire is increased by a factor of 9, how many loops are present in the new pattern?

QUESTION 4

(a) Explain the following
(i) Diffuse reflection
(ii) Total internal reflection
(b) The light beam shown in the figure below makes an angle 20° with the normal line NN' in the linseed oil. Determine the angle θ and θ'. (The index of refraction of air, water, and linseed are 1.0, 1.33, and 1.48 respectively).



QUESTION 5

An object is located 20cm to the left of a diverging lens having a focal length f = -32cm.

(a) Determine the location and magnification of the image
(b) Construct a ray diagram for this arrangement.