Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	PHYSICS II
COURSE CODE	:	DAS 14203
PROGRAMME CODE	:	DAE
EXAMINATION DATE	:	DECEMBER 2019/ JANUARY 2020
DURATION	:	2 HOURS AND 30 MINUTES
INSTRUCTIONS	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) (i) Briefly explain about sound wave.

(4 marks)

(ii) Calculate the speed of compression waves (sound waves) in water. Given the bulk modulus for water is 2.2×10^9 N/m^2.

(3 marks)

(b) A source transmitted sound wave with an output power 80 W.

(i) Determine the sound intensity at a distance 3 m from the source.

(4 marks)

(ii) Calculate the distance between the source and listener if the sound intensity level is measured as 40 dB by the listener

(6 marks)

(c) A police car emitting siren with frequency 1000 Hz moving at velocity 15 m/s. Calculate the frequency heard by stationary observer if the car;

(i) Moving away from the observer.

(4 marks)

(ii) Moving towards the observer.

(4 marks)

Q2 (a) (i) State the definition of light.

(4 marks)

(ii) Compute the frequency of yellow light emitted from sodium flame at wavelength 589 nm.

(3 marks)

(b) The brightness of a particular type of 100 W light bulb is rated at 1700 lm.

(i) Calculate the luminous intensity.

(3 marks)

(ii) Determine the illuminance at a distance of 2.0 m. Assure the light output is uniform in all directions.

(3 marks)

(c) A 300 cd tungsten-filament lamp is located 2.0 m from a surface whose area is 0.25 m^2. The luminous flux makes an angle of 30° with the normal to the surface.

(i) Define the term '*illumination*'.

(3 marks)

(ii) Estimate the luminous flux striking the surface.

(3 marks)

(d) A spotlight is equipped with a 40 cd bulb that concentrates a beam onto a vertical wall. The beam covers an area of 9 m^2 on the wall, and the spotlight is located 20 m from the wall. Calculate the luminous intensity for the spotlight.

(6 marks)

Q3 (a) Twin water bugs Jimminy and Johnny are both creating a series of circular waves by jiggling their legs in the water. The waves undergo interference and create the pattern represented in **Figure Q3 (a)**. The thick lines in the diagram represent wave crests and the thin lines represent wave troughs. Several of positions in the water are labeled with a letter. Classify each labelled position in the figure given either constructive or destructive interference occurs.

(3 marks)

(b) A two-slit interference experiment is used to determine the unknown wavelength of laser light source. With the silts 0.200 mm apart and a screen at distance of 1.00 m, the third bright band out from the central bright band is found to be 9.49 mm from the center of the screen.

(i) Compute the wavelength of the light.

(3 marks)

(ii) Calculate how far apart would the silt have to be so that the fourth minimum (dark fringe) would occur at 9.49 mm from the center of the screen.

(4 marks)

(c) Light of wavelength 580 nm is incident on a slit of width 0.300 mm. The observing screen is placed 2.00 m from the slit.

(i) Calculate the position of the first dark fringes.

(6 marks)

(ii) Determine the width of the central bright fringe.

(4 marks)

(d) A slit of width 0.50 mm is illuminated with light of wavelength 500 nm and a screen is placed 120 cm in front of the slit. Find the width of the first maxima.

(5 marks)

Q4 (a) (i) Write the law of reflection.

(2 marks)

(ii) Write the laws of refraction (Snell's Law)

(3 marks)

(iii) Describe the phenomena total internal reflection.

(2 marks)

(iv) Explain the characteristic of images formed by plane mirror

(4 marks)

(b) A beam of light strikes one face of a window with an angle of incidence of 25.0°. The refraction index, n of the glass is 1.52. The beam travels through the glass and emerges from a parallel face on the opposite side. Ignore reflections. Find the angle of refraction (transmitted angle) for the ray inside the glass.

(3 marks)

(c) If you lie down on the bottom of a swimming pool and look up, you can see the entire outside world by looking up from the vertex of a cone of half angle θ_t. For water, n is 1.33 solve the θ_t.

(4 marks)

(d) Deduce the radius and type of spherical mirror must be used, in order to give an erect image one-fifth of its original size where the object is placed 15 cm in front of the mirror.

(7 marks)

- END OF QUESTIONS –

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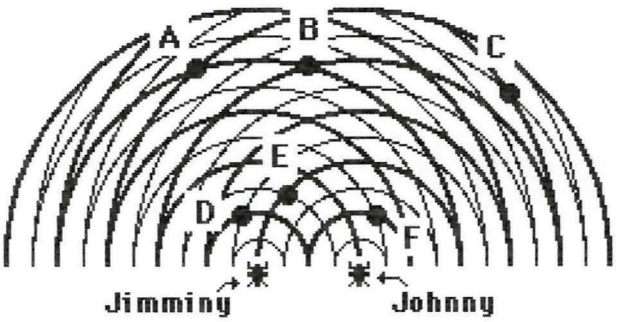

Figure Q3 (a)

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LIST OF FORMULA

1. Gravity acceleration, $g = 9.81$ m/s^2
2. Speed of sound, $v_{sound} = 340$ m/s
3. Threshold of sound intensity, $I_o = 1 \times 10^{-12}$ W/m^2
4. Atmospheric pressure, $P_{atm} = 1.0 \times 10^5$ Pa
5. Density of seawater, $\rho_{seawater} = 1025$ kg/m^3
6. Bulk Modulus of Water $\beta = 2.0 \times 10^9$ N/m^2

$d\sin\theta = m\lambda$	$Y = \frac{m\lambda D}{d}$	$I = I_0(\cos\theta)^2$
$\frac{1}{s}+\frac{1}{s}=\frac{1}{R}$	$n_1\sin\theta_1 = n_2\sin\theta_2$	$\sigma = \frac{F}{A} = \frac{mg}{A}$
$c = f\lambda$	$E = \frac{F}{A}$	$I = \frac{F}{\Omega}$
$\sin\theta = \pm m\frac{\lambda}{a}$	$\sin\theta \approx \tan\theta \approx \frac{y_1}{D}$	$\sin\theta_c = \frac{n_t}{n_i} = \frac{1}{1.33}$
$V_{sphere} = \frac{4}{3}\pi r^3$	$\Omega = \frac{A}{R^2}$	$d = \frac{(m+\frac{1}{2})\lambda R}{y_m}$
$v = \sqrt{\frac{F_T}{\mu}}$	$E_l = \frac{F_l}{4\pi d^2}$	$v = \sqrt{\frac{B}{\rho}}$
$\beta = 10\log\left(\frac{I}{I_o}\right)$	$I \ \alpha \ \frac{1}{r^2}$	$W=mg$
$I = \frac{P}{4\pi r^2}$	$f_O = f_S\left(\frac{v \pm v_O}{v \mp v_S}\right)$	$E = \frac{I\cos\theta}{R^2}$
$\frac{Q}{t} = \kappa A\frac{\Delta T}{d}$	$\rho = \frac{m}{V}$	$d = \frac{m\lambda R}{y_m}$
$s_i = -\frac{s_o}{5}$	$\frac{1}{s}+\frac{1}{s}=\frac{2}{R}$	$\Delta y = \frac{m_2\lambda D}{a} - \frac{m_1\lambda D}{a} = \frac{\lambda D}{a}$