

4.2 Travelling Waves

Question Paper

Course	DPIB Physics
Section	4. Waves
Topic	4.2 Travelling Waves
Difficulty	Medium

Time allowed: 20
Score: /10
Percentage: /100

Question 1

A travelling wave has a frequency of 200 Hz. Two consecutive points with a phase difference of $\frac{\pi}{2}$ are 1 cm apart.

What is the speed of the wave?

- A. 4 m s^{-1}
- B. 8 m s^{-1}
- C. 200 m s^{-1}
- D. 800 m s^{-1}

[1 mark]

Question 2

A radio station broadcasts in the frequency range 97–99 MHz.

What range of wavelengths are being used?

- A. $3.0 - 3.1 \times 10^{-3} \text{ m}$
- B. $3.0 - 3.1 \text{ m}$
- C. 0.33 m
- D. $0.33 \times 10^3 \text{ m}$

[1 mark]

Question 3

A longitudinal travelling wave has speed v and wavelength λ . What is the least distance between a compression and a rarefaction measured against the direction of propagation?

- A. v
- B. $\frac{v}{\lambda}$
- C. λ
- D. $\frac{\lambda}{2}$

[1 mark]

Question 4

A sound wave has a wavelength of 0.40 m. What is the phase difference between two points along the wave which are 1.7 m apart?

- A. zero
- B. 45°
- C. 90°
- D. 180°

[1 mark]

Question 5

Two waves are travelling from the surface of the Sun to the upper atmosphere of Earth.

Which statements must be correct?

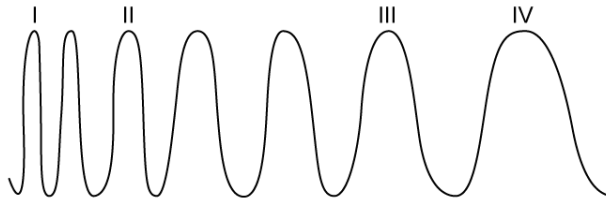
- I. The waves have the same frequency
- II. The waves have the same speed
- III. Neither wave is longitudinal
- IV. At least one of the waves is audible to humans

- A. I and II
- B. I, II and III
- C. II and III
- D. I and IV

[1 mark]

Question 6

A section of the electromagnetic spectrum is shown. What could the labelled sections represent?



	I	II	III	IV
A.	ultraviolet	infrared	x-rays	radio waves
B.	blue light	red light	orange light	green light
C.	x-rays	blue light	infrared	microwaves
D.	gamma waves	microwaves	infrared	visible light

[1 mark]

Question 7

Which is a possible frequency of visible light?

- A. 1.2×10^{14} Hz
- B. 2.4×10^{14} Hz
- C. 4.8×10^{14} Hz
- D. 9.6×10^{14} Hz

[1 mark]

Question 8

Sound waves can be propagated through fluids and solids. Which statements are correct?

- I. Sound waves have constant speed in air
- II. Thunder always arrives before lighting because of the difference in wave speeds.
- III. Sound waves can be modelled using the equation that $v = f\lambda$
- IV. Vibrations from an earthquake will be felt in the ground before they are heard, because of the difference in wave speeds

- A. I and IV
- B. II and IV
- C. I, III and IV
- D. II, III and IV

[1 mark]

Question 9

Which cannot be observed with ultrasound?

- A. diffraction
- B. dispersion
- C. polarisation
- D. refraction

[1 mark]

Question 10

Approximately how many times larger is the wavelength of sound waves which are audible to humans greater than the wavelength of light waves which are visible to humans?

- A. 10^2
- B. 10^5
- C. 10^{12}
- D. 10^{24}

[1 mark]