

# 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.  $4 \text{ m s}^{-1}$
- B.  $8 \text{ m s}^{-1}$
- C.  $200 \text{ m s}^{-1}$
- D.  $800 \text{ m s}^{-1}$

[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.  $0.33 \text{ m}$
- D.  $0.33 \times 10^3 \text{ m}$

[1 mark]

### Question 3

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

- A.  $v$
- B.  $\frac{v}{\lambda}$
- C.  $\lambda$
- 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.  $45^\circ$
- C.  $90^\circ$
- D.  $180^\circ$

[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?

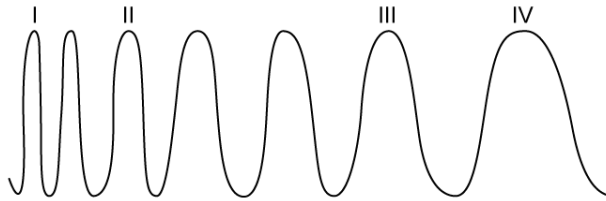
- I. The waves have the same frequency
- II. The waves have the same speed
- III. Neither wave is longitudinal
- IV. At least one of the waves is audible to humans

- 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.  $1.2 \times 10^{14}$  Hz
- B.  $2.4 \times 10^{14}$  Hz
- C.  $4.8 \times 10^{14}$  Hz
- D.  $9.6 \times 10^{14}$  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]