9.2 Diffraction & Interference

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	9. Superposition
Topic	9.2 Diffraction & Interference
Difficulty	Easy

Time allowed: **10**

Score: **/10**

Percentage: **/100**

Question 1

A student set up an experiment with a diffraction grating. They put a narrow beam of monochromatic light incident along the normal. They found that the third-order diffracted beams are formed at angles of 45˚ to the original direction.

Which of the following gives the highest order of diffracted beam produced by this grating?

A 6^{th} **B** 5^{th} **C** 4^{th} **D** 3^{rd}

[1 mark]

Question 2

When a wave passes an obstruction diffraction can be observed, this effect is greatest when the wavelength and obstruction are similar in size.

When waves are travelling through the air, which of the following would best demonstrate diffraction?

A radio waves passing a copper wire

B visible light waves passing a gate post

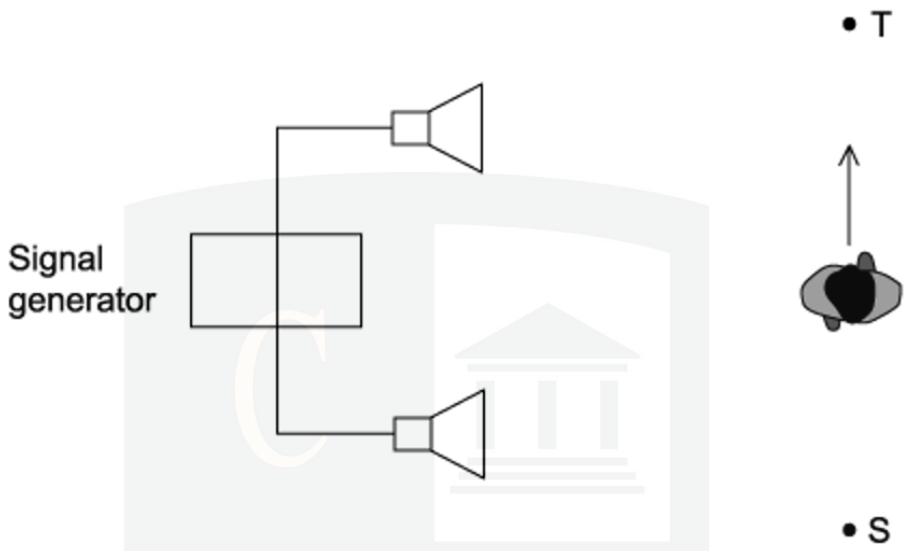
C microwaves passing a steel post

D sound waves passing human hair

[1 mark]

Question 3

Two loudspeakers are connected to a signal generator, as shown in the diagram.



As the student walks between S to T she notices that the loudness of the sound increases then decreases repeatedly.

Why does the loudness change?

A polarisation of the sound waves

B reflection of the sound waves

C diffraction of the sound waves

D interference of the sound waves

[1 mark]

Question 4

A diffraction pattern is observed when monochromatic light was incident on a diffraction grating.

Which row describes the effect of replacing the grating with one that has more lines per metre?

	number of orders of diffraction visible	angle between first and second orders of diffraction
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

[1 mark]

Question 5

A student investigates the interference of light using two identical green LEDs.

Which statement would explain why the investigation will not work?

A the light waves from the sources have a range of wavelengths

B the light waves from the sources are not monochromatic

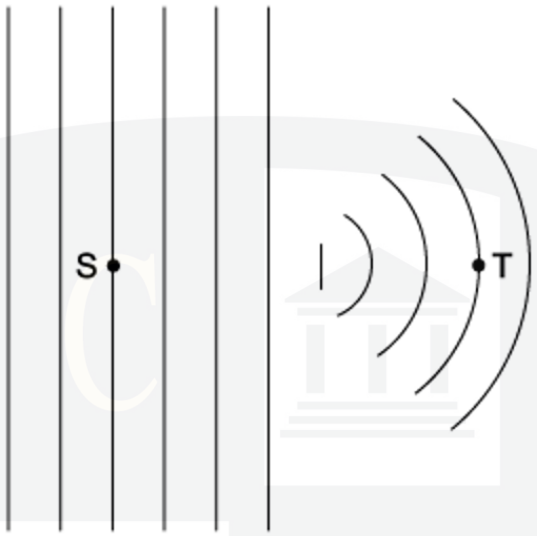
C the light waves from the sources are not coherent

D the light waves from the sources do not have the same amplitude

[1 mark]

Question 6

A ripple tank was used to demonstrate plain wavefronts passed through a gap, as shown in the diagram.



Which property would be different at S compared to T?

A frequency

B amplitude

C wavelength

D velocity

[1 mark]

Question 7

An atomic lattice has a spacing of around 10^{-10} m, which electromagnetic wave would cause the most significant diffraction effect?

A X-ray

B infra-red

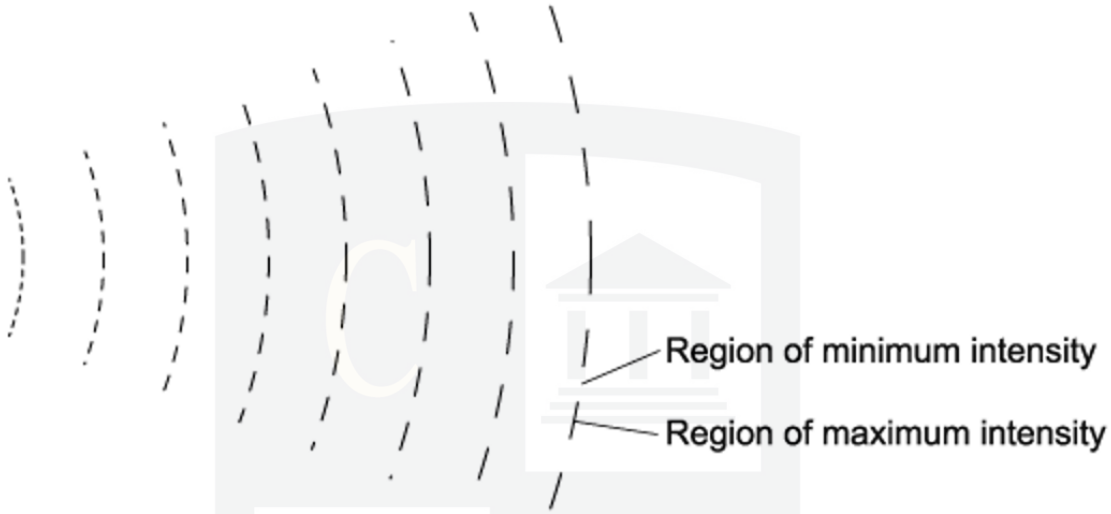
C microwave

D ultraviolet

[1 mark]

Question 8

The diagram shows the pattern of waves. The source of the waves was unable to be seen.



Which of the following would cause this pattern?

A diffraction only

B interference only

C coherence only

D diffraction and interference

[1 mark]

Question 9

Two fringes were created on a screen in a double-slit experiment; the distances were too small to measure.

Which of the following would increase the distance between the fringes?

A increasing the frequency of the light source

B increasing the distance between the light source and the slits

C increasing the distance between the slits and the screen

D increasing the distance between the slits

[1 mark]

Question 10

Which of the following is the definition of diffraction?

A change of direction when waves cross the boundary between one medium and another

B splitting of white light into colours

C addition of two coherent waves to produce a stationary wave pattern

D bending of waves around an obstacle

[1 mark]