INSIGHT

Trial Exam Paper

2010

PHYSICS

Written examination 2

STUDENT NAME:

QUESTION AND ANSWER BOOK

Reading time: 15 minutes
Writing time: 1 hour 30 minutes

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A – Core – Areas of Study			
1. Electric Power	18	18	40
2. Interactions of light and matter	11	11	24
B – Detailed Studies			
1. Synchrotron and its applications	13	13	26
OR			
2. Sound	13	13	26
OR			
3. Photonics	13	13	26
Total			90

- Students are permitted to bring the following items into the examination: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring sheets of paper or white out liquid/tape into the examination.

Materials provided

- The question and answer book of 43 pages, with a separate data sheet.

Instructions

- Write your **name** in the box provided.
- Remove the data sheet during reading time.
- Answer all the questions in the space provided.
- Always show your working where space is provided.
- Where the answer box has a unit printed in it, give your answer in that unit.
- You must answer all questions in English.

Students are NOT permitted to bring mobile phones or any other electronic device into the examination.

SECTION A – Core

Instructions for Section A

Answer **all** questions for **both** Areas of study in this section of the paper.
When answer boxes are provided, write your final answer in the box.
If a unit is printed in an answer box, give your final answer in that unit.

Area of study 1 – Electric Power

The following information relates to Questions 1 and 2.

Two permanent magnets of different magnetic field strengths are placed as shown in Figure 1. Magnet Q has about double the magnetic field strength as that of magnet P.

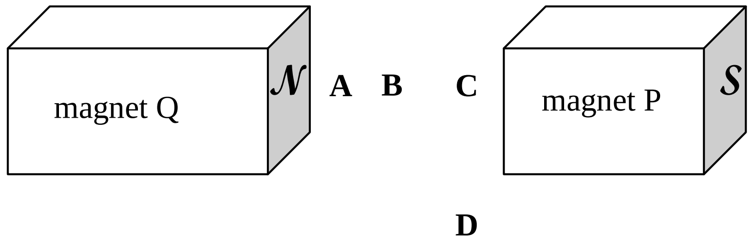

Figure 1

Question 1

Complete the diagram by sketching four magnetic field lines, with appropriate arrows, that would illustrate the magnetic field between and around the two magnets.

2 marks

Question 2

Which one of the locations A, B, C or D would have the **lowest** magnetic field strength?

2 marks

Use the following information to answer Questions 3 – 5.

In an effort to light a small light bulb, a magician slides a 30 cm metal bundle consisting of three thin rods over conducting rails immersed in an external magnetic field of 30 mT, as shown in Figure 2.

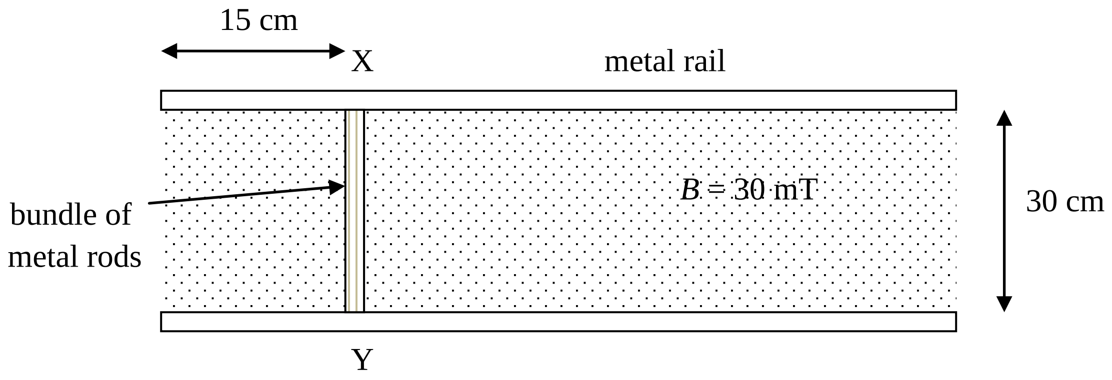

Figure 2

Question 3

As the first ‘act’, the magician turns off the external field from its strength of 30 mT to 0 in a time of 6 ms. What is the magnitude of induced emf across the ends of the bundle of three metal rods?

V

3 marks

Question 4

In the next ‘act’ the magician slides the metal rod to the left with a uniform speed of 5.0 cm s^{-1}. The magnitude and direction of the magnetic field is unchanged. What is the magnitude of the induced emf in the bundle of metal rods now?

V

3 marks

Question 5

When the magician slides the rod to the left as described in Question 4 and an emf is induced in the metal rods, which of the ends, X or Y, is at a higher potential? Explain your reasoning.

2 marks

Use the following information to answer Questions 6 – 8.

A flat square coil with sides 20 cm and consisting of 100 turns rotates in an external magnetic field with a frequency of 50 Hz. The magnitude of the external magnetic field is 0.25 T. As the coil rotates, the flux through it changes, as shown in Figure 3.

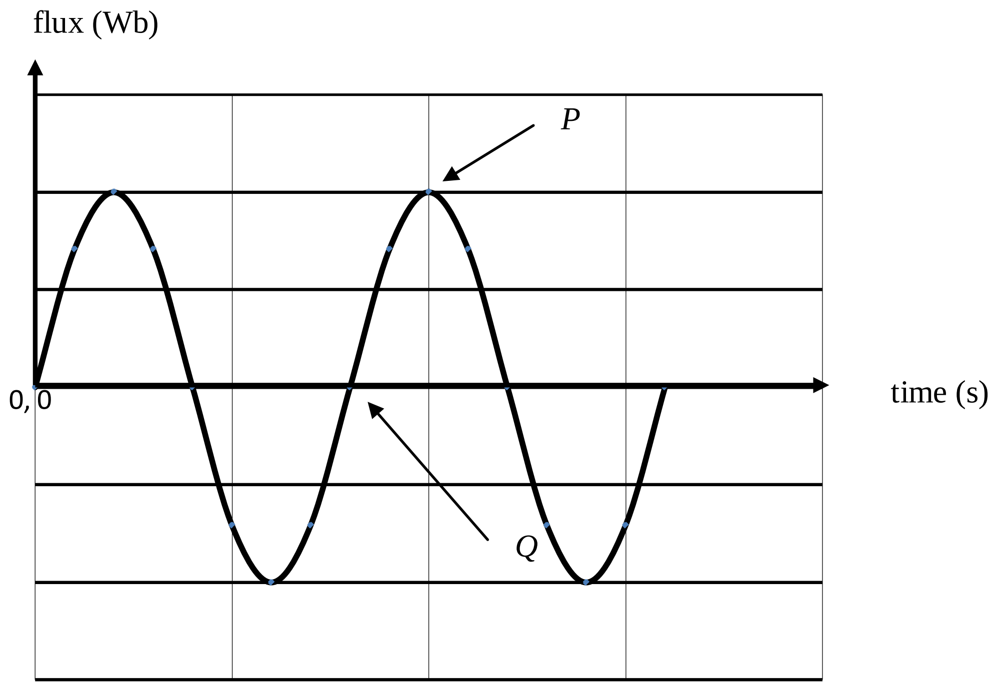

Figure 3

Question 6

On the axes of Figure 3, indicate the numerical values on the *y*-axis and the *x*-axis where indicated by the arrows *P* and *Q*.

Wb, s

2 marks

Question 7

On the axes re-drawn below in Figure 4, draw the shape of the induced emf as a function of time.

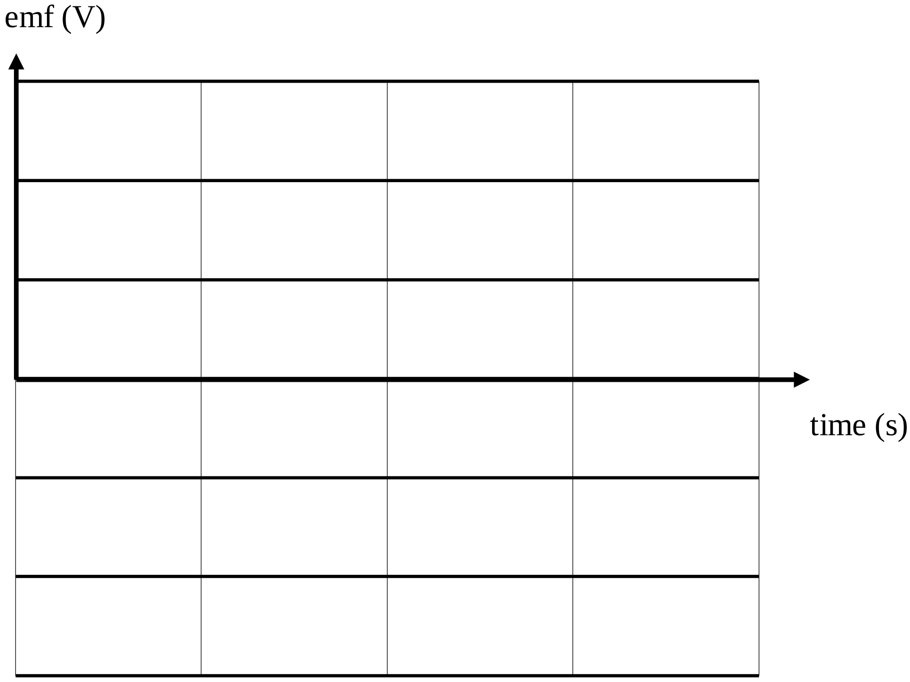

Figure 4

2 marks

Question 8

The frequency of rotation is now halved. Using the same axes supplied in Figure 4, draw the shape of the induced emf as a function of time.

2 marks

Use the following information to answer Questions 9 – 11.

A square coil, *PQRT*, with sides 20.0 cm and consisting of 100 turns is rotated in the field of a uniform permanent magnet of field strength 30 mT, as shown in Figure 5, so as to operate as a DC motor. The current through the arm *PQ* is measured as 2.0 A.

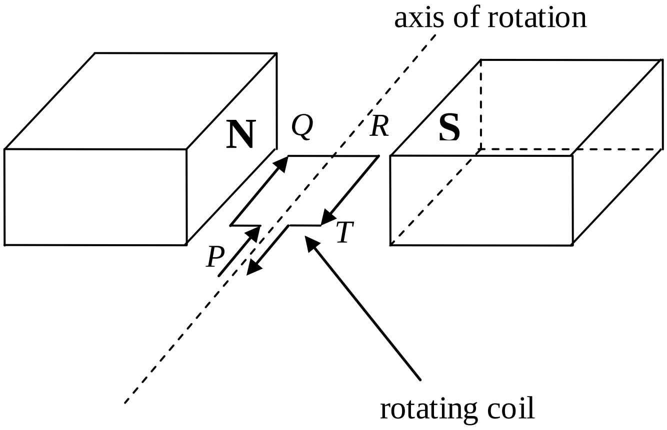

Figure 5

Question 9

With reference to the external magnetic field and the effect of current in the coil, explain **why** there is a force on the arm *PQ* in the position shown.

2 marks

Question 10

In the position shown, what is the magnitude of net force on the arms *PQ* and *QR*?

	Side *PQ*	**Side *QR***
Magnitude of force	N	N

2 marks

Question 11

Explain, with reference to the force on the side *PQ* as it turns through 180°, what device is built in the design of the motor to ensure that the motor keeps spinning in the same direction?

3 marks

Use the following information to answer Questions 12 – 16.

A power station produces 350 MW at 15 kV. Power lines transmit the power to a small village 10 km away using overhead power transmitting cables, which have a total resistance of 4.5 Ω. Two transformers are used in the process. From the first transformer, called transformer 1 and which is at the site of the power station, the voltage output is 450 kV. A schematic diagram of the station, transformers and transmission lines to the village is shown in Figure 6.

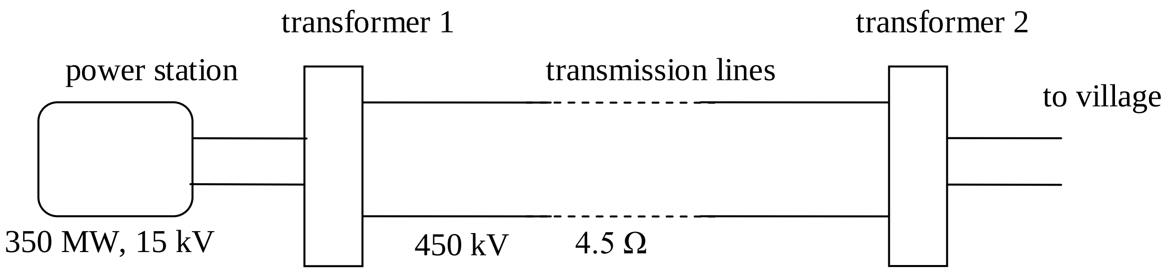

Figure 6

Question 12

Calculate the ratio of number of primary turns to that of secondary turns for the transformer 1 used at the site of the power station.

:

2 marks

Question 13

What is the current in the transmission lines between transformer 1 and transformer 2?

A

2 marks

Question 14

What is the power lost by the transmission lines from transformer 1 to transformer 2? Show your working.

MW

2 marks

Question 15

What is the voltage at the primary coil of transformer 2?

kV

3 marks

Question 16

Outline two appropriate methods that could be used to further reduce power loss, without changing the power production.

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___

___

___

2 marks

Use the following information to answer Questions 17 and 18.

In Mariah's room there are three lights, two of which are on the ceiling and one is her study lamp. The room is supplied by a power supply of 30 V_{RMS}. The three lights are connected as shown in the circuit (Figure 7). The two ceiling lights have a resistance of 50 Ω each. When all three lights are on, Mariah measures the current by a meter in the circuit, as shown in the circuit diagram, to be 0.5 A.

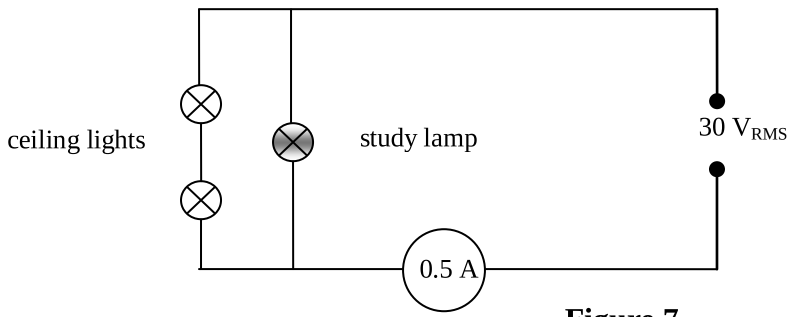

Figure 7

Question 17

What is the resistance of the study lamp?

Ω

2 marks

Question 18

What will be the energy consumed by the room when all three lights are turned on for 1 hour?

MJ

2 marks

Area of study 2 – Interactions of light and matter

Use the following information to answer Questions 1 – 3.

Photons are considered to have both wave-like and particle-like properties. A photon is also called as 'a bundle of energy'. In order to estimate the energy, wavelength and momentum of photons, a 1 mW laser beam is used to emit a beam of light of wavelength 480 nm. Each photon emitted by the laser beam can be considered to be identical.

Question 1

What is the energy of a single photon emitted by the laser?

J

2 marks

Question 2

How many photons are emitted by the laser in 40 seconds?

2 marks

Question 3

Calculate the momentum of one photon emitted by the laser beam.

N s

2 marks

Use the following information to answer Questions 4 – 6.

An illustration of Young's double slit experiment is shown in Figure 1. A 520 nm laser was used to obtain dark and bright bands on a screen from two narrow slits, S_1 and S_2. At a certain point, *P*, a bright band is observed. This point, *P*, is at a distance, d_1, of 1.5 m from one slit, as shown in the Figure 1.

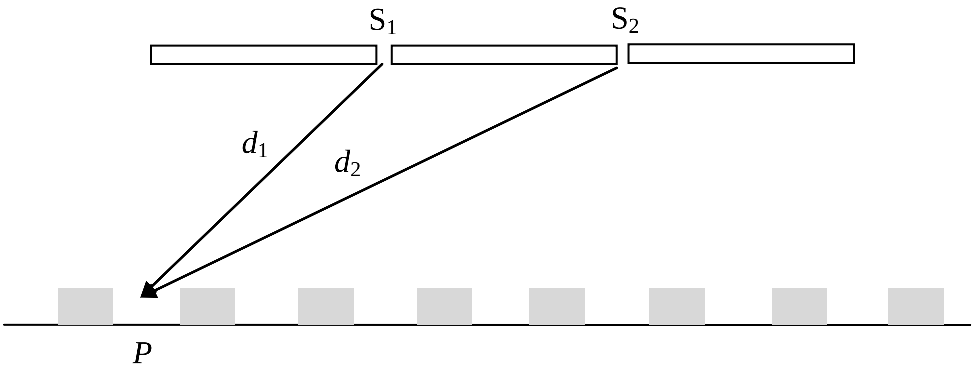

Figure 1

Question 4

Discuss whether the production of bright and dark bands is best explained by the wave-like or particle-like nature of light. Your explanation must refer to the **reason** why these dark and bright bands form.

2 marks

Question 5

Estimate the path difference of the beams from the two slits arriving at point *P*. Show your working.

m

2 marks

SECTION A – Area of study 2 – continued

Question 6

Which one of the following statements best describes the change that would occur in the pattern of dark and bright bands if the frequency emitted by the laser **increased**?

A. Bands will move closer together.

B. The bands will become more intense.

C. The bands will become less intense.

D. The bands will move further apart.

2 marks

Use the following information to answer Questions 7 and 8.

Results from a photoelectric effect experiment are shown in Figures 2a and 2b. The effects of changing light intensity and frequency on photocurrent shows behaviour represented in Figure 2a. The maximum kinetic energy of an emitted electron as a function of frequency is shown in Figure 2b.

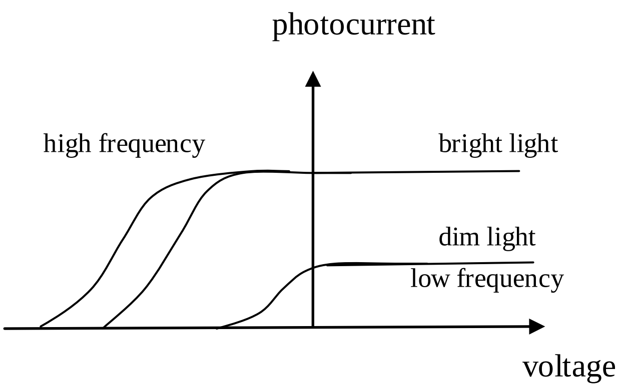

Figure 2a

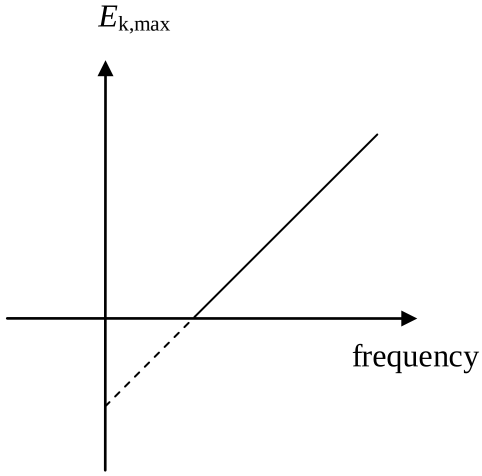

Figure 2b

Question 7

According to the results seen in Figures 2a and 2b, the bright light gives a higher photocurrent than dim light, and a higher frequency of incident light requires a more negative-stopping potential. Explain how these observations are best explained by the particle-like nature of light. You will need to refer to Figures 2a and 2b in your explanation.

___

___

___

___

2 marks

Question 8

The threshold frequency for a metal is measured as 3.5×10^{14} Hz. When light of frequency 7.2×10^{14} Hz shines on the metal, what is the maximum speed of an ejected electron? Show your working.

m s^{-1}

3 marks

Use the following information to answer Questions 9 and 10.

The energy levels for a particular gas at room temperature are illustrated in an energy level diagram (Figure 3). The ground state and ionisations states are shown with two other energy levels between them.

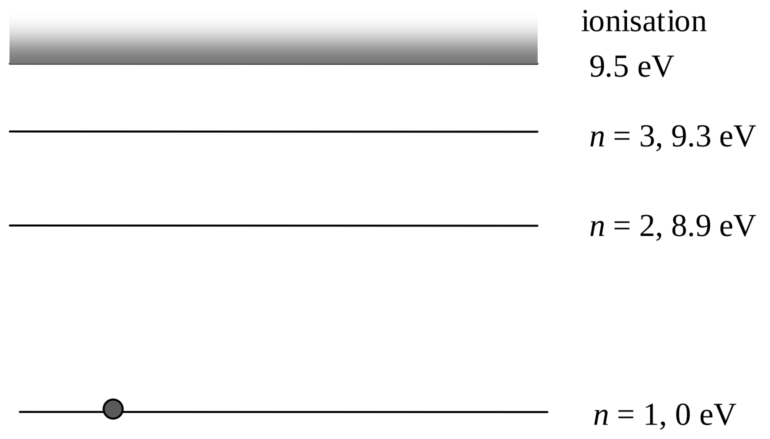

Figure 3

Question 9

Calculate the shortest wavelength present in the emission spectra of this gas, while it is still at room temperature. Show your working.

nm

2 marks

Question 10

A beam of photons, with each photon of energy 9.3 eV, is now incident on a sample of this gas at room temperature. Determine the energies absorbed (in eV) or emitted (in eV) as a result of all electron transactions that will occur between energy levels as a result of this beam. Show your working clearly.

Absorption emission line(s): ____________________

Emission spectra line(s): ____________________

3 marks

Use the following information to answer Question 11.

X-rays have been used for decades to study crystal structure by diffraction. More recently, electrons have been used to study crystal structure as they too show diffraction.

Question 11

What is the de Broglie wavelength of electrons travelling at 8.9×10^{6} m s^{-1}? Mass of an electron is 9.1×10^{-31} kg.

m

2 marks

END OF SECTION A

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TURN OVER

SECTION B – Detailed studies

Instructions for Section B

Choose **one** of the following **Detailed Studies**. Answer **all** the questions on the Detailed Study you have chosen in the boxes provided.
A correct response scores 2 marks, an incorrect response scores 0.
Marks are not deducted for incorrect answers.

Detailed study 1 – Synchrotron and its applications

Use the following information to answer Questions 1–3.

In an electron gun, electrons are produced and then accelerated using a high voltage source. A simplified diagram of an electron gun is given in Figure 1, showing electrons are accelerated from an initial speed of zero to 3×10^7 m s^{-1}.

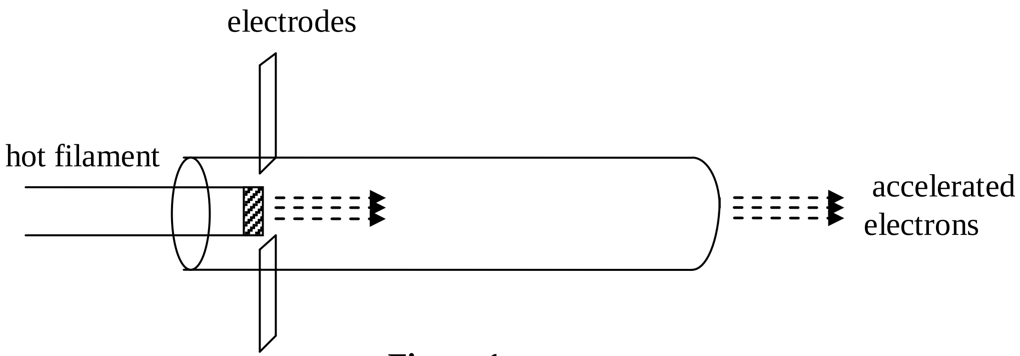


Figure 1

Question 1

Which one of the following gives the value of the accelerating voltage?

A. 1500 V

B. 2560 V

C. 3500 V

D. 5000 V

Question 2

Which one of the following gives the kinetic energy of an electron accelerated from rest by 500 kV?

A. 500 000 J

B. 8×10^{-16} J

C. 2.9×10^{-24} J

D. 8×10^{-14} J

Question 3

What is the speed of an electron which has energy of 5 keV?

A. 4.2×10^7 m s^{-1}

B. 3×10^8 m s^{-1}

C. 1.7×10^7 m s^{-1}

D. 2.9×10^7 m s^{-1}

Use the following information to answer Questions 4–6.

In the Australian synchrotron, electrons are accelerated at speeds close to that of the speed of light.

Question 4

Where does most of the acceleration of the electron occur?

A. linac

B. booster ring

C. storage ring

D. wiggler

Question 5

The principal purpose of the insertion devices is best described as

A. to insert electrons at the right time into the storage chambers.

B. to increase the speed of electrons to be close to that of the speed of light.

C. to increase the intensity of synchrotron light.

D. to improve the bending of the electrons in near perfect circular paths.

Question 6

Diffraction is a technique used to study the crystal structure of materials. Which one of the following statements best describes the advantages of the synchrotron radiation over X-rays produced in a conventional laboratory instrument?

A. Synchrotron radiation has a high intensity and a large divergence.

B. Synchrotron radiation has a high intensity and a low divergence.

C. Synchrotron radiation has a high intensity, large divergence and cannot be tuned to select a desired wavelength for analysis.

D. Synchrotron radiation has a high intensity, small divergence and can be tuned to select a desired wavelength for analysis.

Use the following information to answer Questions 7 – 10.

An electron moving with a constant speed enters a magnetic field of 79 mT at right angles to the field, as shown in Figure 2.

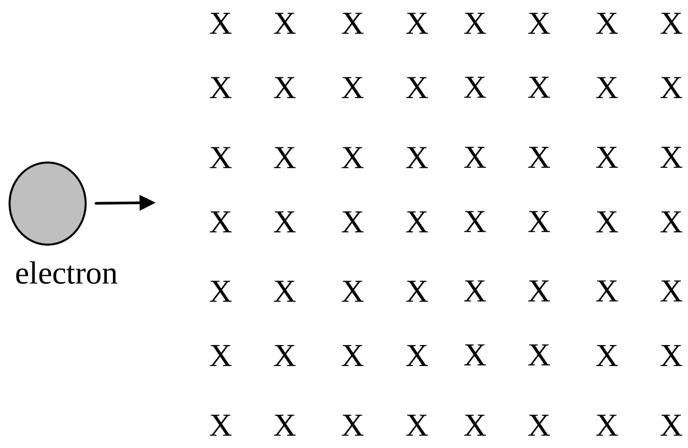


Figure 2

Question 7

Which one of the following best describes the direction in which the electron will move as it enters the magnetic field?

A. It will move up.

B. It will move down.

C. It will take a circular path and return back.

D. Its direction will be unchanged but its speed will increase.

Question 8

Which one of the following lists the physical quantities that will change as the electron enters the magnetic field?

A. energy, velocity and momentum

B. velocity and momentum

C. velocity only

D. energy and momentum

Question 9

The force experienced by an electron as it enters the magnetic field is 0.8×10^{-12} N. The speed of the electron is closest to

A. 6.3×10^{7} m s^{-1}

B. 1.0×10^{5} m s^{-1}

C. 3×10^{8} m s^{-1}

D. 5.0×10^{7} m s^{-1}

Question 10

An electron enters the magnetic field at right angles and moves in a radius of 7.5 m. Which one of the following is the closest in magnitude to the momentum of the electron?

A. 9.5×10^{-20} kg m s^{-1}

B. 6.0×10^{-16} kg m s^{-1}

C. 1.3×10^{-20} kg m s^{-1}

D. 9.5×10^{-20} kg m s^{-1}

Use the following information to answer Questions 11 – 13.

Bragg diffraction uses X-rays to diffract from planes of crystalline materials in accordance with Bragg's law: $d \sin \theta = n\lambda$. The angle, θ, of the detector is systematically increased and the intensity of diffracted X-rays is recorded.

Question 11

In Figure 3, an X-ray diffraction trace for a crystalline material is shown. The peak corresponds to $n = 1$ reflection. The wavelength used is 40×10^{-10} m.

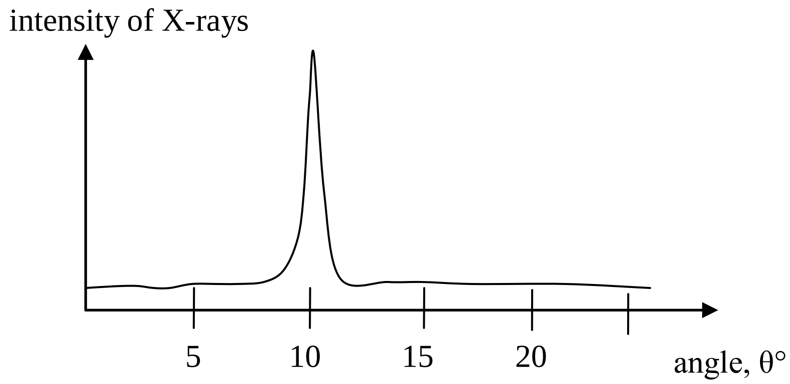


Figure 3

The inter-atomic distance of the crystalline material is closest to

A. 2.4×10^{-8} m

B. 3.2×10^{-10} m

C. 1.2×10^{-8} m

D. 3.1×10^{-8} m

Question 12

Using an X-ray monochromatic beam of wavelength 40×10^{-10} m in another crystalline material of inter-atomic distance 6.0×10^{-9} m, which one of the following is the location of the second maxima, $n = 2$?

A. 41.8°

B. 25.2°

C. 20.9°

D. 15.2°

Question 13

A crystalline material has the first maxima peak at 10°. If this sample is replaced with one of greater inter-atomic distance, which one of the following best describes the new pattern for the first maxima peak, $n = 1$?

A. The peak will stay at the same angle but will have reduced intensity.

B. The peak will move to a higher angle.

C. The peak will move to a lower angle.

D. The peak will stay at the same angle but will have increased intensity.

Detailed Study 2 – Sound

Use the following information to answer Questions 1–5.

A sound frequency generator broadcasts a single frequency note of 500 Hz through a loudspeaker in an open field. The speed of sound under these conditions is 348 m s^{-1}. The sound wave is detected by two students, Andy and Jill, who are 15.0 m and 21.0 m away, respectively. Assume that there is no loss of energy as the sound wave travels from the loudspeaker to the two students.

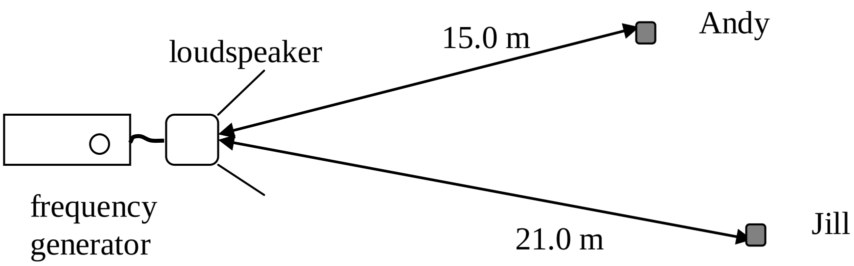


Figure 1

Question 1

Which one of the following is the wavelength of sound in air under the given conditions?

A. 0.7 m

B. 0.35 m

C. 700 m

D. 1.7×10^5 m

Question 2

Andy measures the sound intensity level as 70 dB. Which one of the following is the intensity of the sound wave at his location?

A. 10^{-8} Wm^{-2}

B. 10^{-7} Wm^{-2}

C. 10^{-5} Wm^{-2}

D. 10^{-2} Wm^{-2}

Question 3

Andy measures the sound intensity level as 70 dB. Which of the following is the best estimate of the sound intensity level that Jill will receive?

A. 70 dB

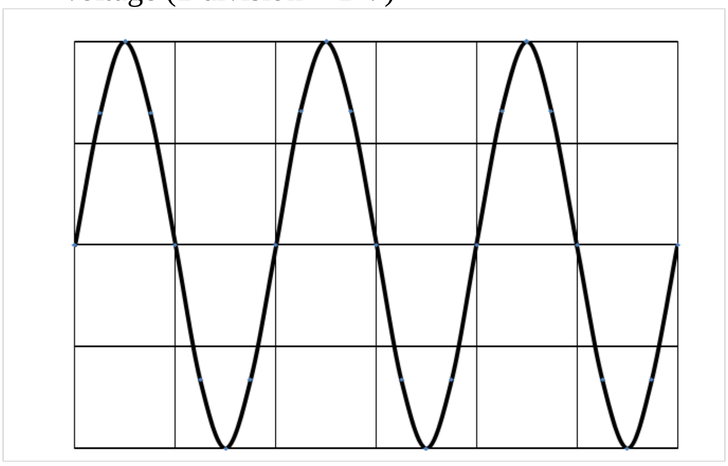
B. 67 dB

C. 65 dB

D. 60 dB

The frequency generator is now set to another frequency and Andy measures the waveform of the sound wave form using a microphone and a cathode ray oscilloscope (CRO). He obtains a trace, given in Figure 2, showing voltage on the vertical scale and time on the horizontal scale

voltage (1 division = 1 V)



time (1 division = 0.2 m s^{-1})

Figure 2

Question 4

What is the frequency of the sound wave being emitted now?

A. 2500 Hz

B. 1250 Hz

C. 5000 Hz

D. 2.5 Hz

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Question 5

The pressure variation of the sound wave observed is represented in Figure 3 at a certain time t_0 and it is moving to the right. Under the trace are shown four other possible waves, A, B, C and D. Which one of the traces, A, B, C or D, shows the variation of air pressure with time at a moment $\frac{t}{4}$ later, where t is the time period?

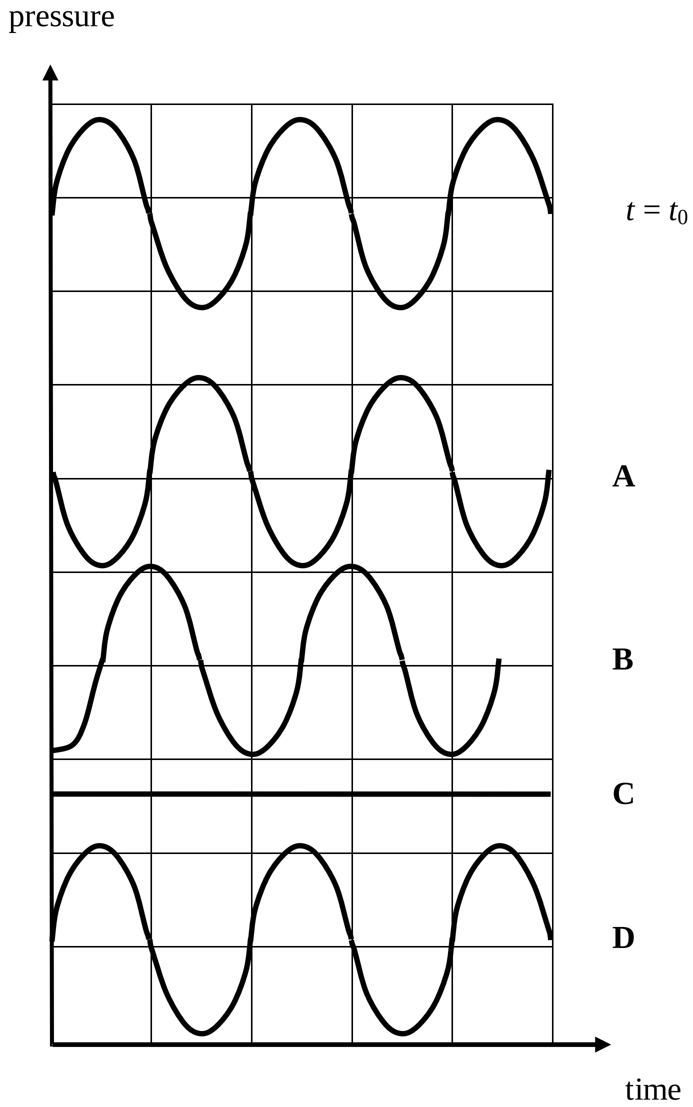

Figure 3

Use the following information to answer Questions 6 and 7.

The response of Tina to sound is described in Figure 4.

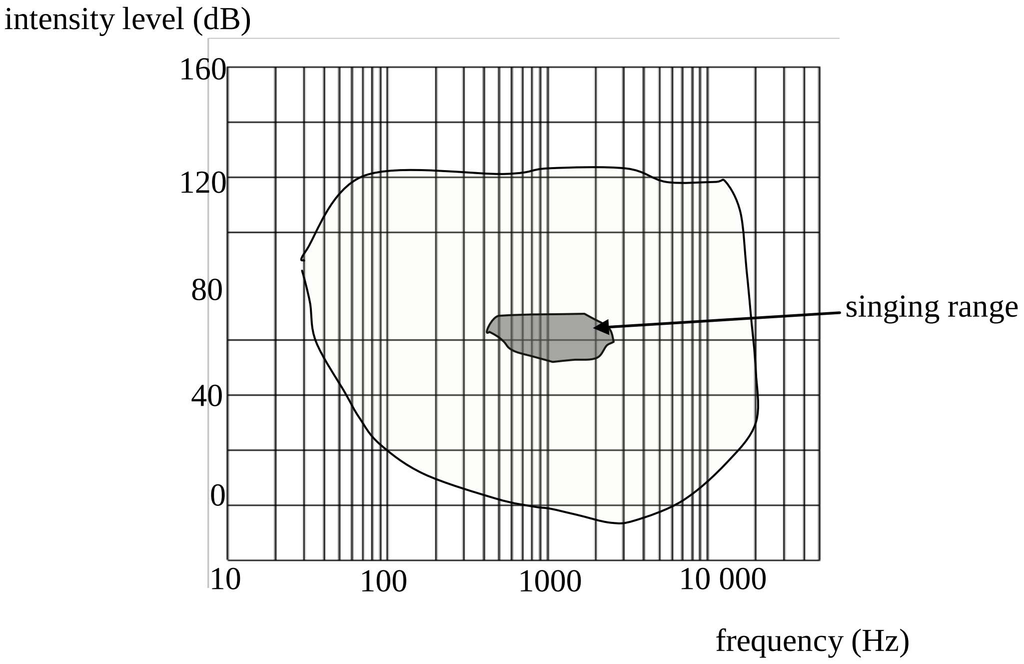

Figure 4

Question 6

The intensity at which Tina would *just* be able to hear at 100 Hz is closest in value to

A. 10^{-7} Wm^{-2}

B. 10^{-8} Wm^{-2}

C. 10^{-9} Wm^{-2}

D. 10^{-10} Wm^{-2}

Question 7

Tina is interested in recording one of her songs. During an experiment,it is established that her vocal frequencies range from 500 Hz to 3200 Hz. Her recording manager suggests that, for best high-fidelity sound, a combination of two microphones should be used for recording. He argues that amplifiers could be used to bring the intensity of each microphone to the appropriate levels.
The response graphs of four microphones are shown in Figure 5. Which two of the four microphones shown below would be most suitable to record the highest fidelity sound for Tina?

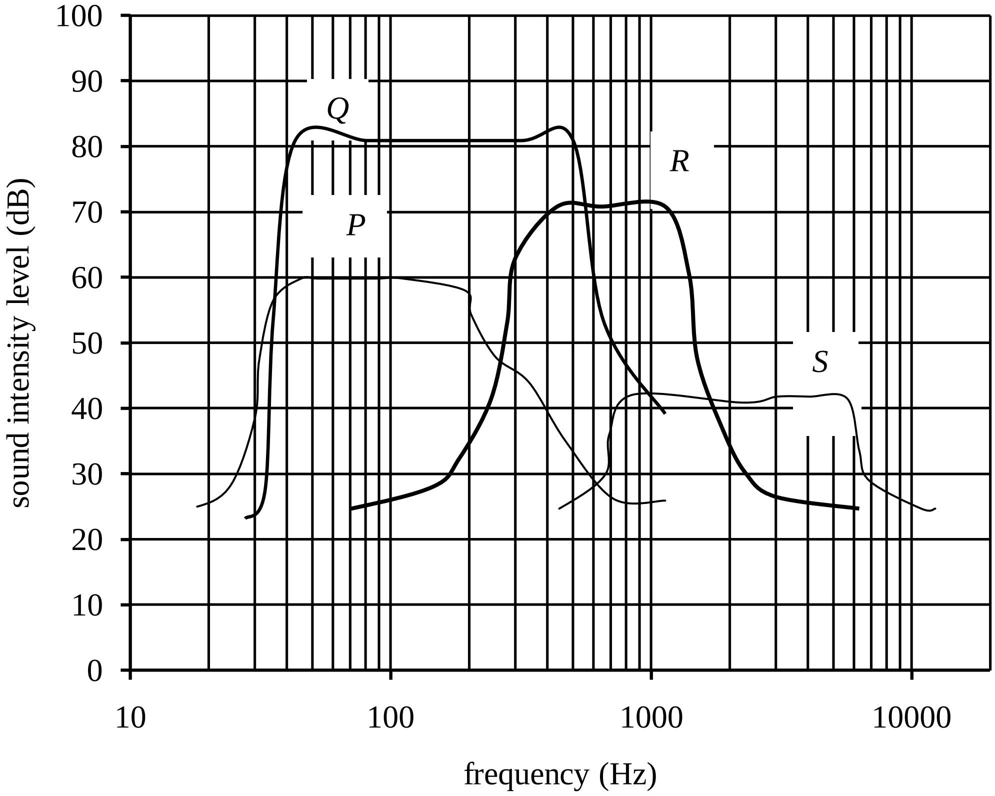

Figure 5

A. *P* and *Q*

B. *R* and *S*

C. *Q* and *R*

D. *P* and *R*

Use the following information to answer Questions 8 and 9.

The speed of sound can be found using tuning forks and an air column created by water in a tube, as shown in Figure 6. At a certain depth of water, the tuning fork can set up a loud resonating sound in the air column above the water. The total length of the tube is 1.0 m.

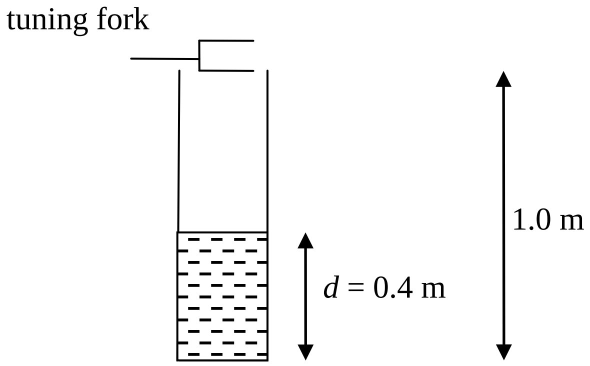

Figure 6

Question 8

Various tuning forks were tried and it was observed that the loudest sound heard is when a tuning fork of 145 Hz is used. At this time, the water in the tube has depth $d = 0.4$ m. Which of the following is the best estimate for the speed of sound in air under the given conditions?

A. 340 m s^{-1}

B. 345 m s^{-1}

C. 348 m s^{-1}

D. 351 m s^{-1}

Question 9

Tuning forks of higher frequencies are next used to find more resonance frequencies at the same depth of water. Which one of the following is most likely to be the next resonant frequency?

A. 290 Hz

B. 350 Hz

C. 362 Hz

D. 435 Hz

Use the following information to answer Questions 10 and 11.

A pipe hangs horizontally from the side of a house and is open at both ends, as shown in Figure 7. Air moves along the inside of the pipe from left to right. In windy weather, the pipe resonates at a certain frequency.

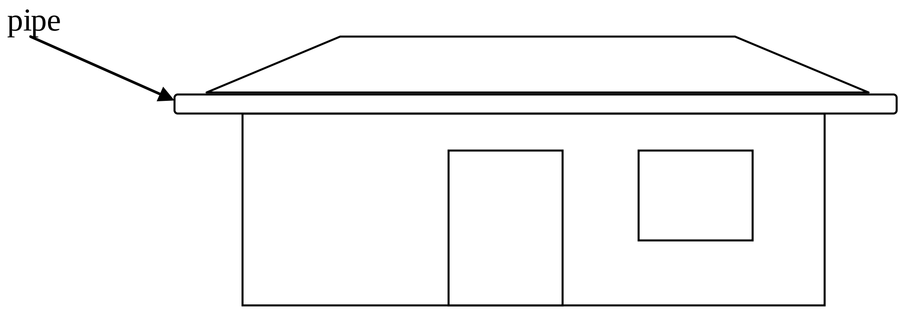

Figure 7

Question 10

Which of the following is the **best** explanation for resonance in this pipe?

A. Standing waves are formed in the air column inside the pipe and the resonant frequency is dependent only on the dimensions of the pipe.

B. The frequency of the sound waves in air equals the natural frequency of the material causing resonance.

C. Standing waves are formed in the air column inside the pipe at a resonating frequency that is dependent only on the dimensions of the pipe and the speed of sound in the air column.

D. Constructive and destructive interference patterns in the air column set up a musical note.

Question 11

For the pipe of length 2.2 m, which of the following is closest to the fundamental frequency of the standing wave that would be set up in the pipe? Take the speed of sound to be 350 m s^{-1} inside the pipe.

A. 40 Hz

B. 160 Hz

C. 350 Hz

D. 80 Hz

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Question 12

Listed below are four statements about different types of microphones.

Which one of the statements best describes the operation of a crystal microphone?

A. This type of microphone is based on a piezoelectric material producing a current in response to changes in pressure.

B. This type of microphone has a capacitor where changes in pressure produce a change in potential difference.

C. Changes in pressure produce movement in a coil mounted over a permanent magnet.

D. Pressure variations cause a thin ribbon of aluminium to oscillate in a magnetic field.

Question 13

Gemma and Jonah stand outside an exit door to a hall from which a range of frequencies are being produced as part of a concert. Although both are the same distance from the door, Gemma is directly in front of the door and Jonah is to the side. The sounds from the concert are heard by both Gemma and Jonah, but the frequencies seem to be different.

Which of the following statements is the best description of the frequencies heard by Gemma and Jonah?

A. Gemma will receive more of the lower frequencies than the higher frequencies.

B. Jonah and Gemma will both receive the same sound.

C. The intensity of sound received by Jonah will be less but there will be no enhanced frequency.

D. Jonah will receive more of the lower frequencies than the higher frequencies.

END OF DETAILED STUDY 2
SECTION B – continued
TURN OVER

Detailed Study 3 – Photonics

Use the following information to answer Questions 1–3.

A red-hot piece of iron, a burning candle, the Sun and an incandescent lamp each give a *continuous* spectrum. The spectra of wavelengths in the visible region produced by these four different light sources are shown in Figure 1. The relative intensities of the spectra are not drawn to scale.

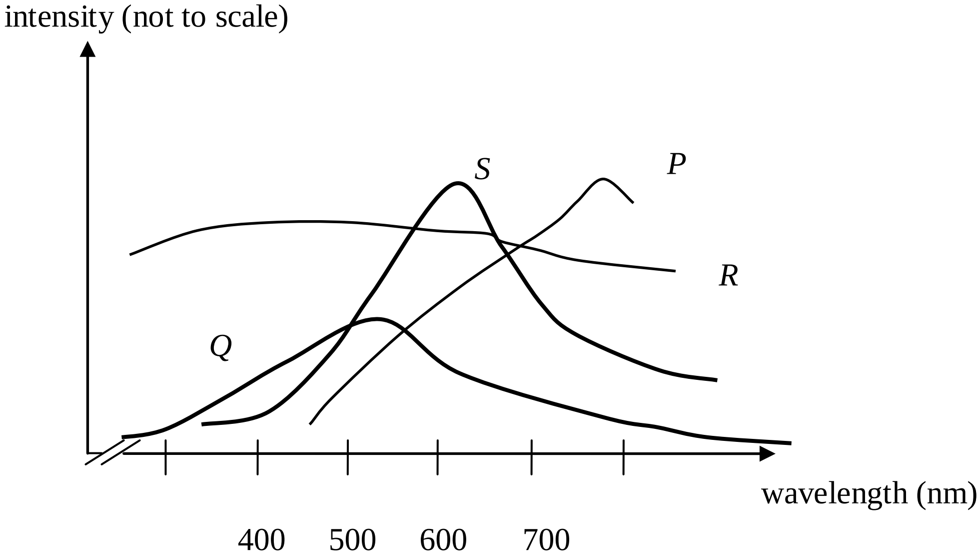

Figure 1

Question 1

Which one of the following statements is the best assignment of light sources to the spectra shown in Figure 1?

A. Spectrum *P* is by a burning candle, *Q* by an incandescent light bulb, *R* by the Sun and *S* by the red-hot iron.

B. Spectrum *Q* is by a burning candle, *P* by an incandescent light bulb, *R* by the Sun and *S* by the red-hot iron.

C. Spectrum *R* is by a burning candle, *P* by an incandescent light bulb, *Q* by the Sun and *S* by the red-hot iron.

D. Spectrum *S* is by a burning candle, *P* by an incandescent light bulb, *Q* by the Sun and *R* by the red-hot iron.

Question 2

Which one of the following statements best describes the mechanism by which light is produced in an incandescent lamp?

A. collision of electrons

B. acceleration and deceleration of atoms

C. collisions of atoms

D. acceleration and deceleration of charged particles

Question 3

As a ball of iron is heated to higher temperatures from an initial temperature of T_1 to a higher temperature of T_3, which one of the graphs in Figure 2 best illustrates the spectra as a function of frequency of light emitted?

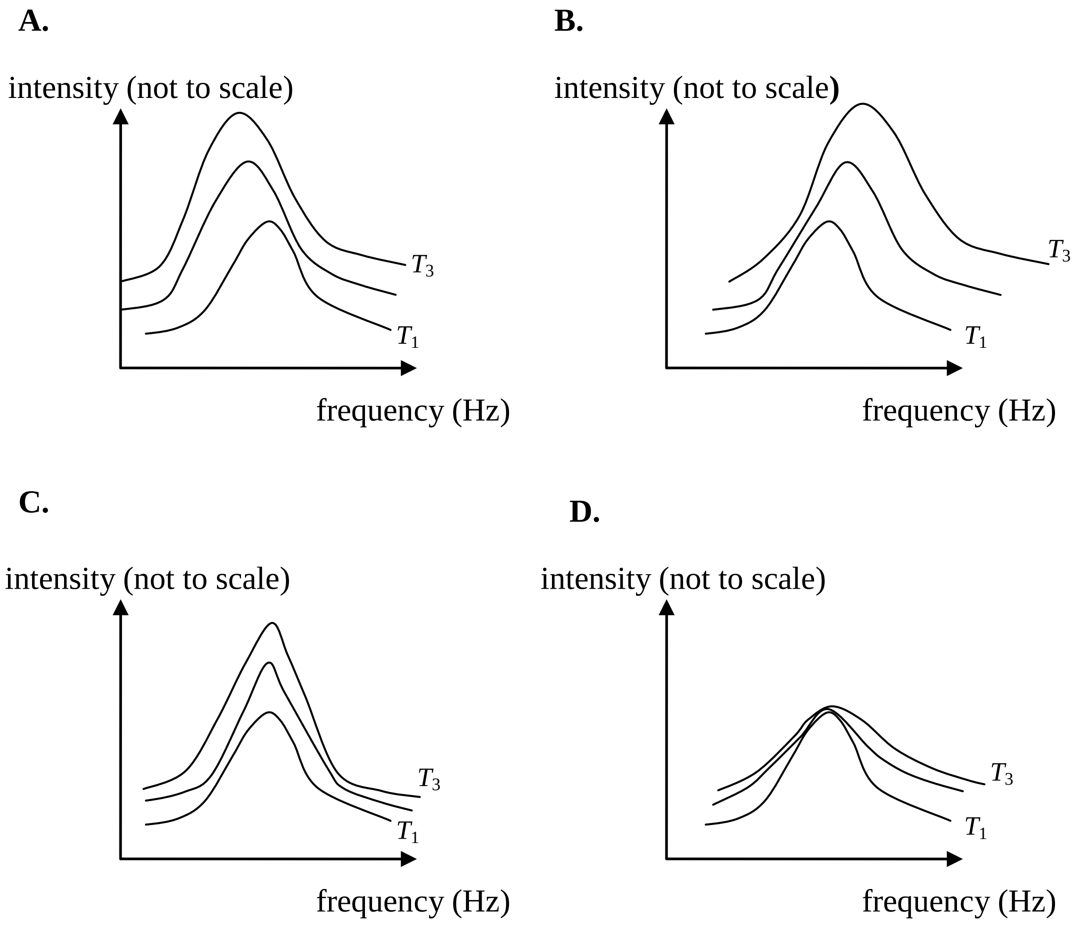

Figure 2

Use the following information to answer Questions 4 and 5.

The spectra of two different LED light sources are studied by assembling the circuit shown below (Figure 3). The circuit consists of a variable DC power supply, a resistor and the test LED. Each LED’s spectrum is measured as the voltage is increased.

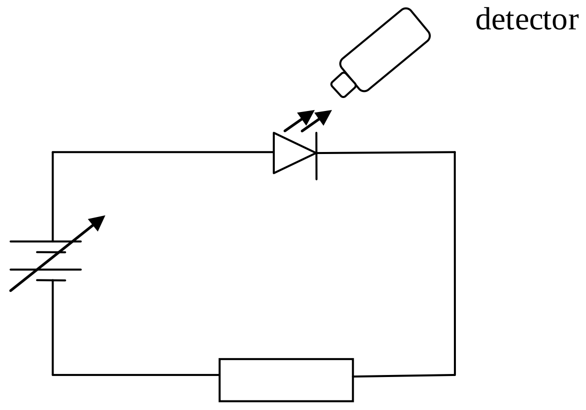

Figure 3

Question 4

The intensity of the spectrum with increasing voltage for a certain LED is shown in Figure 4.

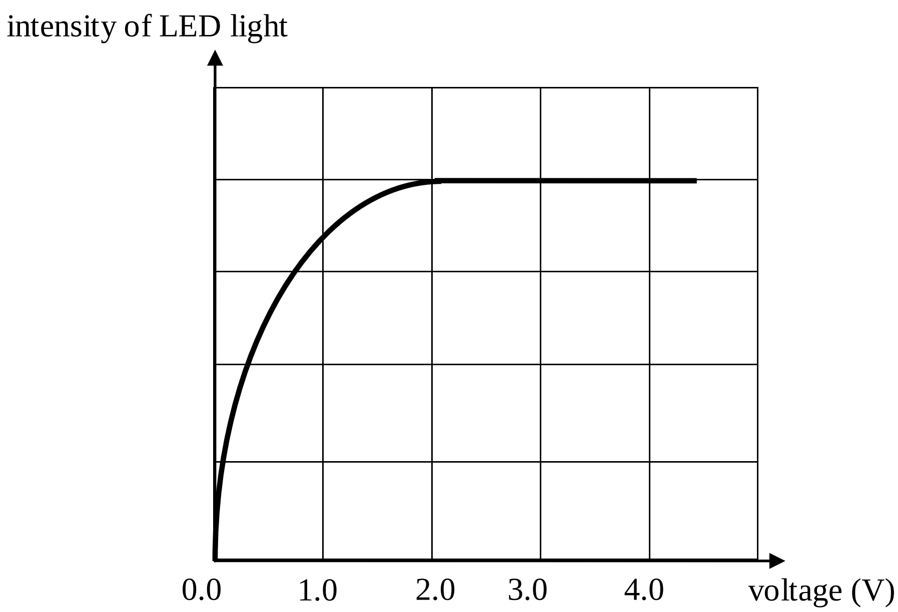

Figure 4

What is the wavelength of the characteristic colour of the LED when it is fully lit?

A. 430 nm

B. 510 nm

C. 620 nm

D. 750 nm

Question 5

The band gap of the material in the LED that emits a wavelength of 510 nm when fully lit is closest to

A. 1.1 eV

B. 3.2 eV

C. 2.4 eV

D. 4.2 eV

Use the following information to answer Questions 6–8.

A laser emits a wavelength of 600 nm and is shone on a fibre optic cable, as shown in Figure 5. The path of the light beam from the source to the core and subsequent reflection at the cladding is also shown. The refractive index of the core is 1.48 and that of the cladding is 1.51.

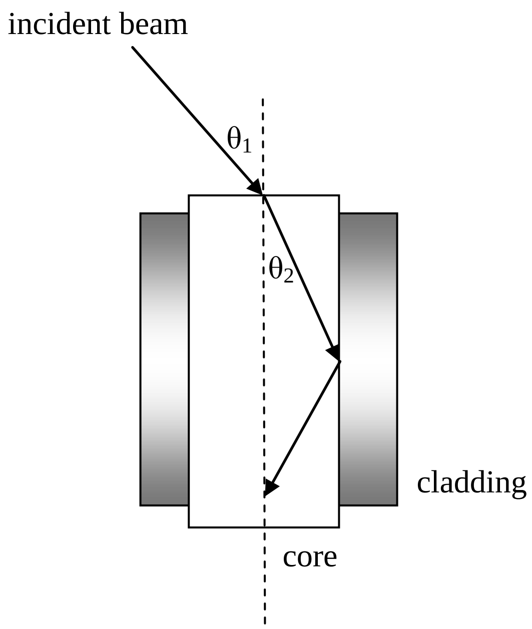

Figure 5

Question 6

When $\theta_1 = 7.50°$, the best value for θ_2 is

A. 5.06°

B. 4.95°

C. 4.50°

D. 5.15°

Question 7

The best value for the acceptance angle for this cable is about

A. 21°

B. 17°

C. 14°

D. 10°

Question 8

As the beam travels from the core to the cladding, it reflects. The critical angle from the core to the cladding is closest to

A. 43.68°

B. 51.05°

C. 68.92°

D. 78.56°

Use the following information to answer Questions 9 and 10.

A single-mode fibre sends data over 10 km. Its transmission characteristic graph is shown (Figure 6).

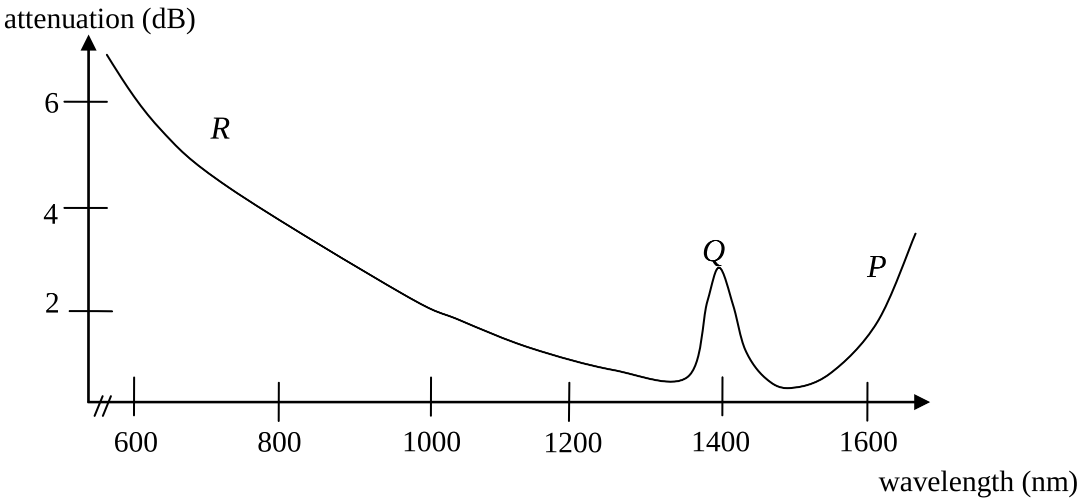

Figure 6

Question 9

The principal cause of attenuation at position *P* is due to

A. Rayleigh scattering.

B. modal dispersion.

C. absorption by glass.

D. absorption by OH^-.

Question 10

Two lasers are being considered for communication. Laser L_1 has a wavelength of 600 nm and laser L_2 has a wavelength of 1600 nm. Which one of the following statements best describes the attenuation properties of the two fibre optic cable with the lasers?

A. Laser L_1 will have lower attenuation than laser L_2, since laser L_2 has significant losses primarily due to Rayleigh scattering.

B. Laser L_1 will have higher attenuation than laser L_2, since laser L_1 has significant losses primarily due to Rayleigh scattering.

C. Laser L_1 will have higher attenuation than laser L_2 due to both Rayleigh scattering and absorption.

D. Lasers L_1 and L_2 will have about the same attenuation because a very narrow range of wavelengths is used in a laser beam.

Use the following information to answer Questions 11–13.

Shaun and Rishi wish to set up a fibre optic cable over a distance of about 200 km so that they can send large amounts of data across in the most efficient manner. They are having a discussion about which type of cable to use and make a number of statements.

Question 11

Which one of the following statements would lead to the correct choice of fibre optic cable over a long distance?

A. Graded index multimode fibre can carry multiple modes with minimum material dispersion over long distances.

B. Multimode fibres can carry a lot of signal and are very common.

C. Single-mode fibres have low modal dispersion and can carry large amounts of data using multiplexing.

D. Multimode fibres have no modal or material dispersion and hence are the preferred choice over long distances.

Question 12

When an input signal of 25 mW is sent through a 1 km section of the fibre, only 22 mW is received at the receiving end. The attenuation of the signal is closest in magnitude to

A. 3.0 dB

B. 2.5 dB

C. 1.5 dB

D. 0.5 dB

Question 13

A new fibre optic cable has an attenuation of 0.11 dB per km. During testing of this new fibre optic wire, a signal of 10 mW is received at the end of a 1.50 km sample. The power of the input signal is closest to

A. 14.6 mW

B. 12.9 mW

C. 11.8 mW

D. 10 mW

END OF QUESTION AND ANSWER BOOK