

Table 5.1

Ecosystem function	Ecosystem A	Ecosystem B
Pollination		
Stable food web		
Nutrient cycling		

BCSE PHYSICS
SAMPLE PAPER II

Question I

1. A box is pushed across a horizontal floor with the force 20 N, and the frictional force acting on it is 20 N as shown in figure 1.1.

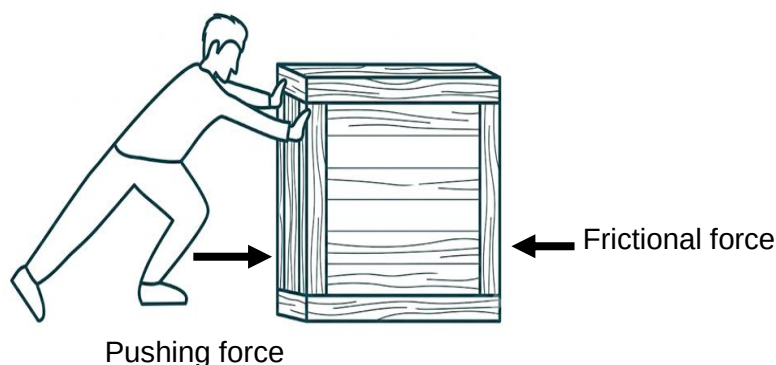


Fig. 1.1

State whether the forces are balanced or unbalanced. Describe its effect to the state of the box.

[2]

2. A student walks along a straight road.
- During the first **4 s**, the student walks at a constant speed, covering a distance of **6 m**.
 - The student the remains stationary for the next **3 s**.
 - Finally, the student walks a further **5 m** in the following **3 s** at a constant speed

Draw a distance-time graph to represent the student's motion in Fig. 1.2.

[3]

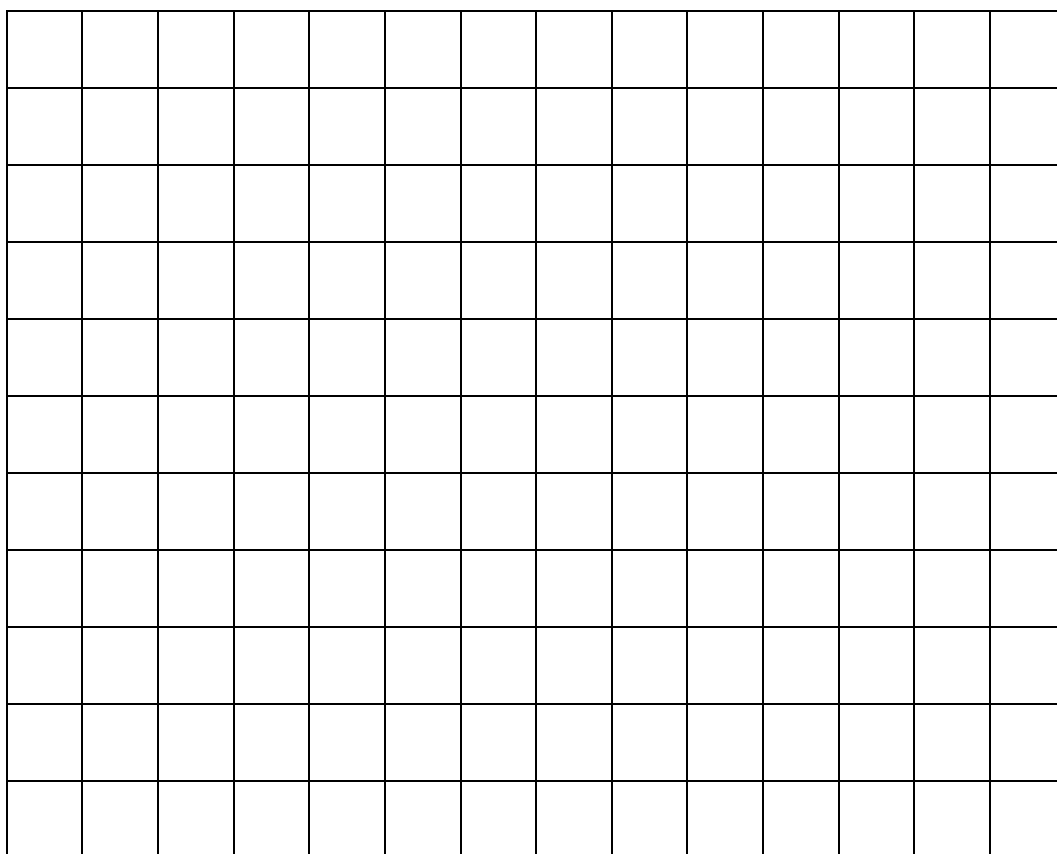


Fig. 1.2

3. Figure 1.3 shows the velocity–time graph of a moving body.

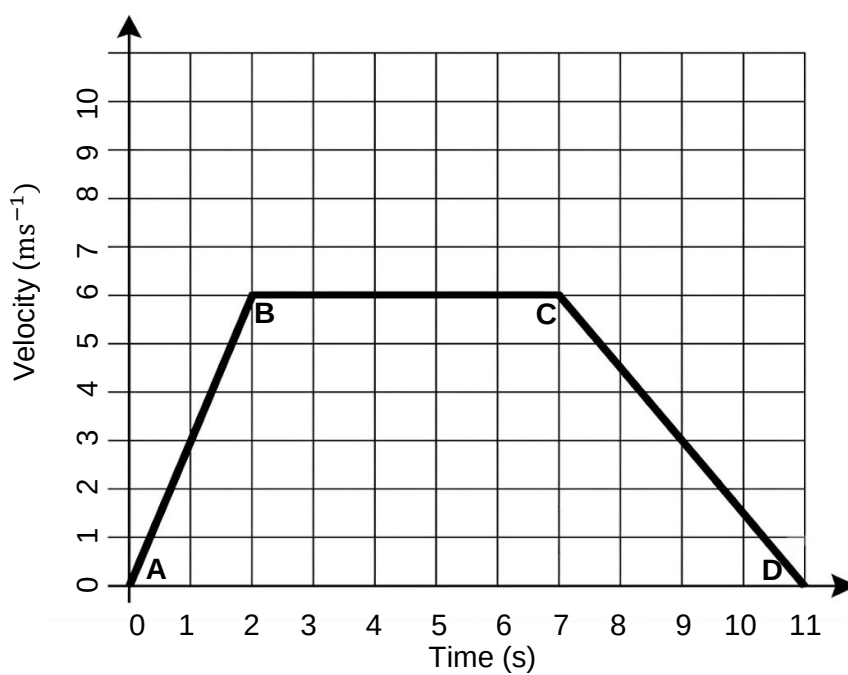


Fig. 1.3

- a. Determine the velocity at $t = 6$ s. [1]

- b. From Fig. 1.3, match each phase of the motion (AB, BC, and CD) with the correct description. Draw one line from each phase to the appropriate description. One has been completed for you. [2]

Phases on the graph	Description of the motion	
- AB - BC - CD	- Zero Acceleration - Negative Acceleration - Positive Acceleration - At rest	

- c. Calculate the displacement of the student during the first 2 s using figure 1.3. Show your work. [2]

Displacement = ... m	
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Question II

1. Explain how the pressure in a liquid changes with depth and density. [2]

2. A diver completely submerges an underwater camera of volume of $3.5 \times 10^{-3} \text{ m}^3$ in seawater. The density of seawater is 1025 kg m^{-3} . Take acceleration due to gravity, $g = 10 \text{ N kg}^{-1}$.
Calculate the upthrust acting on the underwater camera. Show your working. [2]

Upthrust = ... N	

3. Figure 2.1 shows a force of 200N applied to the piston.

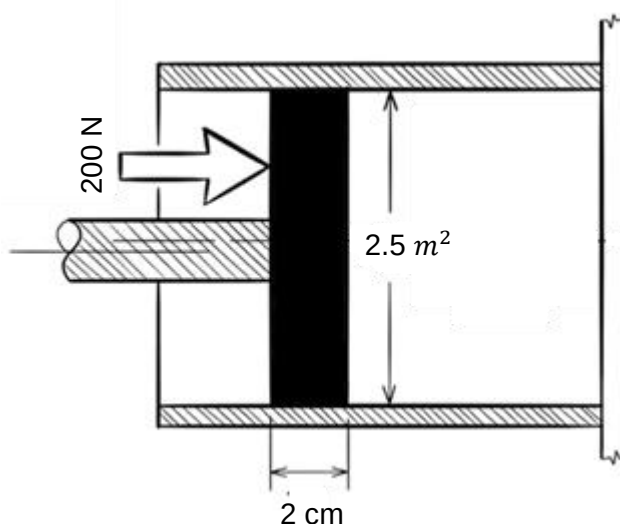


Fig. 2.1

- a. State Pascal's Law. [1]

- b. Calculate the pressure exerted by the piston.

[2]

Pressure = ... Nm^{-2}	
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4. Figure 2.2 shows two containers filled with liquids of different densities to the same depth.

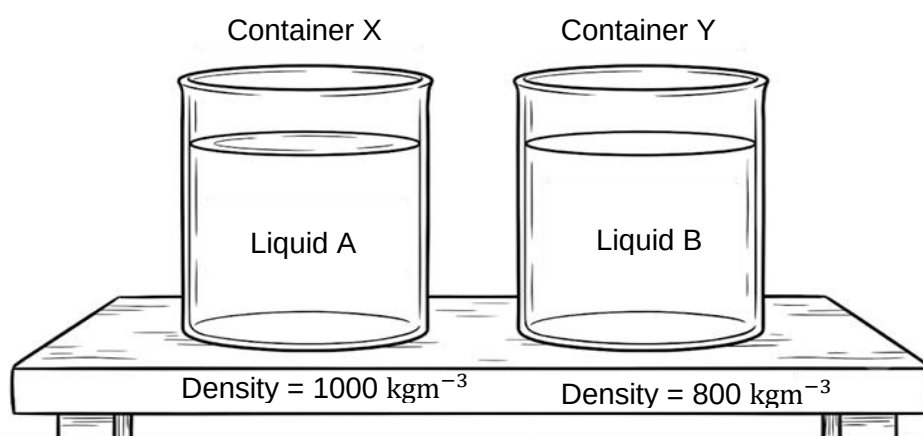


Fig. 2.2

Compare the pressure at the bottom of the two containers. Explain your answer.

[3]

Question III

1. A student sprays perfume in one corner of a classroom. After some time, the smell spreads throughout the room.

Using the particle model, explain why this happens.

[2]

2. Figure 3.1 shows the apparatus used by a student to compare the conduction of thermal energy through iron, copper, glass, and aluminium rods. Each rod is coated with wax.

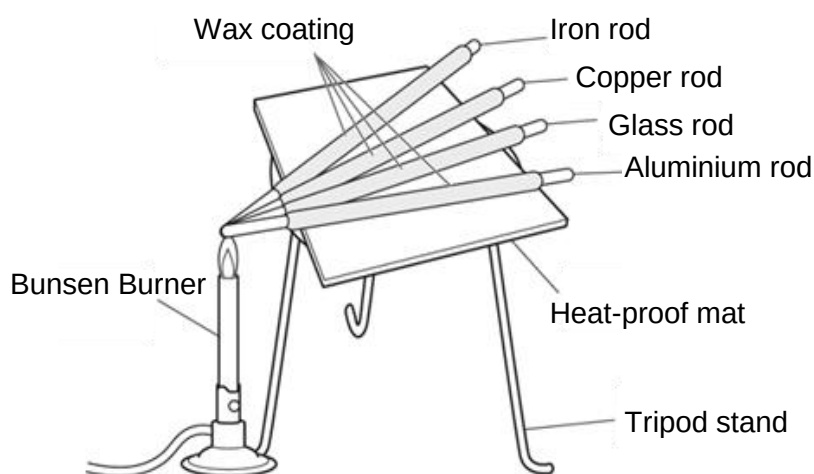


Fig. 3.1

Describe how the student can use this apparatus to compare the rate of thermal conduction through the different rods.

[2]

3. Figure 3.2 shows the arrangement of the particles in a substance during a change of state.

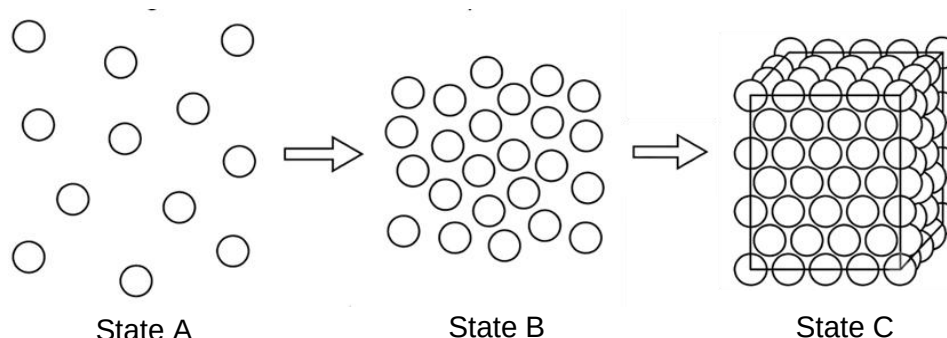


Fig. 3.2

A student claims that the particles in state B have become smaller because they are closer together than in state A.

Evaluate the student's statement using the particle theory of matter.

[2]

4. In Figure 3.2, state C is supplied 3000 J of thermal energy. The temperature remains constant, and the substance changes back to state B.

Describe the energy changes that occur during this change of state at the molecular level.

[2]

5. Explain why a coolant with high specific heat capacity is used in a cooling system.

[2]

Question IV

1. Figure 4.1 shows a socket and a three-pin plug.

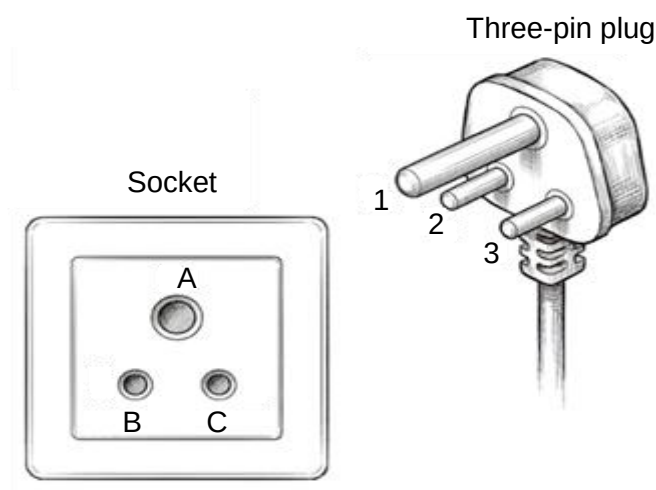


Fig. 4.1

The three pins of the plug shown in Figure 4.1 are connected to different type of wires: live, neutral, and earth.

Match the pins labelled 1, 2, and 3 to the correct type of wire. One answer has been completed for you.

[2]

Pins	Wires
1	Live
2	Earth
3	Neutral

2. Fig. 4.2 shows two circuits containing two lamps connected in different arrangements.

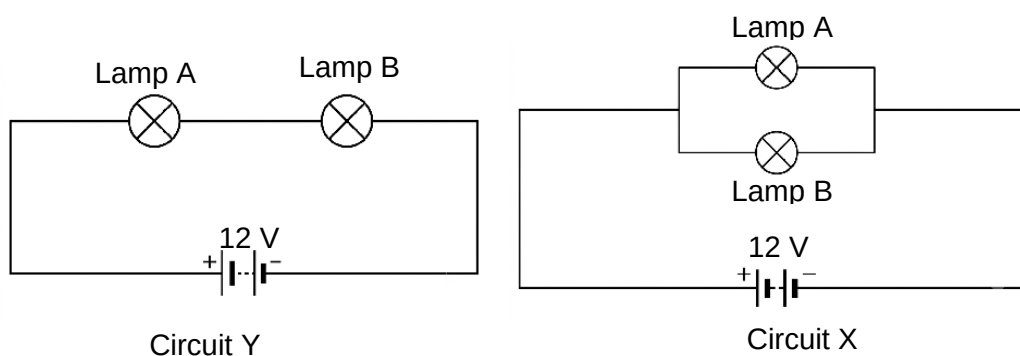


Fig. 4.2

- a. A student measures the potential difference across Lamp A as 5 V in circuit X. Calculate the potential difference across lamp B. Show your work. [2]

Potential difference across lamp B = ... V	
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- b. A voltmeter is connected across Lamp B in circuit X. Predict the voltmeter reading across Lamp B. [2]

Voltmeter reading across lamp B = ... V	
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- c. Identify which circuit provides a greater potential difference to Lamp B. Explain your answer. [2]

3. Diagram for a.c. generator is shown in Figure 4.3. [2]

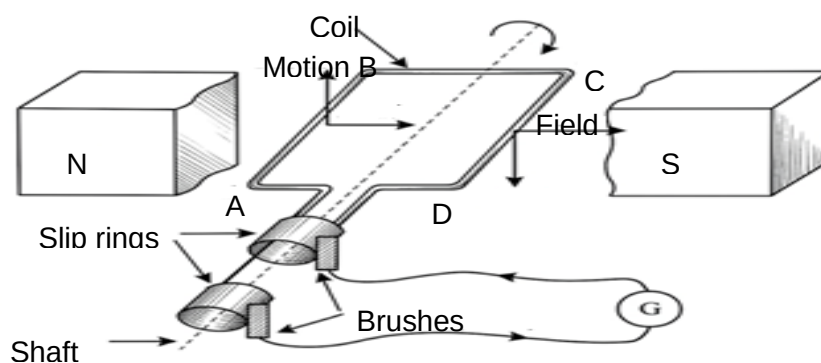


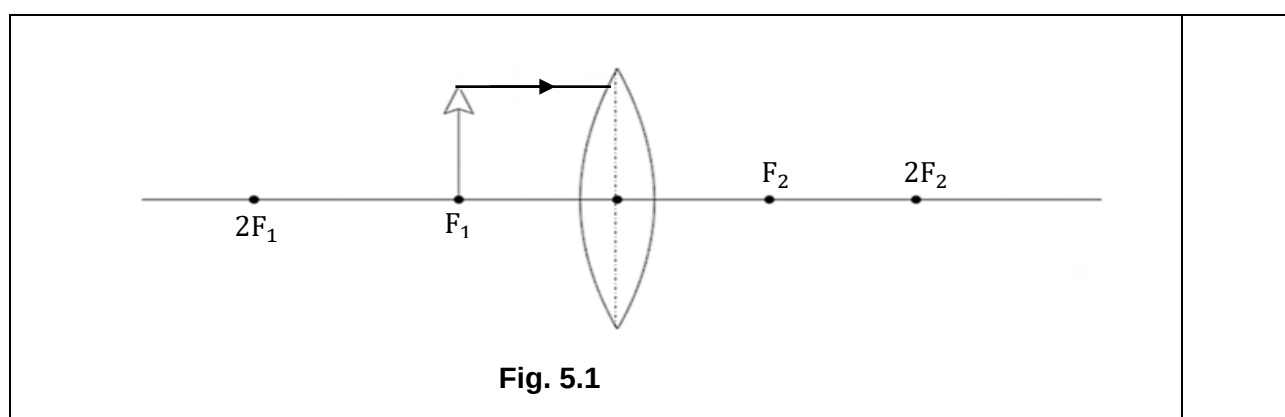
Fig. 4.3

State **two** factors affecting the magnitude of an induced e.m.f.

Factor 1:	
Factor 2:	

Question V

1. Complete the ray diagram shown in Figure 5.1. [1]



2. State **one** difference between monochromatic light and white light. [2]

Monochromatic Light	White Light	

3. Figure 5.2 shows the propagation of a wave.

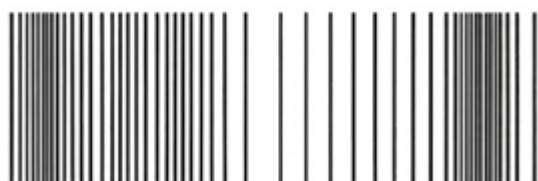


Fig. 5.2

- a. Define sound wave. [1]

- b. Explain why sound wave is classified as mechanical longitudinal waves.

[2]

4. Figure 5.3 shows two types of signals used in communication system.

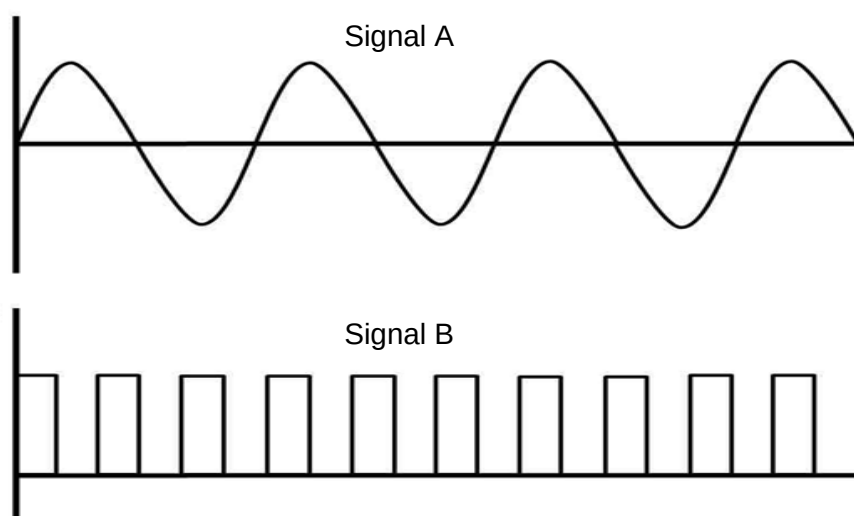


Fig. 5.3

- a. Identify the types signals labelled A and B.

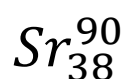
[2]

Signal A:	
Signal B:	

- b. Explain how signals A and B are used to represent and transmit information in a communication system. [2]

Question VI

1. A nucleus of strontium-90 is represented using nuclide notation as shown. [2]



Strontium-90 decays by emitting one β -particle (beta-particle).

State atomic number and the mass number of a daughter nucleus (X).

2. Define half-life of an isotope. [1]

3. State **two** necessary safety precautions to minimise the risk when handling radioactive substances. [2]

Precaution 1:	
Precaution 2:	

4. The Sun is one of billions of stars in our galaxy. It emits a large amount of energy in the form of electromagnetic radiation. [3]
State the **three** regions of the electromagnetic spectrum in which the Sun emits the greatest amount of energy.

Region 1:	
Region 2:	
Region 3:	

5. The Sun is the central star of our Solar System, with eight planets orbiting around it.

a. State the name of the galaxy that contains our Solar System. [1]

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b. State the evidence that shows the Sun contains most of the mass in the Solar System. [1]
