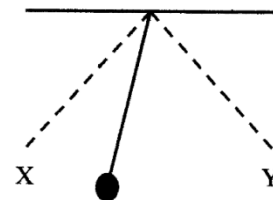


Answer **all** questions. For each question there are four different answers, **A**, **B**, **C** and **D**. Choose the **one** you consider **correct**.

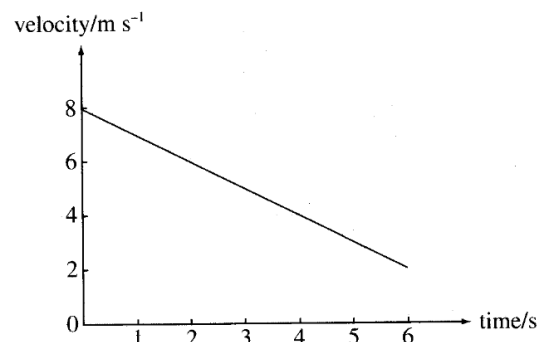
- 1 The bulb of a simple pendulum is swinging between **X** and **Y**. It takes 8.6 s to swing from **X** to **Y** and back to **X** ten times. What is the period of the pendulum?

- A** 0.43 s  
**B** 0.86 s  
**C** 4.3 s  
**D** 86 s



- 2 The graph shows the variation of the velocity of a car with time. Find the displacement described by the car in the first 4 s.

- A** -8 m  
**B** 2 m  
**C** 8 m  
**D** 24 m

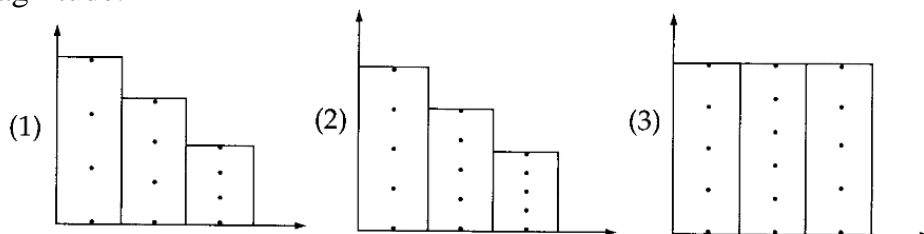


- 3 A block moves with an initial velocity 4 m/s horizontally on a rough level ground. It stops 6 m away from its starting position. How far can the block move on the ground if its initial velocity is 8 m/s?

- A** 6 m  
**B** 8.5 m  
**C** 12 m  
**D** 24 m

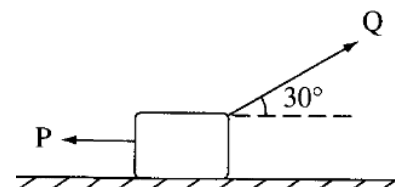
- 4 The tape charts measure the motions of a trolley projected on an inclined plane with different slopes. The frequency of the ticker-tape timer remains unchanged. Arrange the acceleration of the trolley in descending order of magnitude.

- A** I, II, III  
**B** I, III, II  
**C** II, I, III  
**D** II, III, I



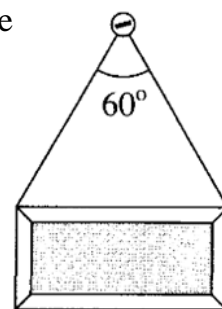
- 5 Two forces **P** and **Q** are applied on a block of mass 2 kg on a smooth horizontal surface as shown. **P** has a magnitude of 10 N and **Q** has a magnitude of 20 N. what is the resultant motion of the block?

- A** Not moving.  
**B** Moving with an acceleration of  $5 \text{ m/s}^2$  towards the right.  
**C** Moving with an acceleration of  $7.3 \text{ m/s}^2$  towards the right.  
**D** Moving with an acceleration of  $3.7 \text{ m/s}^2$  towards the right.

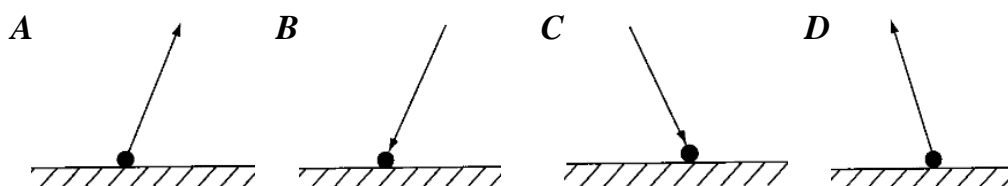
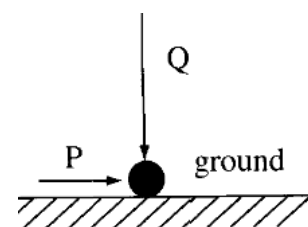


6 A picture of mass 4 kg is hung on the wall using a light rope as shown. Find the tension in the rope.

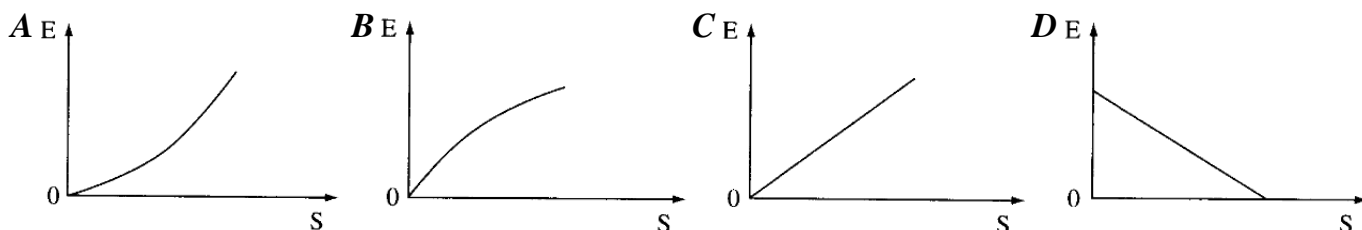
- A 11.2 N
- B 23.1 N
- C 25.4 N
- D 28.2 N



7 A particle of negligible mass rests on the ground. Two forces  $P$  and  $Q$  as shown are applied on the particle. If the particle remains at rest, which of the following arrows represents the reaction to the particle exerted by the ground?

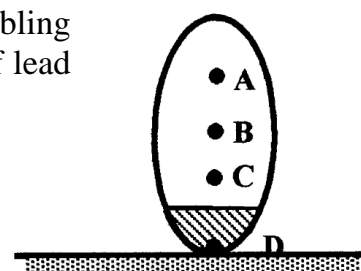


8 An object falls freely in vacuum. Which of the following graphs correctly describes the variation of the kinetic energy  $E$  of the object with the vertical distance  $S$  travelled?



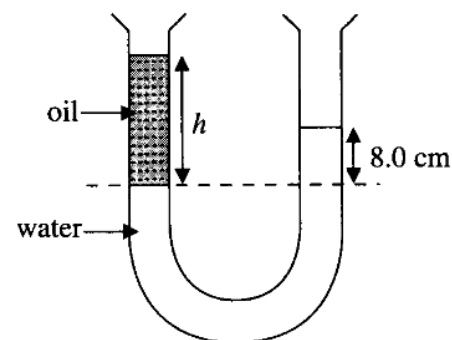
9 The diagram shows a cross-section through a child's toy called a Tumbling Kelly. The toy consists of a thin plastic egg-shaped shell with a layer of lead fixed at the bottom. Which letter is at the centre of the mass of the toy?

- A A
- B B
- C C
- D D



10 A manometer is filled with water and oil as shown. Given that the density of water and oil is  $1\,000\text{ kg/m}^3$  and  $800\text{ kg/m}^3$  respectively, calculate the height  $h$ .

- A 8.0 cm
- B 10.0 cm
- C 12.5 cm
- D 18.0 cm

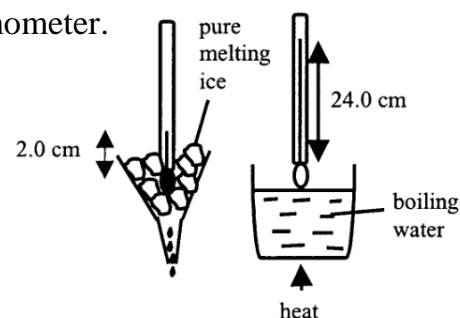


- 11 A diver is 20 m below water surface. Given that the density of water  $1\,000\text{ kg/m}^3$ , what is the amount of pressure exerted by the water on the diver?
- A** 10 000 Pa  
**B** 100 000 Pa  
**C** 200 000 Pa  
**D** 300 000 Pa

- 12 When a solid is cooled, it contracts. The simple kinetic energy explains that this is because the molecules
- A** vibrate less irregularly.  
**B** become smaller so that the solid volume is reduced.  
**C** vibrate faster and the spacing between them decreases.  
**D** have less energy of vibration and therefore they occupy less space.

- 13 The diagram shows the positions of the mercury threads in a thermometer. What is the distance between each  $1^\circ\text{C}$  mark on the thermometer?

- A** 0.22 cm  
**B** 0.24 cm  
**C** 2.0 cm  
**D** 2.2 cm

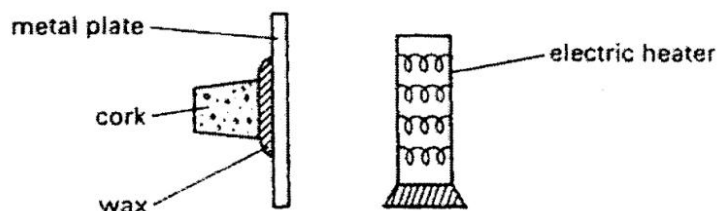


- 14 A given amount of ice is warmed steadily. Which of the following is observed as its temperature rises up to  $4^\circ\text{C}$ ?

	<i>Mass</i>	<i>Volume</i>	<i>Density</i>
<b>A</b>	Same	Increases	Decreases
<b>B</b>	Same	Decreases	Increases
<b>C</b>	Increases	Increases	Same
<b>D</b>	Decreases	Decreases	Same

- 15 A small cork is attached to a metal plate with wax. An electric heater is placed close to the plate. After a time, the wax melts and the cork drops off. How does heat reach the cork?

- A** By convection only.  
**B** By conduction only.  
**C** By conduction and radiation.  
**D** By conduction and convection.

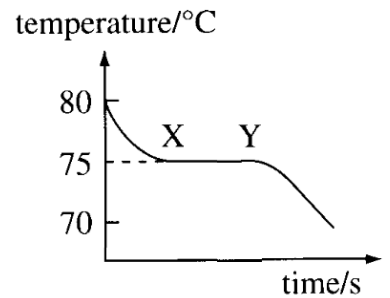


- 16 A bullet moving with speed  $500\text{ m/s}$  hits a target. If 40% of the kinetic energy is converted into the internal energy of the bullet, what will be the rise in temperature of the bullet? [Specific heat capacity of the bullet is  $200\text{ J/kgK}$ ]

- A** 1 K  
**B** 6.25 K  
**C** 100 K  
**D** 250 K

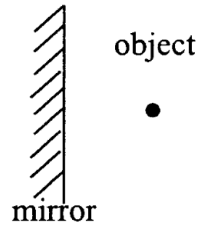
- 17 If an immersion heater takes 5 minutes to melt a certain a certain portion of ice at  $0^{\circ}\text{C}$  completely. What will be the time taken to bring the water formed from the melted ice to  $50^{\circ}\text{C}$ ? [Specific heat capacity of water =  $4\,200\text{ J/kgK}$ , Specific latent heat of fusion =  $330\,000\text{ J/kg}$ ]
- A 3.2 minutes  
 B 3.8 minutes  
 C 5.0 minutes  
 D 7.9 minutes

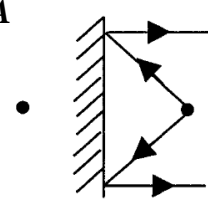
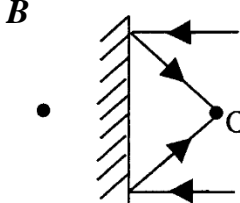
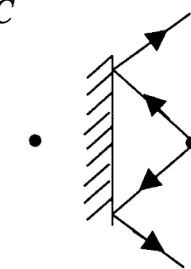
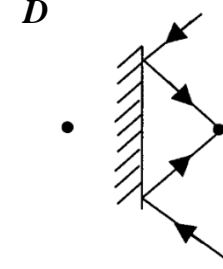
- 18 Liquid naphthalene is cooled and the variation of its temperature with time is shown. Which of the following statements concerning the graph is/are correct?



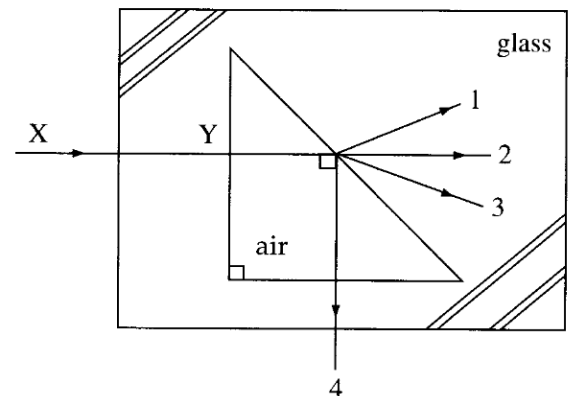
- I** The melting point of naphthalene is about  $75^{\circ}\text{C}$ .  
**II** During **XY**, only solid naphthalene is present.  
**III** During **XY**, no energy is lost by naphthalene to the surroundings.
- A **I**  
 B **III**  
 C **I, II**  
 D **II, III**

- 19 A point object **O** is placed in front of a plane mirror. Which of the following diagrams shows the formation of the image **I** behind the mirror?



- A  B  C  D 

- 20 The diagram shows a glass block in which a triangular section has been cut out. Its critical angle is  $42^{\circ}$ . What will be the path of the light ray **XY** leaving the triangular section in the glass?



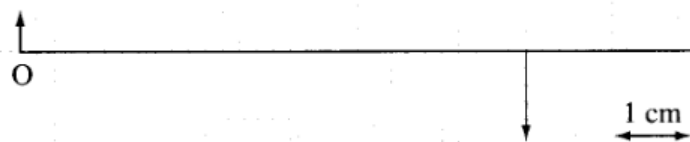
- A Path **1**  
 B Path **2**  
 C Path **3**  
 D Path **4**

- 21 On a hot day along a straight road, patches of ‘water’ can be seen in the distance. Which is the correct statement?

- A The layer of air near the road focuses light to form areal image.  
 B The refractive index of air increases with increasing temperature.  
 C The refractive index of air decreases with increasing temperature.  
 D The air near the surface of the road is denser than the air higher up.

- 22 In the diagram, a two times magnified image  $I$  of an object placed at  $O$  is produced by a single lens. Determine the nature of the lens and the distance between object  $O$  and the lens.

	<i>Nature</i>	<i>Distance</i>
<b>A</b>	convex	2 cm
<b>B</b>	convex	3 cm
<b>C</b>	concave	2 cm
<b>D</b>	concave	3 cm



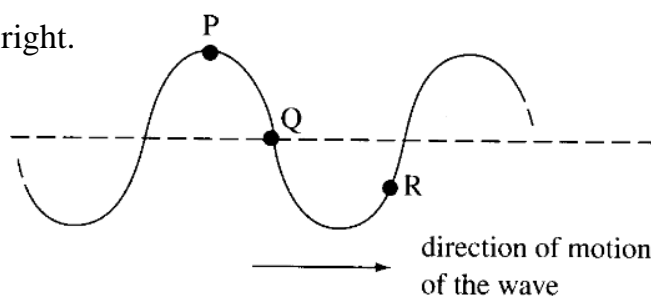
- 23 Light of frequency  $5 \times 10^{14}$  Hz travels in air at a speed of  $3 \times 10^8$  m/s. What is its frequency and wavelength when it travels through a piece of glass with a refractive index of 1.5?

	<i>Frequency</i>	<i>Wavelength</i>
<b>A</b>	$5 \times 10^{14}$ Hz	$4 \times 10^{-7}$ m
<b>B</b>	$5 \times 10^{14}$ Hz	$6 \times 10^{-7}$ m
<b>C</b>	$7.5 \times 10^{14}$ Hz	$4 \times 10^{-7}$ m
<b>D</b>	$7.5 \times 10^{14}$ Hz	$6 \times 10^{-7}$ m

- 24 A transverse wave is travelling along a string towards the right and a section of it at a certain instant is shown. Which of the following statements is/are correct?

- I** At this instant, point  $P$  is moving downwards.  
**II** At this instant, point  $Q$  is moving towards the right.  
**III** At this instant, point  $R$  is moving downwards.

- A** **I**  
**B** **III**  
**C** **I, II**  
**D** **II, III**



- 25 In a ripple tank experiment, a series of plane waves are sent from a shallower region to a deeper region. Which of the following statements is true when the water waves enter the deeper region?

- A** The speed and frequency increases but the wavelength remains constant.  
**B** The wavelength and frequency increases but the speed remains constant.  
**C** The speed and wavelength increases but the frequency remains constant.  
**D** The speed and wavelength decreases but the frequency remains constant.

- 26 Two sounds  $A$  and  $B$  are measured to be 70 dB and 80 dB respectively. Which of the following descriptions about the two sounds is/are correct?

- I** Pitch of  $B$  is higher than that of  $A$ .  
**II** Amplitude of  $B$  is larger than that of  $A$ .  
**III** Frequency of  $B$  is higher than that of  $A$ .

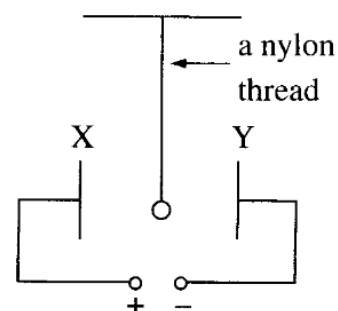
- A** **I**  
**B** **II**  
**C** **I, III**  
**D** **II, III**

27 A short pulse of microwaves was sent to detect the position of a slowly flying aeroplane. The microwaves reflected from the aeroplane were picked up  $4 \times 10^{-4}$  s after their transmission from the station. If microwaves travel at a speed of  $3 \times 10^8$  m/s, the distance of the aeroplane from the station was

- A  $3.0 \times 10^4$  m.
- B  $6.0 \times 10^4$  m.
- C  $1.2 \times 10^5$  m.
- D  $3.0 \times 10^{12}$  m.

28 A metal sphere hanging on a nylon thread is placed between two metal plates X and Y which are connected to the terminals of a high d.c. voltage as shown. The sphere is first drawn to touch plate X and then released will oscillate to touch X and Y alternatively. The net charge on the sphere is

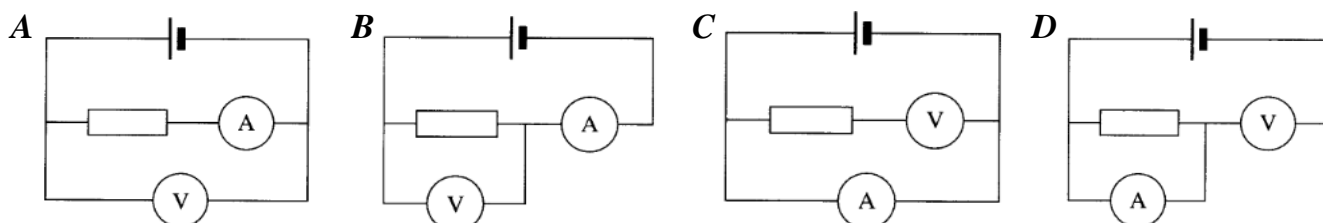
- A always positive when it is oscillating.
- B always negative when it is oscillating.
- C positive when it is moving from X to Y.
- D negative when it is moving from X to Y.



29 Lightning is seen flashing from the sky to the ground. What are coming down from the sky?

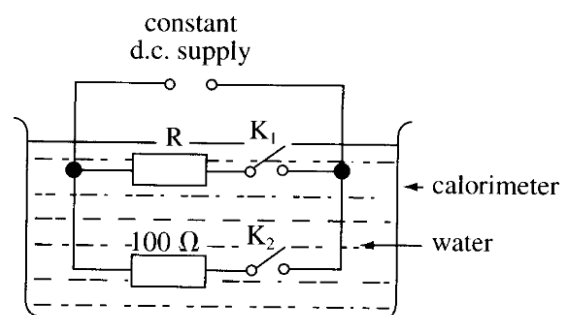
- A Protons
- B Neutrons
- C Electrons
- D Air molecules

30 If the resistance of a resistor is very high (around 10 k $\Omega$ ), which of the following circuits should be used to measure its resistance?



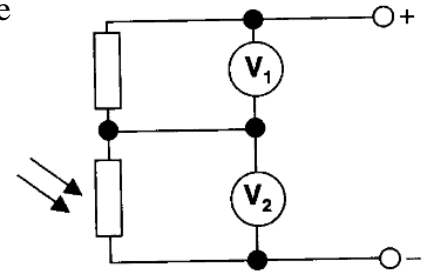
31 An immersion heater is used to boil the water in a calorimeter as shown. When only  $K_2$  is closed, it takes 20 minutes to boil the water. When both keys  $K_1$  and  $K_2$  are closed, it takes 4 minutes to boil the same amount of water. What is the resistance of the resistor  $R$ ?

- A 25  $\Omega$
- B 50  $\Omega$
- C 100  $\Omega$
- D 200  $\Omega$



32 In the circuit, how do the voltmeter readings change as the surrounding gets brighter?

	$V_1$	$V_2$
<b>A</b>	Increases	Increases
<b>B</b>	Increases	Decreases
<b>C</b>	Decreases	Increases
<b>D</b>	Remains unchanged	Decreases

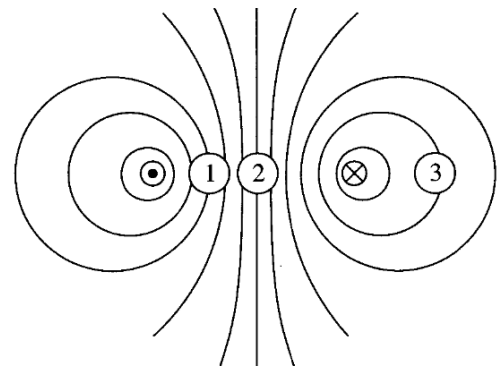


33 What is the most appropriate fuse rating for a 240 V, 1.3 kW heater?

- A** 3 A
- B** 5 A
- C** 10 A
- D** 13 A

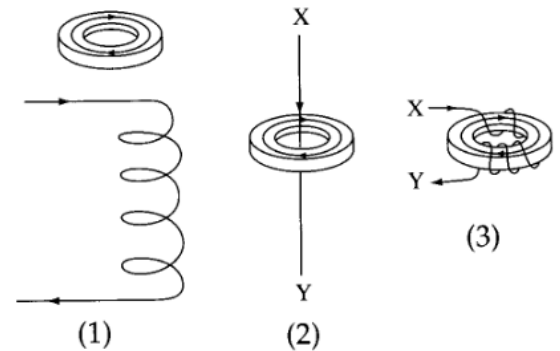
34 The diagram shows the magnetic field of two current carrying wires perpendicular to the plane of the paper. Which set of compasses shows the correct directions of the pointers?

	<b>1</b>	<b>2</b>	<b>3</b>
<b>A</b>	↑	↑	↑
<b>B</b>	↑	↑	↓
<b>C</b>	↑	↓	↓
<b>D</b>	↓	↑	↓



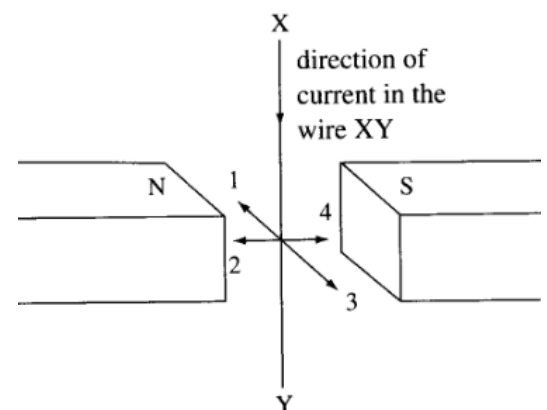
35 In which of the diagrams, the magnetic flux in the iron ring associated with the current-carrying wire **XY** is correctly indicated by the arrow?

- A** 1
- B** 2
- C** 1, 3
- D** 2, 3

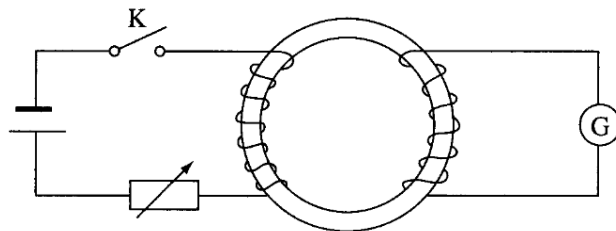


36 A wire **XY** is suspended freely between two magnetic poles as shown. When current flows from **X** to **Y** in the wire, the wire will experience a force acting along the direction marked

- A** 1.
- B** 2.
- C** 3.
- D** 4.

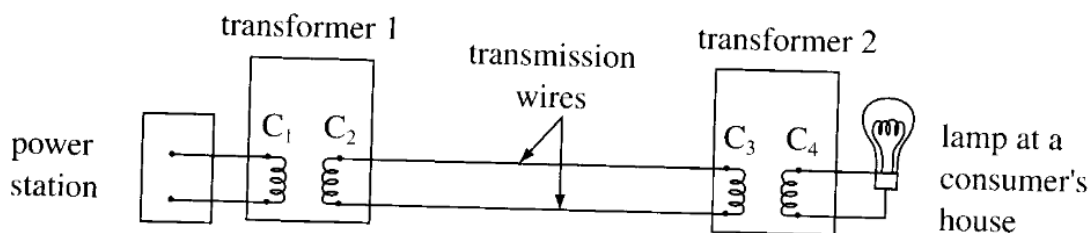


- 37 In the circuit, the rheostat is adjusted so that when key **K** is closed, a small current flows. This current is slowly increased by varying the rheostat until a maximum current is reached and kept for one minute. Key **K** is then opened. The galvanometer **G** shows the greatest deflection when the
- A current is increased.
  - B open-key **K** is closed.
  - C closed-key **K** is opened.
  - D maximum current is just reached.



- 38 Which of the following will make the efficiency of a transformer less than 100%?
- I Loss of magnetic flux from the iron core.
  - II The heating effect due to current in the coils.
  - III The heating effect due to eddy current in the iron core.
- A I, II
  - B I, III
  - C II, III
  - D I, II & III

- 39 The set-up is used to demonstrate how electricity is transmitted from a 'power station' to a 'consumer'. To reduce the power loss along the transmission lines, what are the values of the turns of each coil  $C_1$ ,  $C_2$ ,  $C_3$  and  $C_4$  in the transformers?



	$C_1$	$C_2$	$C_3$	$C_4$
A	$10^2$	$10^3$	$10^2$	$10^3$
B	$10^2$	$10^3$	$10^3$	$10^2$
C	$10^3$	$10^2$	$10^3$	$10^2$
D	$10^3$	$10^3$	$10^2$	$10^2$

- 40 The diagram shows the display on the screen of a CRO when an alternating signal of 100 Hz applied across the Y-plates. What is the time taken for the spot to travel from **P** to **Q** on the screen?
- A 2.0 ms
  - B 5.0 ms
  - C 20 ms
  - D 50 ms

