

External assessment 2022

Multiple choice question book

Physics Alternative Sequence

Paper 1

General instruction

- Work in this book will not be marked.

Section 1

QUESTION 1

Electromotive force is

- (A) the production of voltage across an electrical conductor due to its dynamic interaction with a magnetic field.
- (B) a difference in potential that tends to give rise to an electric current.
- (C) the repulsion experienced by two negatively charged particles.
- (D) one of the four fundamental forces.

QUESTION 2

A photon is described as

- (A) a continuous wave of light energy.
- (B) a particle that can only propagate in a medium.
- (C) a quantum of all forms of electromagnetic energy.
- (D) a particle that mediates the forces between protons.

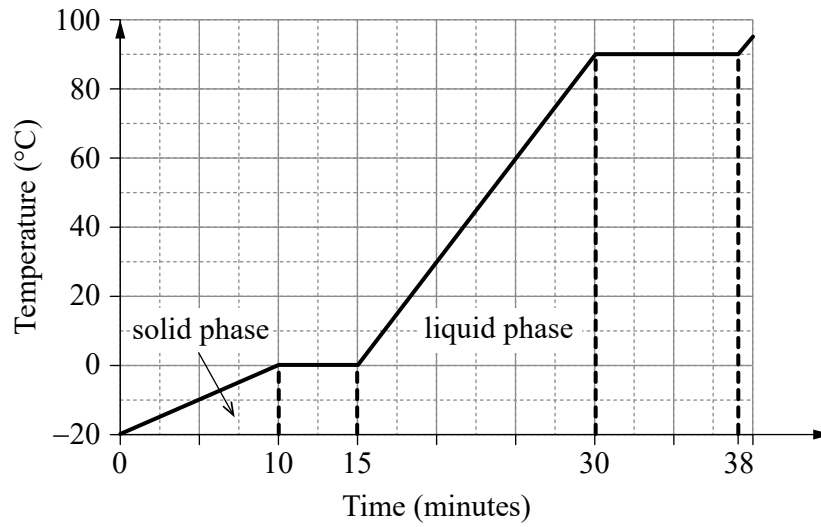
QUESTION 3

The energy available for electrical charges moving through a circuit is measured in terms of the

- (A) potential difference.
- (B) capacitance.
- (C) resistance.
- (D) current.

QUESTION 4

One kilogram of an unknown substance is heated in a calorimeter cup and its temperature recorded as a function of time. Heat is applied at a constant rate by a heater with a 1000 W power rating.

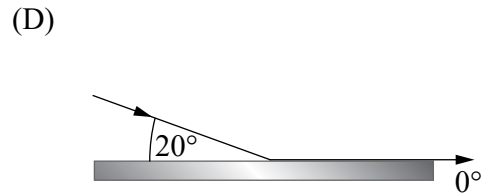
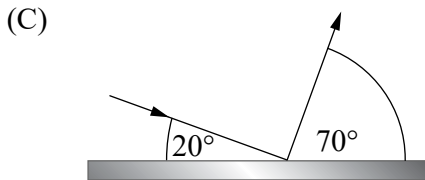
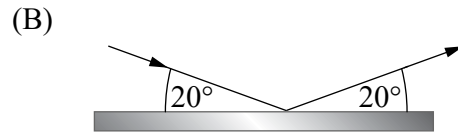
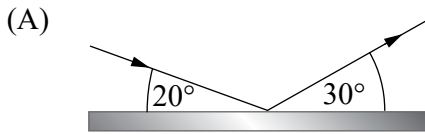


Determine the latent heat of vaporisation for this substance.

- (A) $5 \times 10^3 \text{ J kg}^{-1}$
- (B) $8 \times 10^3 \text{ J kg}^{-1}$
- (C) $3 \times 10^5 \text{ J kg}^{-1}$
- (D) $5 \times 10^5 \text{ J kg}^{-1}$

QUESTION 5

Which option accurately depicts the reflection of light in a plane mirror?



QUESTION 6

After coherent light has been passed through a double slit, the observation of an interference pattern on a screen is explained by the

- (A) wave nature of light.
- (B) equal width of the slits.
- (C) discrete packets of photons.
- (D) distance from the slits to the screen.

QUESTION 7

Which change would produce the greatest increase in magnetic field strength inside a current-carrying solenoid?

- (A) decreasing the thickness of the wire
- (B) increasing the length of the solenoid
- (C) adding more turns of wire to the solenoid
- (D) using an alternating current instead of a direct current

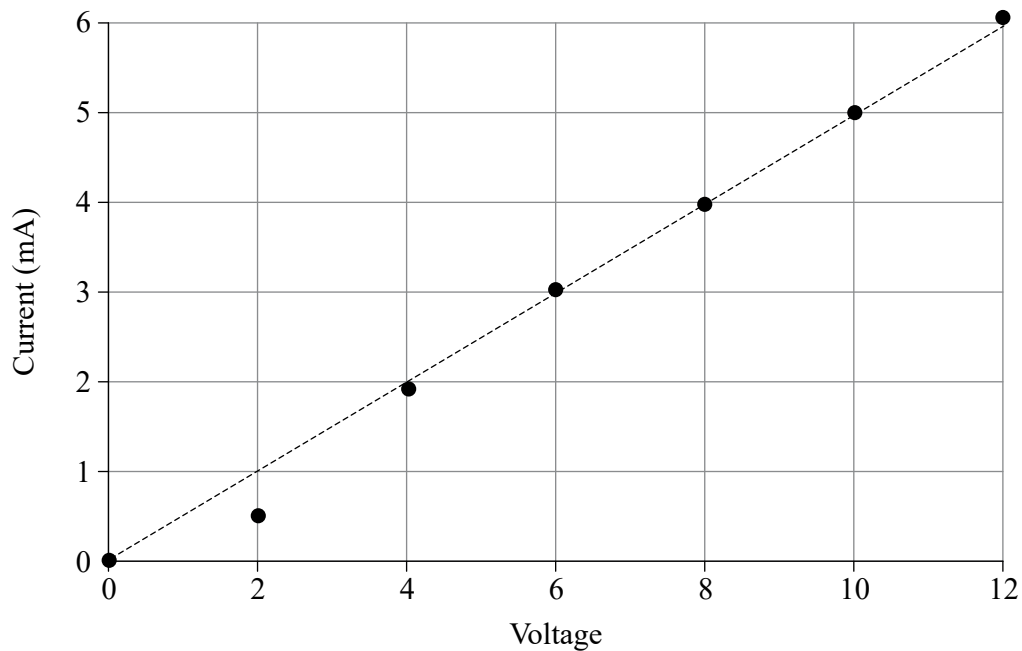
QUESTION 8

Determine the wavelength of an electromagnetic wave with an energy of 2.4×10^{-23} J.

- (A) 7.2×10^{-15} m
- (B) 2.8×10^{-11} m
- (C) 8.3×10^{-3} m
- (D) 1.2×10^2 m

QUESTION 9

An experiment was conducted to determine the resistance of an ohmic conductor. The graph shows the current in the ohmic conductor as the voltage across it was changed.



Determine the conductor's resistance.

- (A) $5 \times 10^{-4} \Omega$
- (B) $5 \times 10^{-1} \Omega$
- (C) $2 \times 10^0 \Omega$
- (D) $2 \times 10^3 \Omega$

QUESTION 10

Electric field strength refers to the

- (A) intensity of an electric field at a particular location.
- (B) change in electrical potential energy between two defined points.
- (C) sum of electrically charged particles passing a point in a given time.
- (D) physical property of an object experiencing a force in an electromagnetic field.

QUESTION 11

The maximum kinetic energy of an electron ejected from a metallic surface can be increased by

- (A) using a positively ionised metal.
- (B) using a metal with a larger work function.
- (C) increasing the intensity of the incident light.
- (D) decreasing the wavelength of the incident light.

QUESTION 12

A lightbulb produces 360 J of light energy and 1580 J of heat energy. Calculate the efficiency of the lightbulb.

- (A) 4%
- (B) 5%
- (C) 19%
- (D) 23%

QUESTION 13

A rectangular coil of 3000 turns and dimensions $0.1 \text{ m} \times 0.2 \text{ m}$ is rotated in a uniform magnetic field of 2 mT.

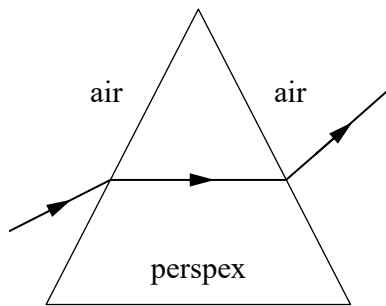
Calculate the minimum number of revolutions per second required to produce an average EMF of 6 V.

- (A) 1
- (B) 3
- (C) 13
- (D) 50

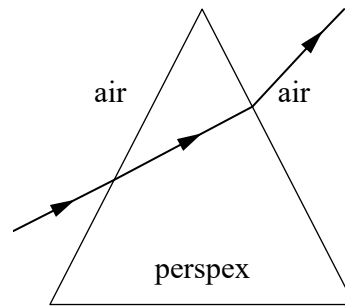
QUESTION 14

Which option shows the refraction of light passing from air ($n = 1.00$) through a perspex prism ($n = 1.42$)?

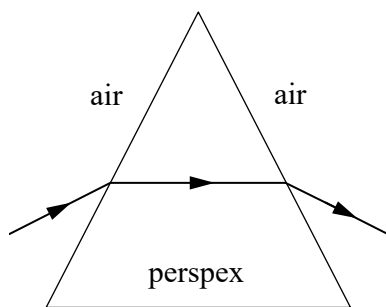
(A)



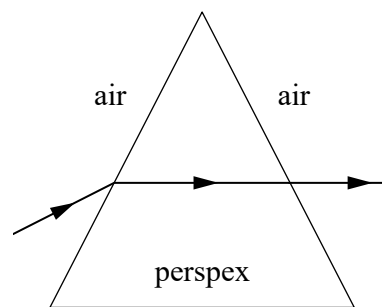
(B)



(C)



(D)



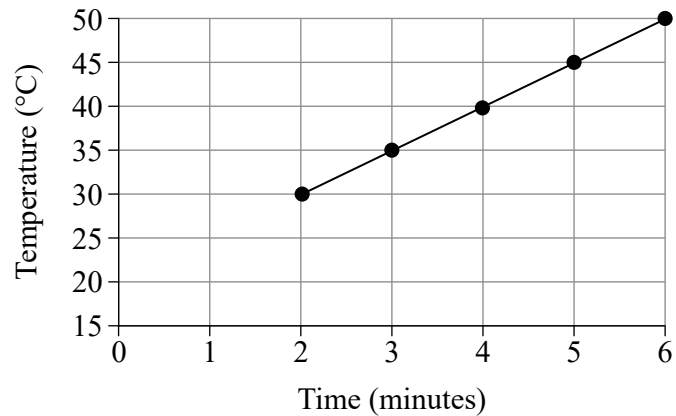
QUESTION 15

Which option is a property of mechanical waves?

- (A) requiring a medium to propagate
- (B) propagating at the speed of light in a vacuum
- (C) being produced by an oscillating electric charge
- (D) comprising mutually perpendicular electric and magnetic fields

QUESTION 16

The graph shows the temperature of an insulated vessel containing 5 kg of water that is heated at a constant rate by a heater.



Determine the heater's power.

- (A) 8.3×10^2 W
- (B) 1.7×10^3 W
- (C) 1.1×10^5 W
- (D) 2.1×10^5 W

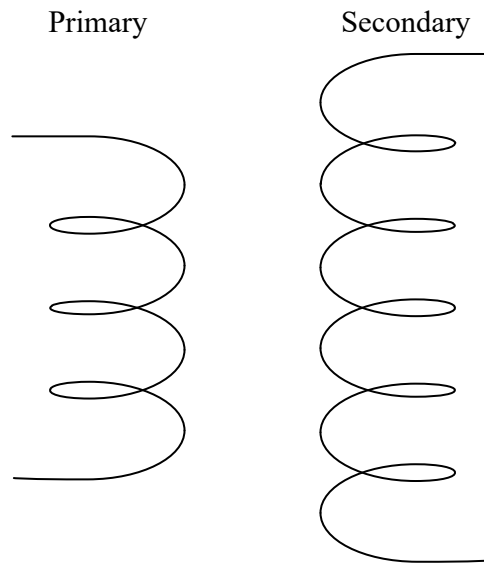
QUESTION 17

Three kilograms of ice at 0°C is added to an insulated bucket containing 20 kilograms of water at 25°C . Calculate the final temperature of the total amount of water once thermal equilibrium is reached.

- (A) 11.3°C
- (B) 13.0°C
- (C) 14.0°C
- (D) 15.4°C

QUESTION 18

The primary and secondary coils from a lossless transformer are shown.

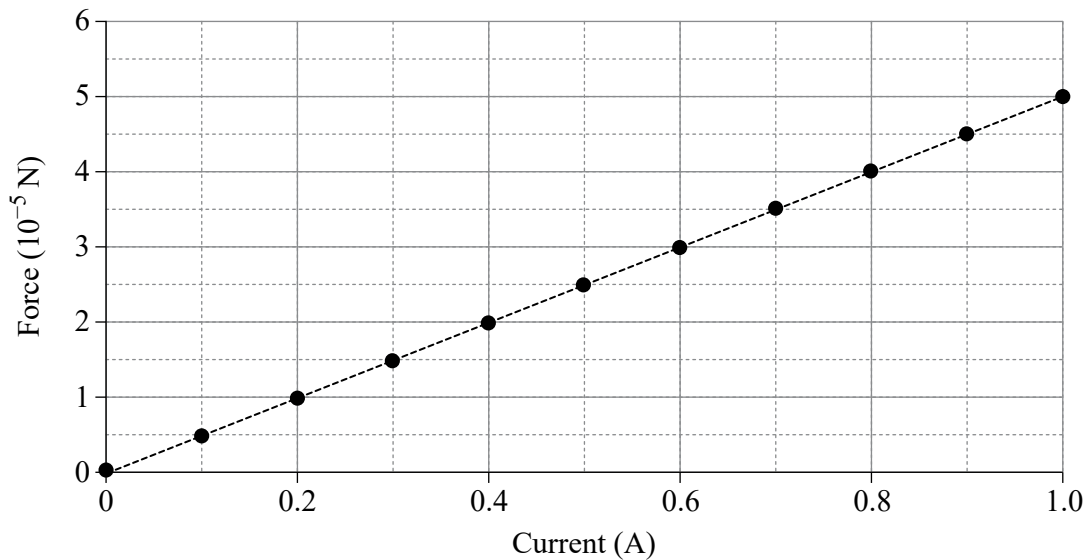


Compared to the primary coil, the secondary coil will experience decreased

- (A) power.
- (B) current.
- (C) voltage.
- (D) resistance.

QUESTION 19

A current-carrying wire is placed perpendicular to two magnets. As the current in the wire is changed, the force acting on it is recorded.



The gradient of the line-of-best-fit is proportional to the

- (A) potential difference.
- (B) electromotive force.
- (C) resistance of the wire.
- (D) magnetic field strength.

QUESTION 20

An 8.0 V battery is used to power a circuit with 2.4 Ω and 3.6 Ω resistors placed in series. Calculate the total power of the circuit.

- (A) 1.3 W
- (B) 11 W
- (C) 44 W
- (D) 48 W

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