ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

PHYSICS   6032/1
PAPER 1 Multiple Choice

JUNE 2023 SESSION   1 hour

Additional materials:
   Multiple Choice answer sheet
   Soft clean eraser
   Soft pencil (type B or HB is recommended)
   Electronic calculator

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.
Write your name, centre number and candidate number on the answer sheet in the spaces
provided unless this has already been done for you.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four
possible answers, **A, B, C** and **D**. Choose the one you consider correct and record your choice
in **soft pencil** on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score **one** mark. A mark will **not** be deducted for a wrong answer.

Any rough working should be done in this booklet.

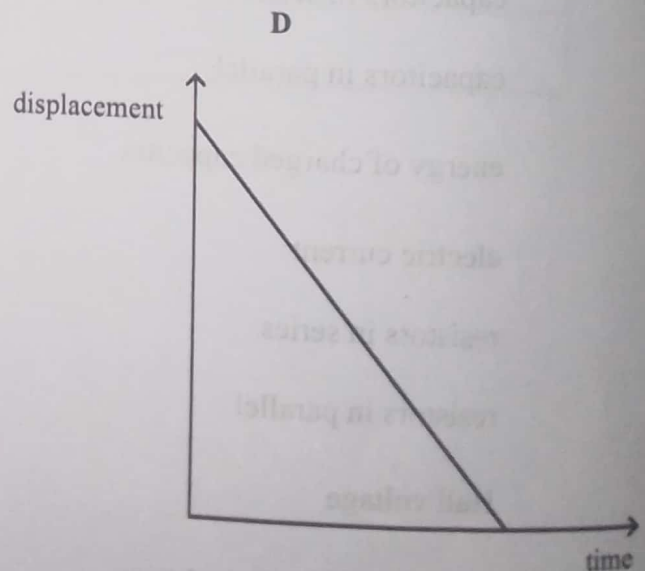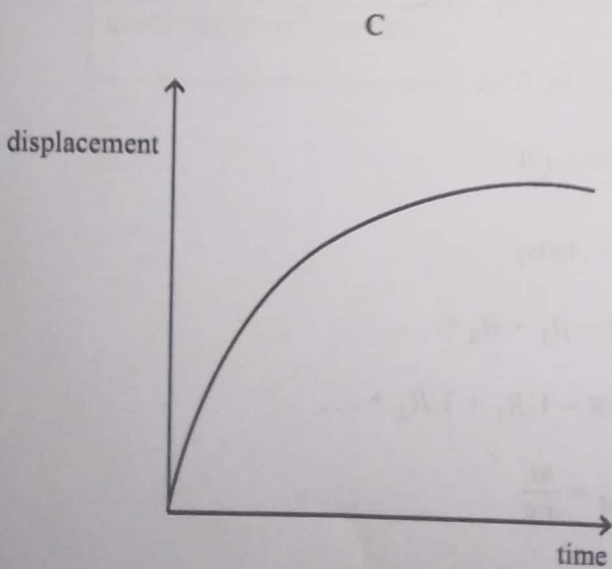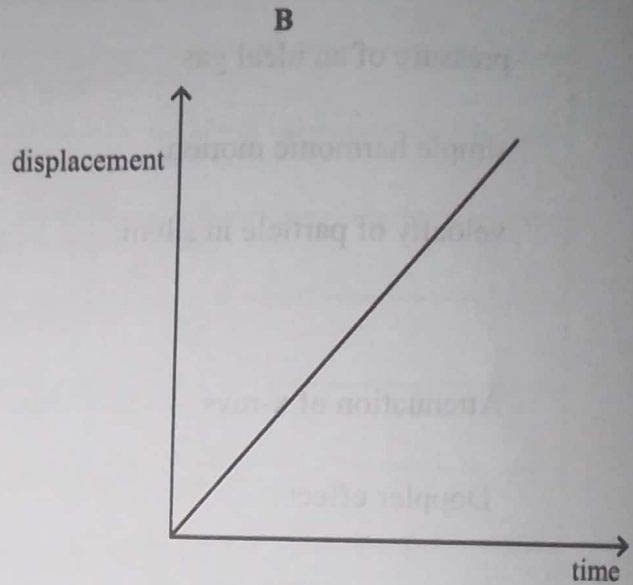**This question paper consists of 20 printed pages.**
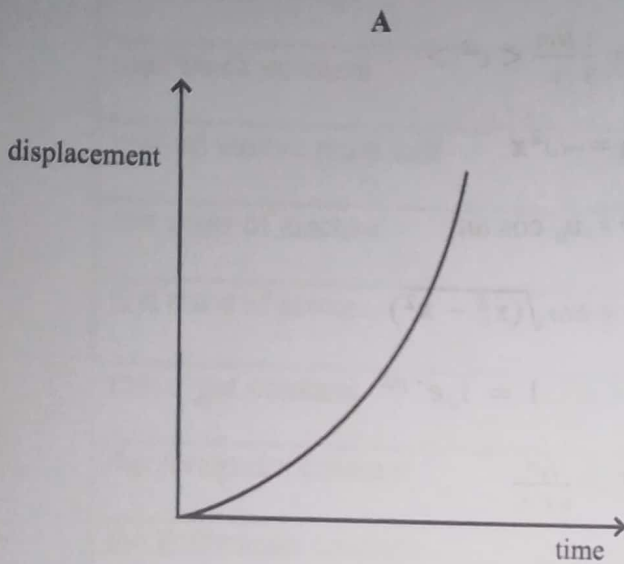
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1   Which one is the correct unit for electric field strength?

    A $kgms^{-2}C$
    B $kgm^2s^{-2}C^{-1}$
    C $kgm^2s^{-2}C$
    D $kgms^{-2}C^{-1}$

2   A ball is released from rest and falls in the absence of air resistance. Which graph shows the variation of displacement with time?

A

B

C

D


3   The magnitude of the upthrust acting on a body falling in a fluid depends on the

    A   surface area of the object.
    B   speed of the object.
    C   volume of the displaced fluid.
    D   density of the object.

4   A geostationary satellite has a circular orbit of radius R around the Earth. The satellite falls into a new orbit of radius R/4.

What is the period of the satellite in the new orbit?

A   3 hrs
B   6 hrs
C   24 hrs
D   192 hrs

5   The angular frequency of a body in simple harmonic motion making n complete oscillations in one second is

A $\frac{1}{n} rads^{-1}$.

B $\frac{2\pi}{n} rads^{-1}$.

C $n\ rads^{-1}$.

D $2\pi n\ rads^{-1}$.

6   Which graph represents the variation of kinetic energy with displacement for a body executing simple harmonic motion?

A

B

C

D
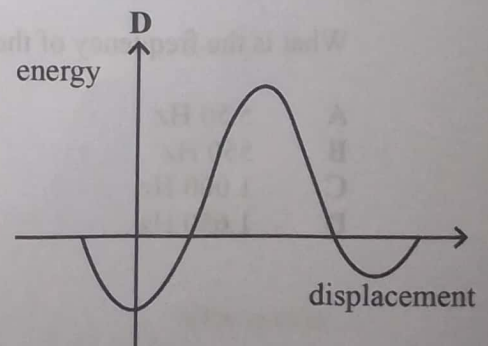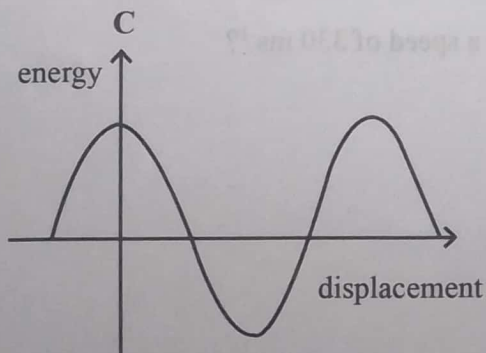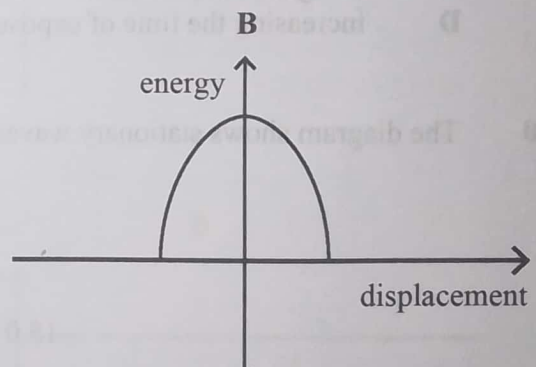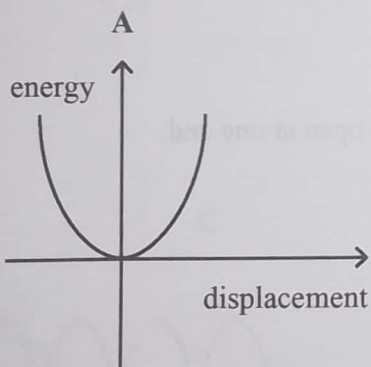
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7   In optical fibre transmission of information, infrared radiation is preferred to visible light because infrared radiation

    A   transfers more heat energy than visible light.
    B   is less attenuated in glass than visible light.
    C   travels faster than visible light.
    D   has a higher frequency than visible light.

8   Sound waves travel in air at constant temperature.

Which statement is correct about the sound waves?

    A   wavelength is directly proportional to amplitude
    B   velocity is inversely proportional to wavelength
    C   frequency is inversely proportional to wavelength
    D   amplitude is inversely proportional to velocity

9   A radiographer wants to produce an image of high quality while investigating human muscle tissue using X-rays.
This can be achieved by

    A   using soft X-rays.
    B   using hard X-rays.
    C   using contrast media.
    D   increasing the time of exposure.

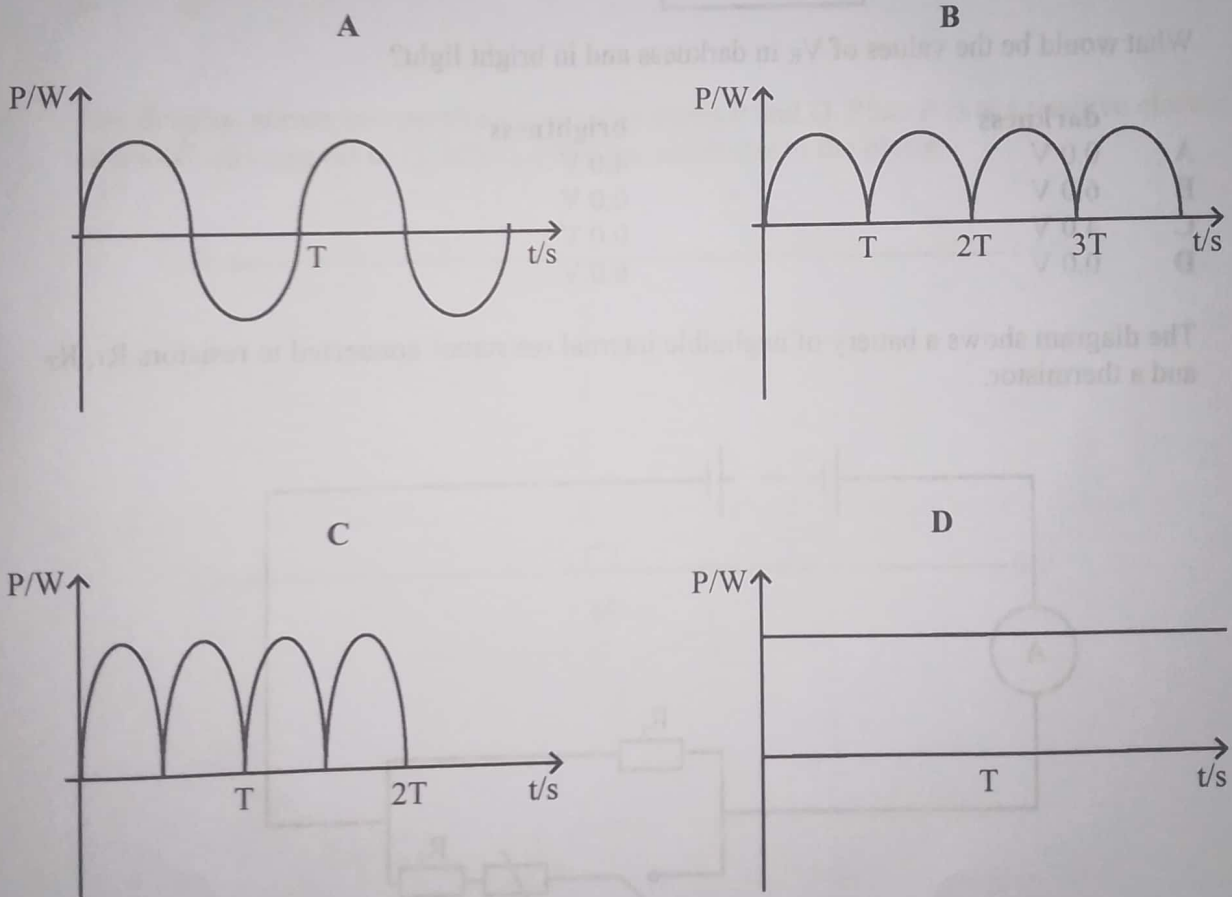10   The diagram shows stationary waves in a pipe which is open at one end.

15.0 cm
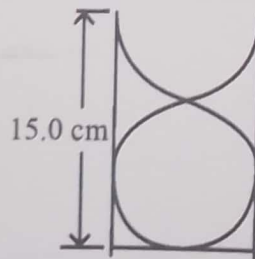
What is the frequency of the sound wave with a speed of 330 ms⁻¹?

    A   5.50 Hz
    B   550 Hz
    C   1 000 Hz
    D   1 650 Hz

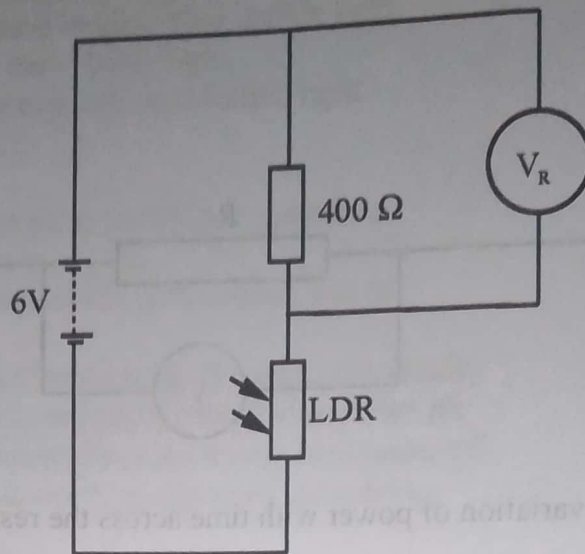**11** The diagram shows a resistor connected to an a.c supply of period T.
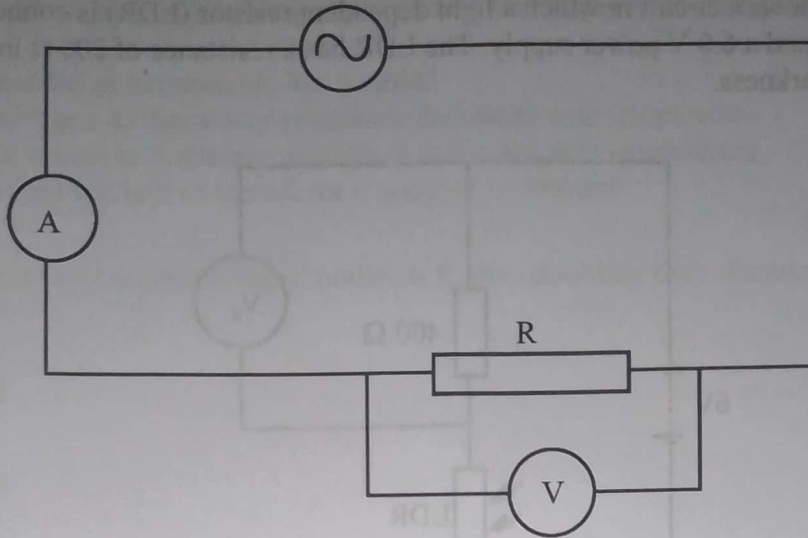
Which graph shows the variation of power with time across the resistor?

A

B

C

D

[Turn over

12   The diagram shows a circuit in which a light dependent resistor (LDR) is connected to a 400 Ω resistor and a 6.0 V power supply. The LDR has a resistance of 200 Ω in bright light and 1 MΩ in darkness.

What would be the values of V_R in darkness and in bright light?

	darkness	brightness
A	0.0 V	4.0 V
B	6.0 V	0.0 V
C	4.0 V	0.0 V
D	0.0 V	6.0 V

13   The diagram shows a battery of negligible internal resistance connected to resistors R_1, R_2 and a thermistor.
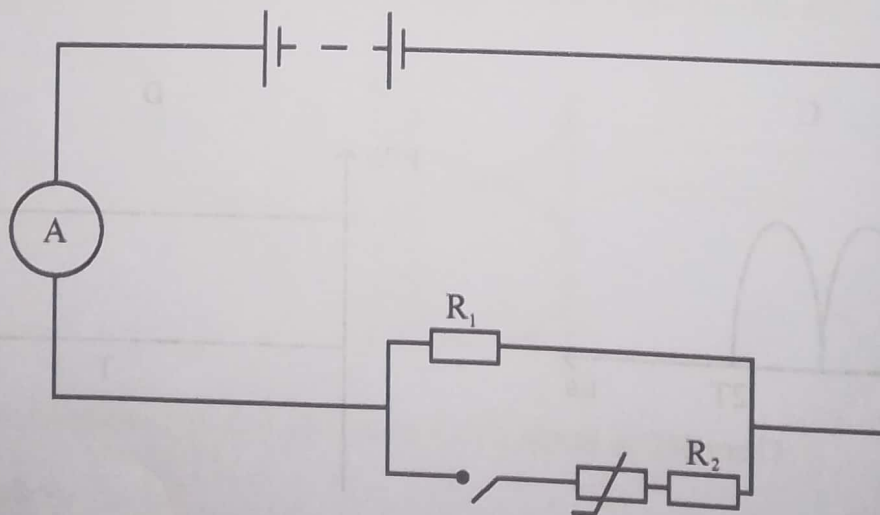
When the switch is closed, the ammeter reading is 3.0 A with the thermistor at 20 °C. How would the ammeter reading change when the temperature changes to 40 °C?

A   doubles as temperature has doubled
B   increases as thermistor resistance decreases with temperature
C   decreases as thermistor resistance increases with temperature
D   reduces to half as thermistor resistance is doubled

14   If the force between two charged bodies is F, then doubling their distance apart changes the force to

A $\frac{1}{4}F$.

B $\frac{1}{2}F$.

C   2F.

D   4F.

15   The diagram shows two parallel conducting plates P and Q. Plate P is at a positive electric potential with respect to Q. MN is a line perpendicular to the plates.

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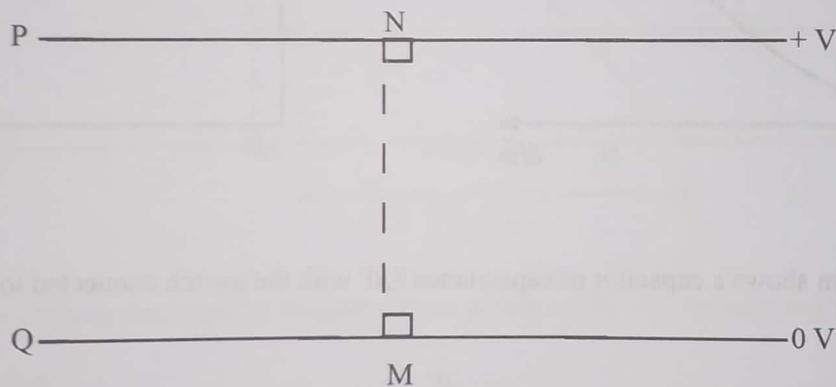
Which graph shows the variation of the electric field with distance along the line MN.

A

E/Vm^{-1}

M N d/m

B

E/Vm^{-1}

M N d/m

C

E/Vm^{-1}

M N d/m

D

E/Vm^{-1}

M N d/m
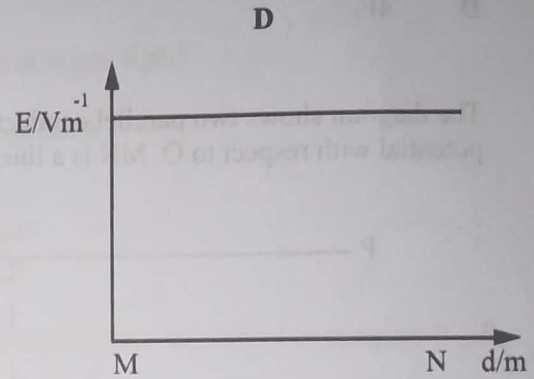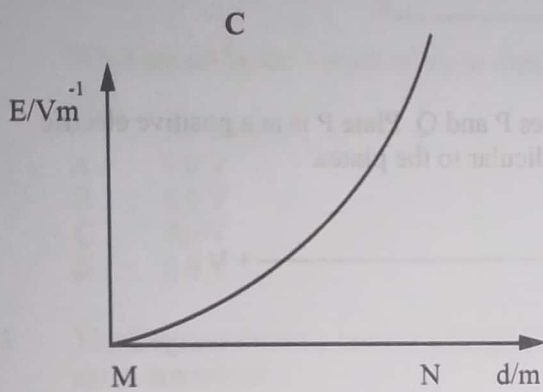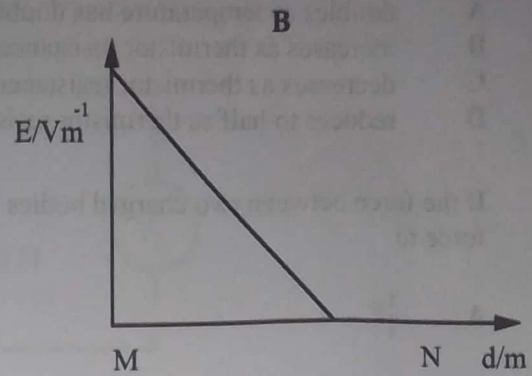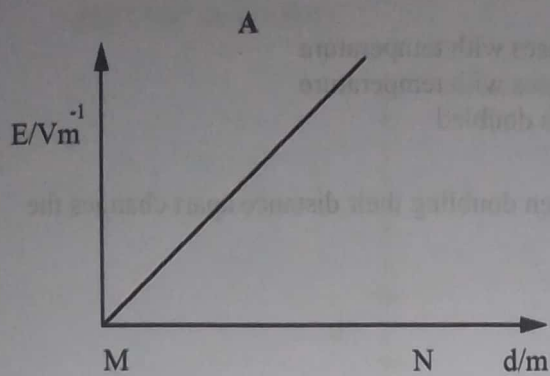
16   The diagram shows a capacitor of capacitance $3\mu F$ with the switch connected to terminal P.

P Q

6 V

3 μF   6 μF
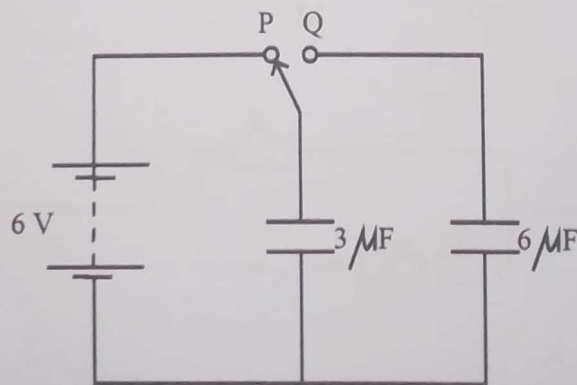
The switch is now connected to Q, thus charging the $6\mu F$ capacitor from the $3\mu F$.
What is the new potential difference across the combination?
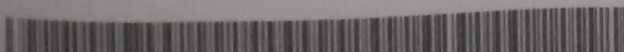
A   2.0 V

B   3.0 V

C   4.0 V

D   6.0 V

17   The diagram shows a conductor carrying a current of 13.0 A lying across a magnetic field of field strength B = 0.2 T at an angle of 150°.
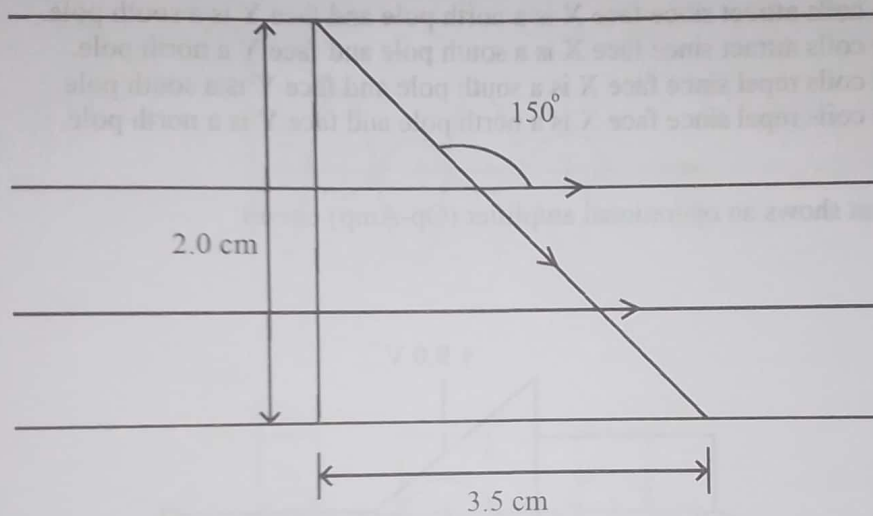
What is the magnitude of the magnetic force acting on the current carrying conductor?

A   5.2 T
B   9.1 T
C   10.4 T
D   18.2 T

[Turn over

18   The diagrams show two current carrying coils facing each other.
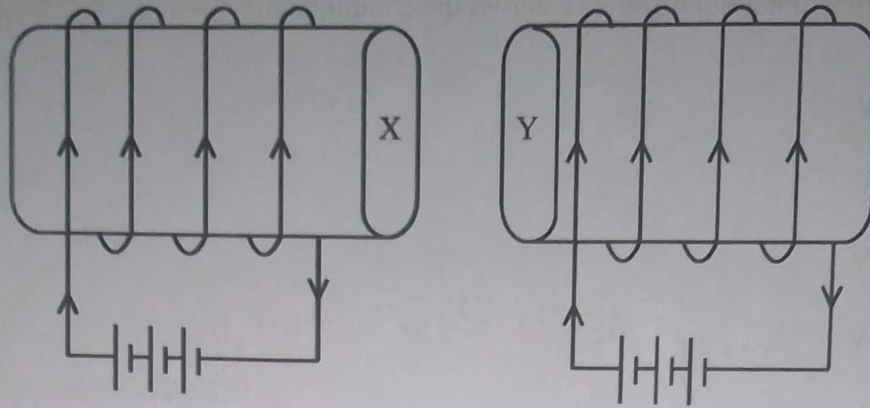
Which statement is correct?

A   The coils attract since face X is a north pole and face Y is a south pole.
B   The coils attract since face X is a south pole and face Y a north pole.
C   The coils repel since face X is a south pole and face Y is a south pole.
D   The coils repel since face X is a north pole and face Y is a north pole.

19   The diagram shows an operational amplifier (Op-Amp) circuit.

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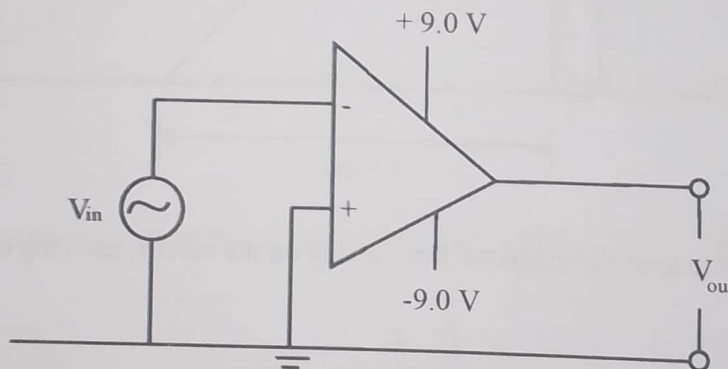
Which graph shows the behaviour of the output voltage for an alternating current input voltage of V_{max} = 2.0 V?

A

B

C

D

[Turn over
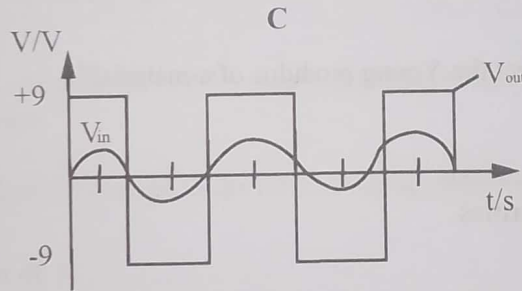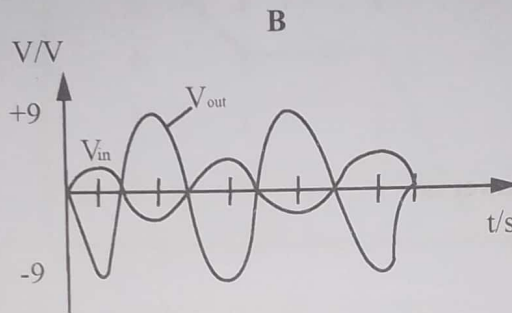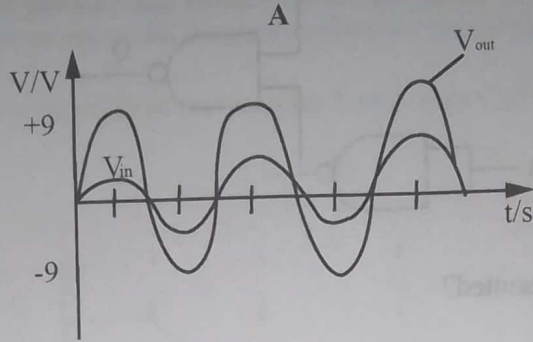
20   The diagram shows a combination of NAND gates performing the function of a certain logic gate.
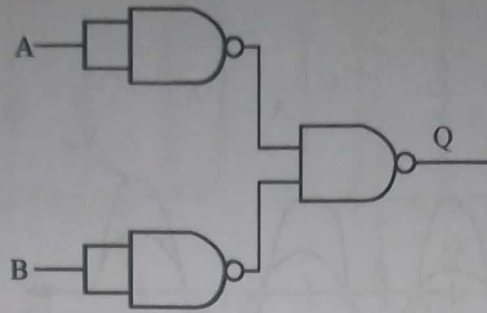
Which logic gate is represented?

A   NAND
B   OR
C   EX-OR
D   AND

21   The gain of a voltage follower is

A   0.
B   1.
C 10^5.
D ∞.

22   Which one does **not** affect the Young modulus of a material?

A   temperature
B   presence of dislocations
C   presence of impurities
D   force applied

23   Which one is **not** an advantage of a thermocouple thermometer?

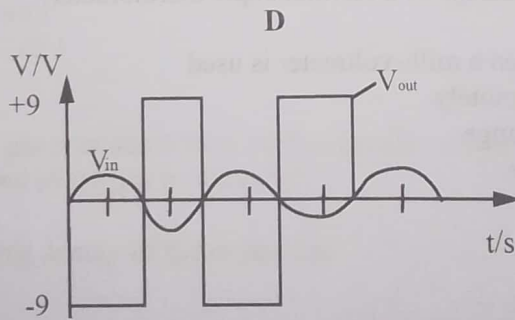A   very accurate when a milli-voltmeter is used
B   cannot be read remotely
C   has a very wide range
D   it is very sensitive

24 Which statement is true about the internal energy of an ideal gas?

    A   it depends on temperature and volume but not on pressure
    B   it depends on temperature but not on volume and pressure
    C   it depends on pressure and volume but not on temperature
    D   it depends on pressure and temperature but not on volume

25 The diagram shows a variation of temperature T with time t as heat is extracted from a substance.
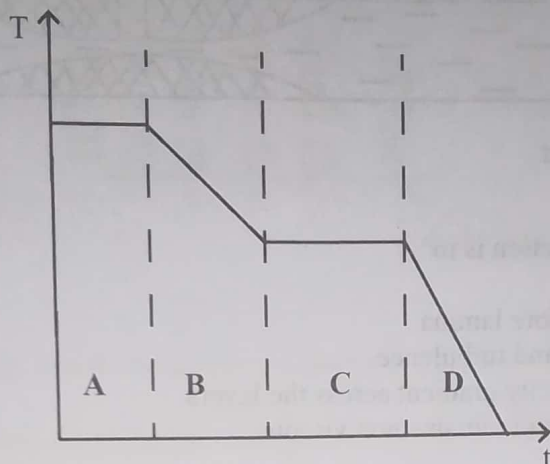
In which section is heat extracted called latent heat of fusion?

26 A sample of an ideal gas absorbs 150 J through heating and does 190 J of external work against the environment.

Which phrase describes the change in the internal energy of the gas?

    A   an increase of 40 J
    B   an increase of 340 J
    C   a decrease of 40 J
    D   a decrease of 340 J

27 A sample of an ideal gas contains 3.18×10^{24} molecules whose molar mass is 4.0 g. The mean square speed of the gas is 300 m²/s².

What is the total kinetic energy of the molecules?

    A   0.60 J
    B   3.2 J
    C   1100 J
    D   180 J

[Turn over

28   The diagram shows a horizontal pipe with a constriction.

flowing liquid
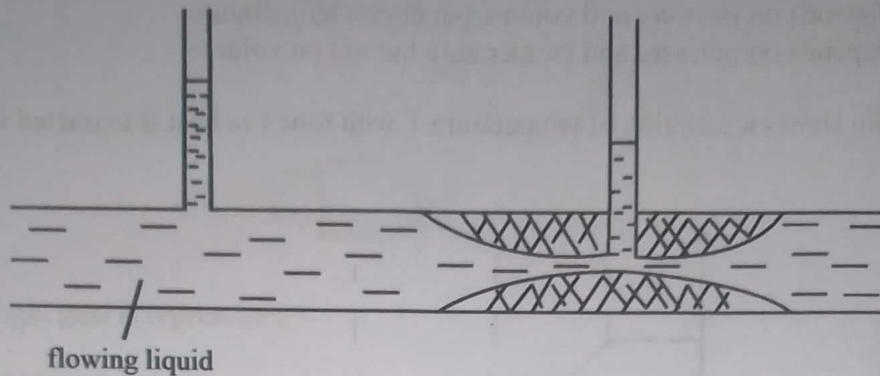
The shape of the constriction is to

A   make the flow more lamina.
B   reduce pressure and turbulence.
C   increase the velocity gradient across the layers.
D   ensure that the fluid remains non viscous.

29   Which statement is **not** true about the mechanism of thermal conduction?

A   Conductors contain a large number of free electrons which carry heat and transfer it
       during collisions.
B   Heated atoms vibrate more and collide with free electrons transferring heat energy to
       them.
C   Individual electrons can move very long distances along a conductor.
D   Thermal conduction cannot occur at absolute zero.

30   The diagram shows a velocity selector. Only the ions having a selected velocity are able to emerge from slit S_2.

upper metal plate

Positive ions S_1 S_2

lower metal plate
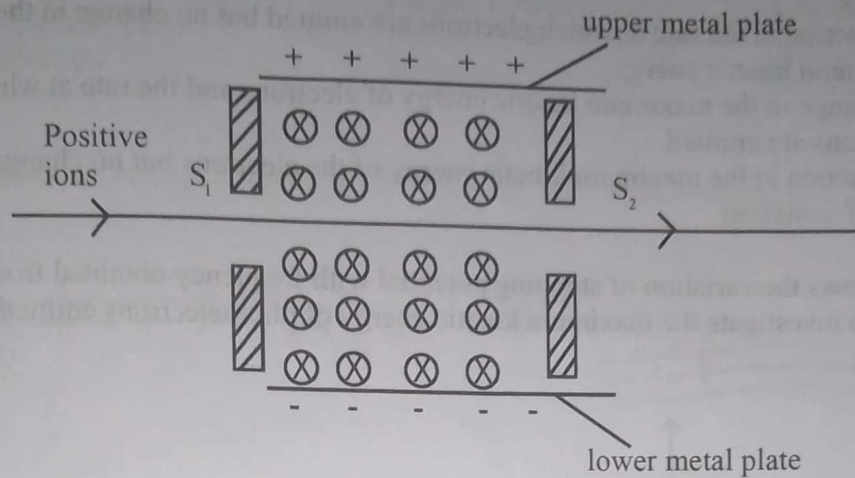
What happens to ions which are unable to emerge from slit S_2?

A   The faster ions are deflected towards the upper plate due to the action of the magnetic field.

B   The faster ions are deflected towards the upper plate due to the action of the electric field.

C   The faster ions are deflected towards the lower plate due to the action of the magnetic field.

D   The faster ions are deflected towards the lower plate due to the action of the electric field.

31   An electron of mass m_e and charge q moves in a circular path in a magnetic field of flux density B.

What is the correct expression for its period?

A $\dfrac{2\pi m_e}{Bq}$

B $\dfrac{Bq}{2\pi m_e}$

C $\dfrac{2\pi m_e}{Bqr}$

D $\dfrac{Bqr}{2\pi m_e}$

[Turn over

32   A photocell is illuminated with X-rays resulting in emission of photo electrons. The intensity of the illumination is reduced and this causes

    A   a reduction in both the rate at which electrons are emitted and their maximum kinetic energy.

    B   a reduction in the rate at which electrons are emitted but no change in their maximum kinetic energy.

    C   no change in the maximum kinetic energy of electrons and the rate at which electrons are emitted.

    D   a reduction in the maximum kinetic energy of the electrons but no change in their rate of emission.

33   The graph shows the variation of stopping potential with frequency obtained from an experiment to investigate the maximum kinetic energy of photoelectrons emitted from a metal surface.
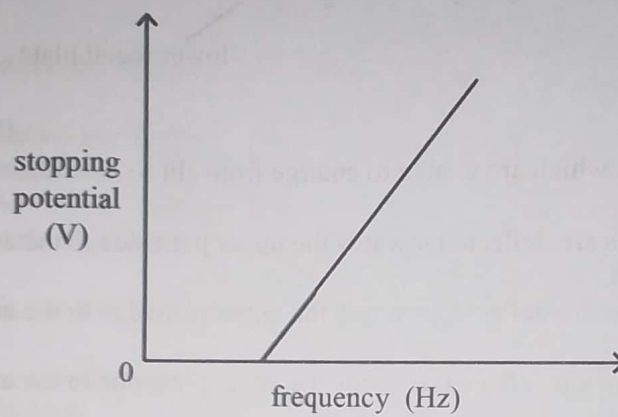

The gradient of the graph is equal to the

    A   work function of the surface divided by the electron charge.

    B   work function of the surface.

    C   placnk's constant divided by the electron charge.

    D   placnk's constant.

34   A radioactive nuclide emits two β particles and an α - particle. The resulting nuclide will be an isotope with

    A   a higher proton number.
    B   a lower proton number.
    C   the same nucleon number.
    D   the same proton number .

35 Which row describes the nature of β radiation, γ-radiation and α − radiation?

	β − radiation	γ − radiation	α − radiation
A	Helium nuclei	uncharged particles	electron
B	electron	packets of wave energy	Helium nuclei
C	Helium nuclei	packets of wave energy	electron
D	electron	uncharged particles	Helium nuclei

**36** Which diagram correctly represents the paths of α particles scattered by a gold nucleus?

A.

B.

C.

D.
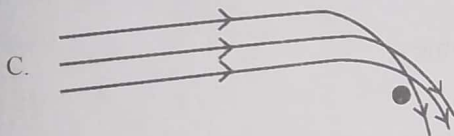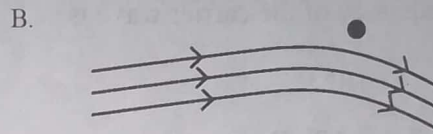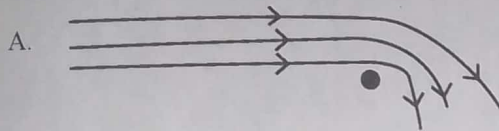
37 Two samples consist of radioactive nuclide A and B. After an interval of time, it is found that 5/8 of the atoms of A and ¼ of atoms of B decayed.
The ratio of

$$\frac{\text{half life of B}}{\text{half life of A}} \text{ is}$$

A 3.41.
B 0.29.
C 3.38.
D 2.96

[Turn over

38 The diagram shows the voltage variation with time of an amplitude modulated carrier wave.
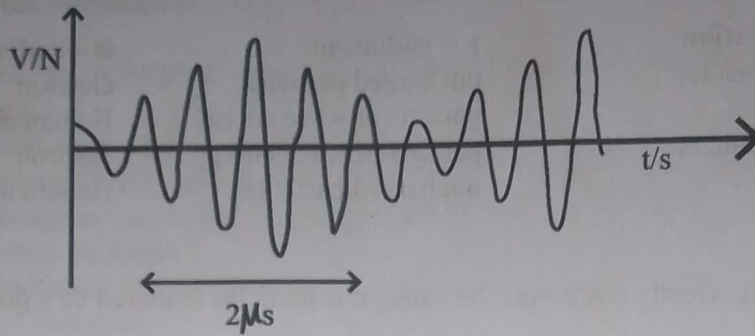
The frequency of the carrier wave is

A 1×10^6 Hz.

B 2.0×10^6 Hz.

C 0.5×10^6 Hz.

D 2.0×10^{-6} Hz.

39 Which **one** is true for both wire-pairs and coaxial cables?

	wire - pairs	coaxial cables
A	suffer from cross talk	has little cross-talk
B	more secure	have low secure
C	has less electrical interference and noise	pick up noise and interference
D	less attenuating	signal attenuated greatly

40 A signal of power 14.0 mW passes along one cable, where the attenuation is 20 dB. It then passes along another cable, where the attenuation is 40 dB. What is the power at the end of the two cables?

A 1.4×10^4 W

B 1.4×10^{-4} W

C 1.4×10^{-6} W

D 1.4×10^{-8} W

4727