CONFIDENTIAL*/SULIT*

960/1

STPM TRIAL 2006

PHYSICS (FIZIK)

PAPER 1 (KERTAS 1)

MULTIPLE-CHOICE (ANEKA PILIHAN)

One hour and forty-five minutes (Satu jam empat puluh lima minit)

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH MALAYSIA CAWANGAN MELAKA

PENILAIAN PENGESANAN PEPERIKSAAN SIJIL TINGGI PERSEKOLAHAN MALAYSIA 2006

Instructions to candidates

DO NOT OPEN THE BOOKLET UNTIL YOU ARE TOLD TO DO SO.

There are **fifty** *questions in this paper. For each question, four suggested answers are given. Choose* **one** *correct answer and indicate it on the multiple-choice answer sheet provided.*

Read the instruction on the multiple-choice answer sheet very carefully.

Answer **all** *questions. Marks will not be deducted for wrong answers.*

Arahan kepada calon:

JANGAN BUKA KERTAS SOALAN INI SEHINGGA ANDA DIBENARKAN BERBUAT DEMIKIAN.

Ada **LIMA puluh** *soalan dalam kertas ini. Bagi soalan, empat cadangan jawapan diberikan. Pilih* **satu** *jawapan yang betul dan tandakan jawapan itu pada helaian jawapan aneka. Pilihan yang diberikan.*

Baca arahan pada Kertas Jawapan aneka pilihan itu dengan teliti.

Jawap **semua** *soalan. Markah tidak akan ditolak bagi jawapan yang salah.*

960/1 **This question paper consists of 17 printed pages and 1 blank pages.**

Kertas soalan ini terdiri daripada 17 halaman bercetak 1 halaman kosong.

1 What is the S.I. unit of gravitational field strength?

A $kg\ N^{-1}$ B $J\ kg^{-1}$ C $m\ s^{-2}$ D N

2 A rough plane is inclined at an angle of 30 ° to the horizontal . When a toy car of mass 1 kg is pushed slightly to move downwards, it moves with constant velocity. Find the parallel force needed to push the car up to move with uniform velocity. [Take $g = 10\ m\ s^{-2}$]

A 5 N B 10 N C 15 N D 30 N

3 Car A and car B start from rest from the same point and accelerate uniformly form rest in the same direction . After 1.5 s, A is 1.0 m in front of B. How far in front will A be leading B after 3.0 s?

A 1.0 m B 1.5 m C 2.0 m D 4.0 m

4 A car of mass 1800 kg is moving along a level road . Brake is applied to bring the car to a stop. In the process, 600 kJ of heat is generated .What is the speed of the car just before braking?

A $18.3\ ms^{-1}$ B $25.8\ ms^{-1}$ C $333\ ms^{-1}$ D $666\ ms^{-1}$.

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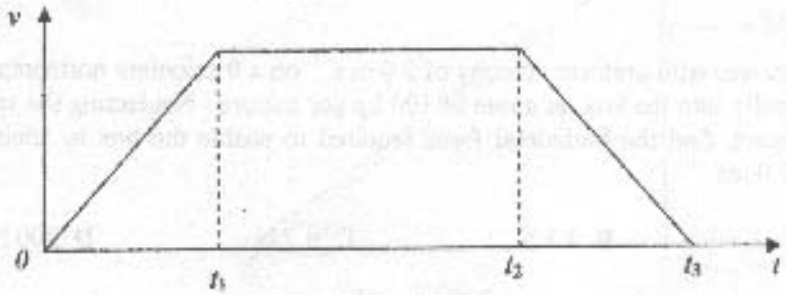
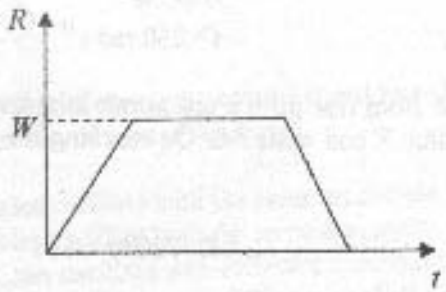
5 A man of weight W stands on a compression balance inside a lift which is moving upward. The velocity – time graph of the lift is as shown below.

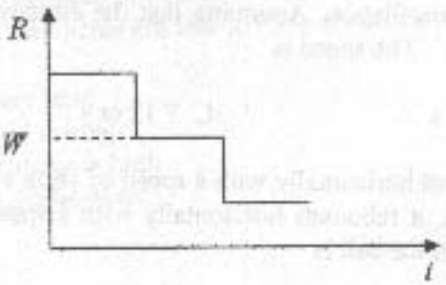


Which of the following graphs shows the variation of the readings R of compression balance with time t?

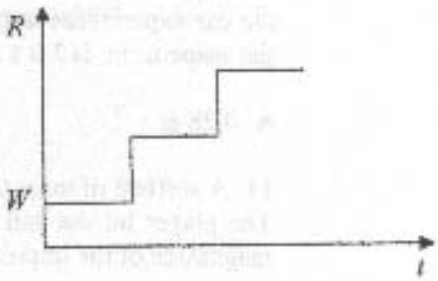


A

B



C



D

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6 An aircraft is flying in a horizontal circle of radius 10 km with a constant speed of 150 m s^{-1} .An object hanging from the ceiling is inclined at angle θ with the vertical . What is the angle θ?

A 12.9 ° B 24.0 ° C 66.0 ° D 77.1 °

7 A box moves with uniform velocity of 2.0 m s^{-1} on a frictionless horizontal surface .Sands falls vertically into the box at a rate of 100 kg per minute . Neglecting the speed of the sand during impact, find the horizontal force required to enable the box to attain the horizontal speed of 2.0 ms $^{-1}$.

A 0 N B 3.3 N C 6.7 N D 200 N

8 A string wrapped tightly around a smooth fixed pulley which has a moment of inertia of 0.040 kg m^2 and a radius of 10 cm . The string is pulled away from it with a constant tangential force of 5.0 N . What is the angular velocity of the pulley after the string has been unwound by 2.0 m ?

A 5 rad s^{-1} B 22 rad s^{-1} C 250 rad s^{-1} D 500 rad s^{-1}

9 An object of mass m is released from rest from a spacecraft at a distance of R from the surface of the Earth which has radius R and mass M . On reaching the Earth's surface, the speed of the object is

A 0 B $\sqrt{GM}$ C $\sqrt{2GM}$ D $\sqrt{2gR}$

10 A 1000 kg car moves along a road with uneven surface that has higher and lower ground at a regular interval. The distance between two successive peaks is 2.0 m. At a certain speed, the car experiences large vertical oscillation .Assuming that the effective spring constant of the suspension is 2.0 x 10^6 N m^{-1}. The speed is

A 0.28 m s^{-1} B 3.56 m s^{-1} C 7.12 m s^{-1} D 14.2 m s^{-1}

11 A softball of mass 0.5 kg moves horizontally with a speed of 16 m s^{-1} towards a player . The player hit the ball with a bat, it rebounds horizontally with a speed of 20 m s^{-1} . The magnitude of the impulse acting on the ball is

A 2 kg m s^{-1} B 18 kg m s^{-1} C 26 kg m s^{-1} D 36 kg m s^{-1}

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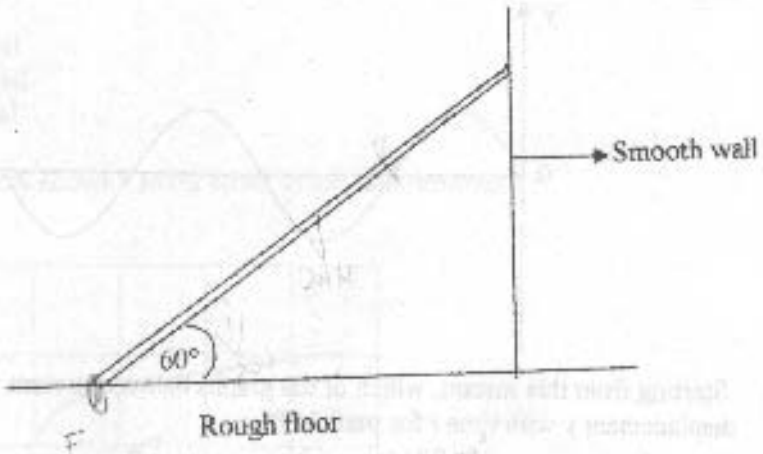
12 The diagram below shows a uniform ladder of weight 200 N leans against a smooth wall.



A boy of weight 300 N climbs the ladder. When he is at a position ¼ up the ladder, what is the frictional force that holds the ladder at its base?

A 43 N B 58 N C 101 N D 500N

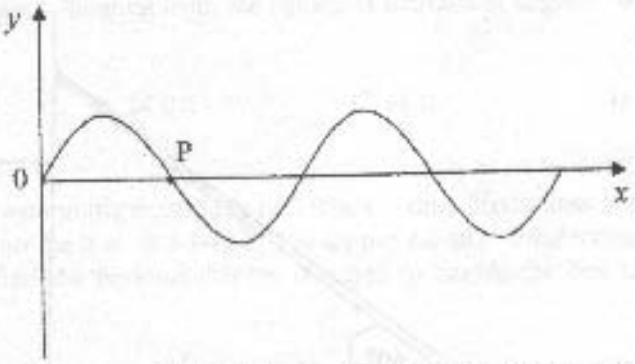
13 Which of the following statements is **not** true about the oscillating particles between two consecutive nodes of a standing wave?

A The particles oscillate with the same amplitude
B The particles oscillate with the same frequency
C The particles oscillate with different maximum speed
D The particles oscillate with different oscillating energy.

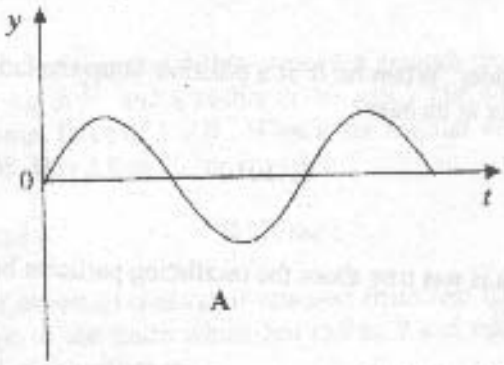
14 The phenomenon of beat can be used to check the frequency of a note for a musical instrument. Two notes are said to have about the same frequency when

A beat is very loud
B beat period is long
C beat frequency is high
D beat can not be heard

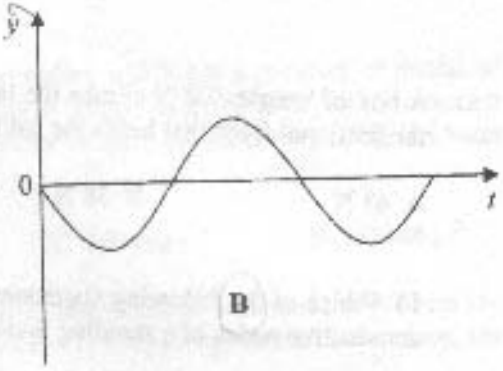
15 The graph below shows a progressive wave moving in the +x direction at an instant of time.



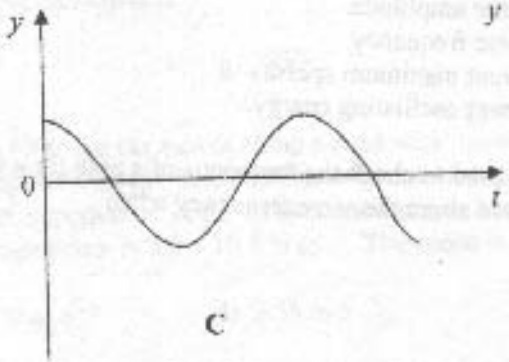
Starting from this instant, which of the graphs below represent the variation of displacement y with time t for particle P?



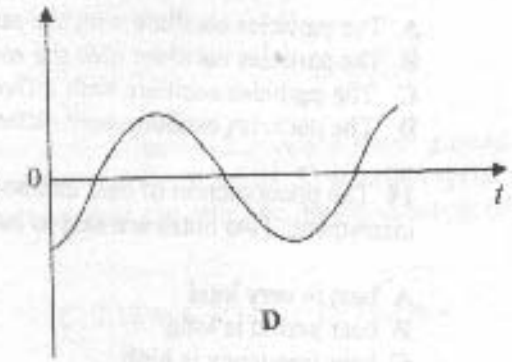
A



B



C

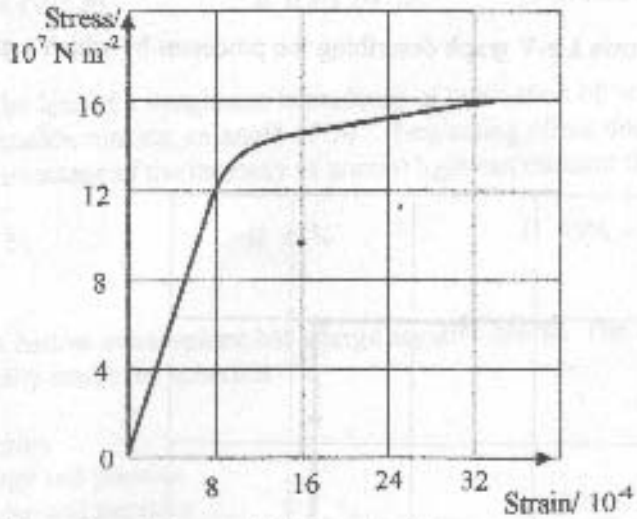


D

16 What type of material produces plastic deformation?

A glassy material
B crystalline material
C amorphous material
D polymeric material

17 The diagram below shows a stress-strain graph of a material.



The Young's modulus and yield strain of the material are

	Young's modulus	Yield strain
A	1.6×10^7 N m^{-2}	3.4×10^{-3}
B	1.6×10^7 N m^{-2}	8.0×10^{-4}
C	1.5×10^{11} N m^{-2}	8.0×10^{-4}
D	1.5×10^{11} N m^{-2}	3.4×10^{-3}

18 The density of aluminium is ρ, its atomic mass is M and the interatomic spacing of aluminium is d. The Avogadro's number is

A $\frac{\rho M}{d^3}$ B $\frac{M}{\rho d^3}$ C $\frac{d^3}{\rho M}$ D $\frac{\rho d^3}{M}$

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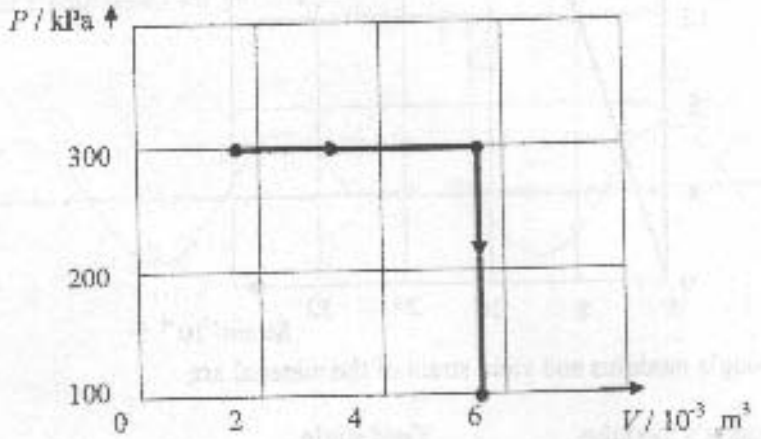
19 An ideal gas has a density of 2.4 kg m^{-3} at a pressure of 2.0×10^5 Pa. Calculate the r.m.s. speed of its molecules.

A 4.1×10^3 m s^{-1} B 5.0×10^3 m s^{-1} C 1.7×10^5 m s^{-1} D 2.5×10^5 m s^{-1}

20 An ideal gas at 300 K is adiabatically expanded to twice its original volume and then heated until its pressure is restored to its original state. What is its final temperature?

A 300 K B 400 K C 450 K D 600 K

21 The diagram below shows a p-V graph describing the processes by which a gas has undergone.



If the net heat absorbed in the processes is 3100 J, the change in internal energy of the gas is

A - 3900 J B -2700 J C 2300 J D 3500 J

22 Which of the following mechanisms is similar to thermal conduction by mean of atomic vibrations?

A Flow of water in a pipe
B Flow of charge in a conductor.
C Propagation of sound wave in solid
D Propagation of electromagnetic wave in vacuum.

23 Which of the following electromagnetic waves has frequency around 1.0×10^{16} Hz?

A Radio wave B microwave C visible light D ultraviolet

24 A converging lens of focal length 20.0 cm is used to cast a well focused image of a full moon. The diameter of the image is 1.8 mm. If the distance of the Moon from the Earth's surface is 3.8×10^8 m, calculate the diameter of the Moon.

A 1.4×10^5 m B 6.8×10^5 m C 3.4×10^6 m D 7.6×10^7 m

25 The lens of a sunglasses is made up of lamination of two polaroid sheets with its axis of polarization making an angle of 30°. Neglecting effect due to tint in the polaroids, what is the percentage of the intensity of normal light can transmit through this lens?

A 37 % B 43% C 75% D 87%

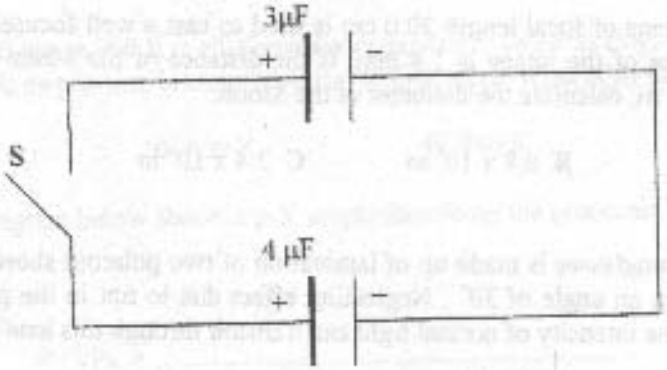
26 A hollow metal sphere has a large negative charge. The value of the electric field intensity inside the sphere is

A zero.
B large and positive.
C large and negative.
D largest at the centre of the sphere.

27 If 10 J of work is required to move a +2 C charge from point P to point Q in an electric field, what is the potential Q with respect to Q ?

A +5V B -5V C +20 V D -20 V

28 The figure below show a 3μF and a 4 μF capacitors which stored charges of 200 μC and 300 μC respectively.



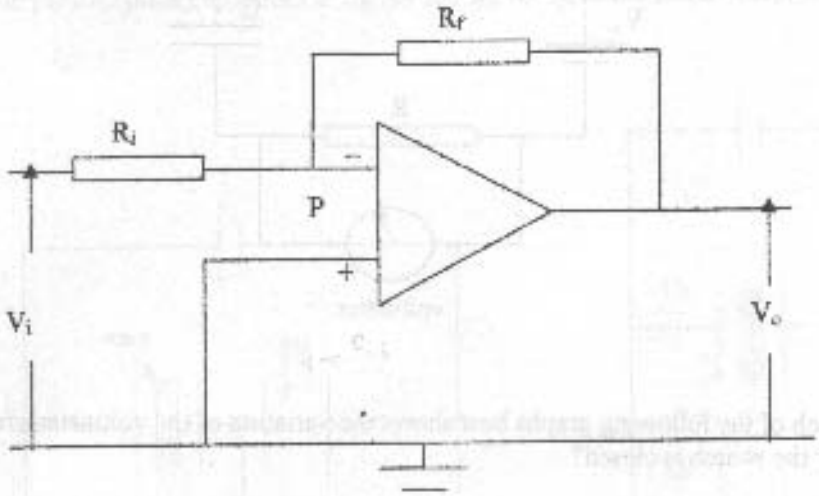
How much heat is dissipated when swtich S is closed?

A 0 J **B** 2.0×10^{-3} J **C** 1.8×10^{-2} J **D** 2.0×10^{-2} J

29 A moving coil meter of resistance 100Ω and produces full scale when a current of 2.0 mA flows through it. If the meter is used to measure a maximum current of 1.0 A, which of the followings should be done?

A Connect a 2 Ω resistor in parallel to the meter.
B Connect a 2 Ω resistor in series to the meter.
C Connect a 10 Ω resistor in parallel to the meter.
D Connect a 10 Ω resistor in series to the meter.

30 The figure below shows an operational amplifier.



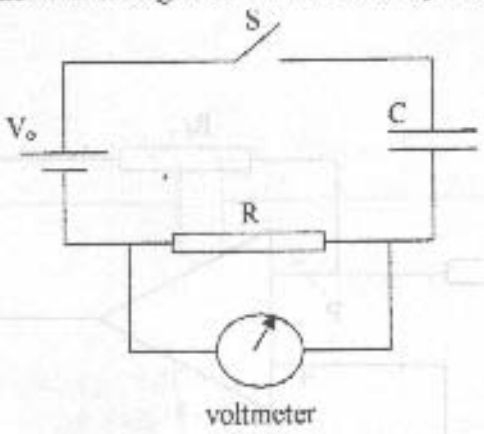
Which of the followings **does not** describe the above amplifier?

A The current flowing through the resistor R_i is the same as the current flowing through the resistor R_f.
B The potential at point P is zero.
C The input voltage V_i is anti-phase with the output voltage V_o.
D The close loop gain of the amplifier is $\frac{R_i - R_o}{R_i}$

31 A wire of length 3.0 cm, carrying a current of 5.0 A, is placed perpendicularly in a magnetic field of flux density 0.040 T. What is the magnitude of the force that acts on the wire?

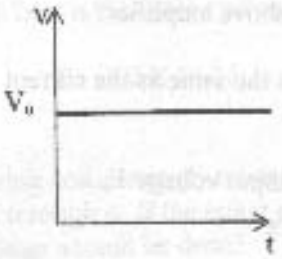
A 0.0020 N B 0.0040 N C 0.0060 N D 0.20 N

32 The capacitor shown in the figure below was initially uncharged.

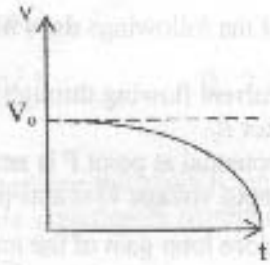


Which of the following graphs best shows the variation of the voltmeter's reading with time after the switch is closed?

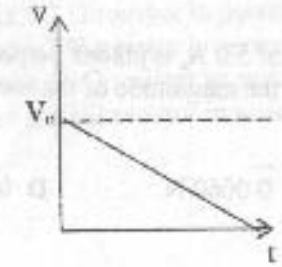
A



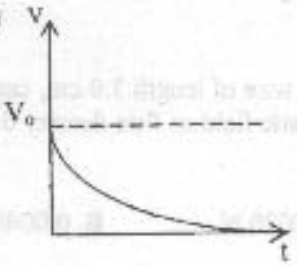
B



C



D



33 The parallel plate capacitors in fig (a) and fig (b) have the same dimensions.

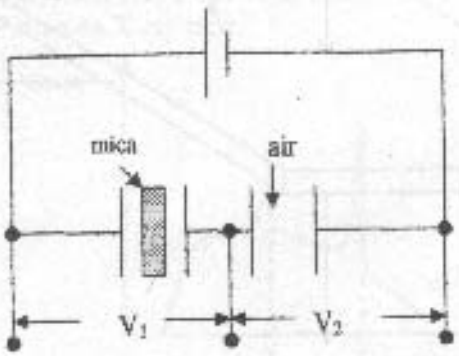


Fig (a)

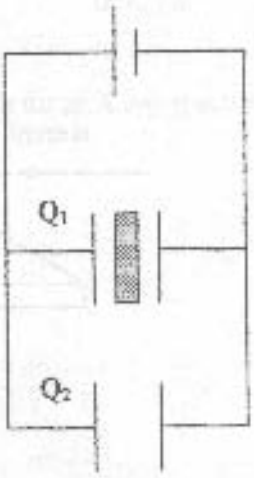
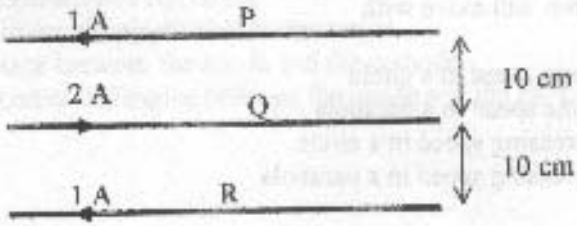


Fig. (b)

Which of the following shows the correct relationship between the potential difference V_1, V_2 and charge Q_1, Q_2?

A $V_1 < V_2$; $Q_1 > Q_2$
B $V_1 < V_2$; $Q_1 = Q_2$
C $V_1 < V_2$; $Q_1 < Q_2$
D $V_1 > V_2$; $Q_1 > Q2$

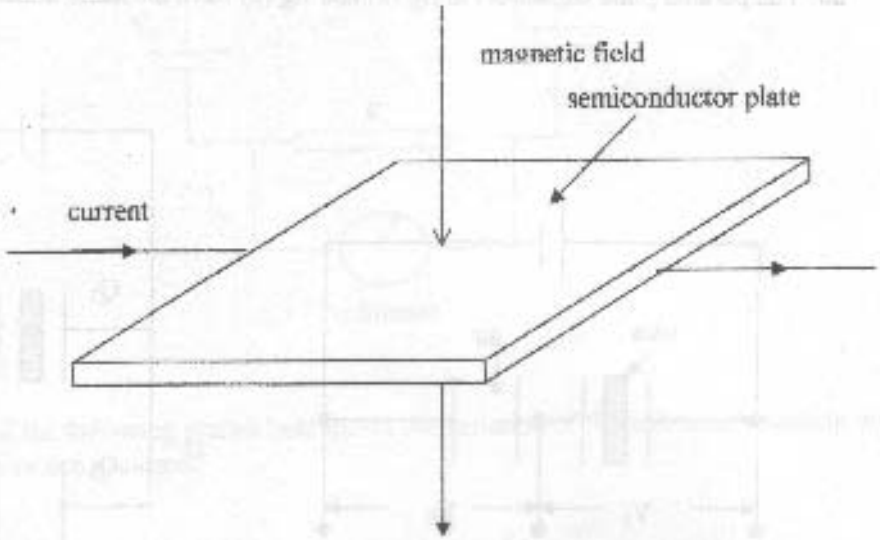
34 Three long wires P, Q and R are arranged parallel to one another in a vacuum as shown in the diagram below.



Given that the force per unit length between two wires, each carrying current of 1 A and separated by 10 cm is 2×10^{-6} N m^{-1}. What is the resultant force per unit length acting on the wire R?

A 1×10^{-6} N m^{-1} B 2×10^{-6} N m^{-1} C 3×10^{-6} N m^{-1} D 4×10^{-6} N m^{-1}

35 A horizontal semiconductor plate is placed in a vertical magnetic field, and a constant current flows through it as shown in the figure below.



The Hall voltage **does not** depend on

A the length of the semiconductor plate
B the temperature of the semiconductor
C the current density of the semiconductor
D the density of the charge carriers in the semiconductor

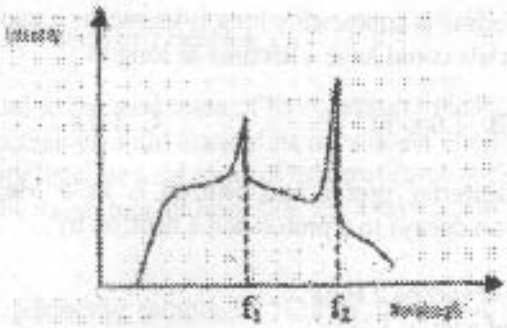
36 An electron moves in a straight line in vacuum where there is a uniform magnetic field and an electric field acting perpendicular to one another. If the magnetic field is removed, the electron will move with

A the same speed in a circle
B the same speed in a parabola
C an increasing speed in a circle
D an increasing speed in a parabola

37 Two concentric circular coils P and Q are placed in the same plane. Coil P has 10 turns of radius 4.0 cm and carries a current of 1.0 A. Coil Q has 20 turns of radius 12.0 cm and the magnitude and direction of its current is adjusted to produce a zero resultant magnetic field at the common centre of the coils. What is the current Q?

A 0.75 A B 1.5 A C 2.3 A D 4.5 A

38 The diagram below shows an intensity-wavelength graph for an X-ray spectrum produced from an X-ray tube.



The values of f_1 and f_2 depend on

A the element used as the target
B the potential difference across the tube
C the current flowing in the filament
D the number of electron colliding with the target.

39 X-ray of higher penetrating power can be produced from an X-ray tube by

A increasing the temperature of the target
B using element of lower atomic number as the target
C reducing the distance between the anode and the cathode
D increasing the potential difference between the anode and the cathode

40 The four energy levels of hydrogen are as follows:

Level P:	13.6 eV
Level Q:	3.40 eV
Level R:	1.50 eV
Level S:	0.85 eV

Light of wavelength 488 nm is produced from transition between level

A Q and P **B** R and P **C** S and P **D** S and Q

41 An excited state whose lifetime is appreciably long is known as a metastable state. Metastable state in some materials could have a lifetime as long as

A 1.0×10^{8} s **B** 1.0×10^{-3} s **C** 1.0 s **D** 10 s

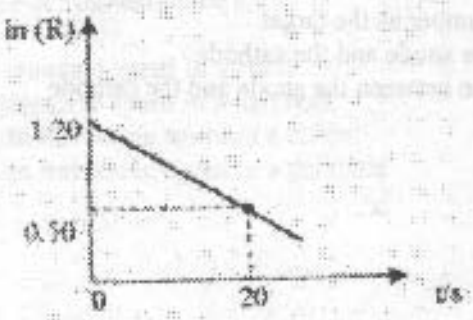
42 The rest mass of the deuteron, proton and neutron is 1876 MeV, 939 MeV and 940 MeV respectively. Deuteron decays to a proton and a neutron by

A emitting a γ - ray photon of energy 2 MeV.
B emitting a γ - ray photon of energy 3 MeV.
C capturing a γ - ray photon of energy 2 MeV
D capturing a γ - ray photon of energy 3 MeV.

43 Which of the following particles can easily penetrate the nucleus of an atom?

A Proton **B** Neutron **C** Deuteron **D** Alpha particle

44 The rate of decay of a radioactive sample is R. A graph of ln (R) against time t is obtained.



What is the half-life of this element?

A 0.035 s **B** 0.070 s **C** 20 s **D** 29 s

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45 It is given that the mass of ^{14}N is 14.00307 u. Total atomic mass of ^{1}H and ^{13}C is 14.011179 u.

The reaction $^{1}H + {}^{13}C \rightarrow {}^{14}N$

A will not happen naturally
B produces a net reaction energy
C can happen if energy is supplied
D can only happen in an environment of no gravity

46 The rest mass of a nucleus

A is equal to the total mass of its constituent nucleons
B is less than the total mass of its constituent nucleons
C is more than the total mass of its constituent nucleons
D may be more than, or less than, the total mass of its constituent nucleons

47 In a radioactive sample, 20 % of its radioactive nuclei decayed after 7 days. What percentage of the initial number of radioactive nuclei would have decayed after 14 days?

A 24% B 30% C 36% D 40%

48 In the Sun, fusion of hydrogen into helium occurs only in the core. This is because

A only the core has a pressure high enough
B only the core has a temperature high enough
C only the core has a mass of hydrogen high enough
D only the core has a density of hydrogen high enough

49 A particle was proposed to account for the 'missing' energy, momentum and angular momentum in beta decay. This particle is

A neutron B proton C electron D neutrino

50 Which of the following statements about hadron is **not true**?

A Proton is a stable hadron.
B All hadrons are made up of quarks.
C All hadron experiences strong and weak force.
D Hadrons are elementary particles that do not contain smaller particles.