رقم الورقة	
رقم المغلف	

حاضر ☐

غائب ☐

سلطنة عمان
وزارة التربية والتعليم

امتحان شهادة دبلوم التعليم العام للمدارس الخاصة (ثنائية اللغة)

للعام الدراسي ١٤٣٣/١٤٣٤ هـ - ٢٠١٢ / ٢٠١٣ م

الدور الثاني - الفصل الدراسي الأول

تنبيه:
- المادة: الفيزياء (ثنائية اللغة).
- الأسئلة في (١٢) صفحة.
- زمن الإجابة: ثلاث ساعات.
- الإجابة في الورقة نفسها.

تعليمات وضوابط التقدم للامتحـان:

- الحضور إلى اللجنة قبل عشر دقائق من بدء الامتحان للأهمية.
- إبراز البطاقة الشخصية لمراقب اللجنـة.
- يمنع كتابة رقم الجلوس أو الاسم أو أي بيانات أخرى تدل على شخصية الممتحن في دفتر الامتحان، وإلا ألغي امتحانه.
- يحظر على الممتحنين أن يصطحبوا معهم بمركز الامتحان كتبا دراسية أو كراسات أو مذكرات أو هواتف محمولة أو أجهزة النداء الآلي أو أي شيء له علاقة بالامتحان كما لا يجوز إدخال آلات حادة أو أسلحة من أي نوع كانت أو حقائب يدوية أو آلات حاسبة ذات صفة تخزينية.
- يجب أن يتقيد المتقدمون بالزي الرسمي (الدشداشة البيضاء والمصر أو الكمة للطلاب والدارسين والزي المدرسي للطالبات واللباس العماني للدارسات) ويمنع النقاب داخل المركز ولجان الامتحان.
- لا يسمح للمتقدم المتأخر عن موعد بداية الامتحان بالدخول إلا إذا كان التأخير بعذر قاهر يقبله رئيس المركز وفي حدود عشر دقائق فقط.
- يتم الالتزام بالإجراءات الواردة في دليل الطالب لأداء امتحان شهادة دبلوم التعليم العام.
- يقوم المتقدم بالإجابة عن أسئلة الامتحان المقالية بقلم الحبر (الأزرق أو الأسود).
- يقوم المتقدم بالإجابة عن أسئلة الاختيار من متعدد بتظليل الشكل (☐) وفق النموذج الآتي:

س - عاصمـة سلطنة عمـــان هي:

☐ القاهرة ☐ الدوحة

■ مسقط ☐ أبوظبي

ملاحظة: يتم تظليل الشكل (■) باستخدام القلم الرصاص وعند الخطأ، امسح بعناية لإجراء التغيير.

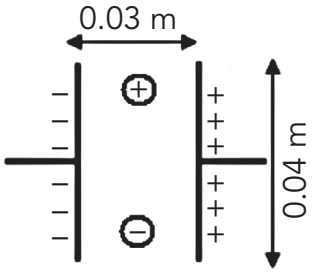
صحيح ■ **غير صحيح** ☐ ◉ ◒ ✗ ✓

Question 1

There are 14 multiple–choice items worth two marks each.
Shade the best correct answer for each of the following items.

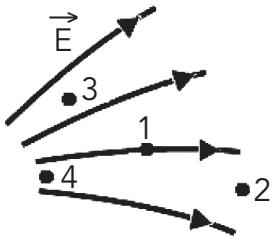
1. The diagram opposite shows two charged parallel plates. If we put an electron and a proton in the middle between them. They will move to:

	Proton	Electron
▢	right	left
▢	left	left
▢	right	right
▢	left	right

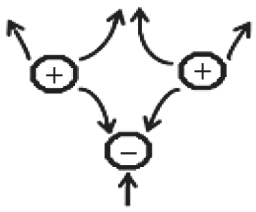


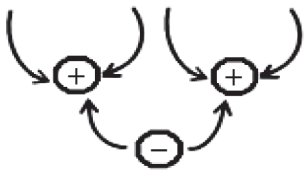
2. The correct order of increasing field strength for the points (1- 4) in the figure below is:

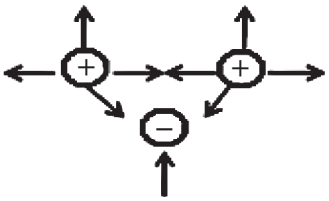
▢ 2, 3, 1, 4
▢ 2, 1, 3, 4
▢ 4, 1, 3, 2
▢ 4, 3, 1, 2

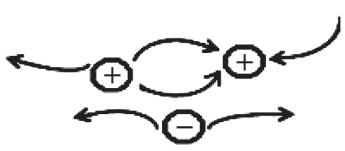


3. The correct diagram of the electric field lines :

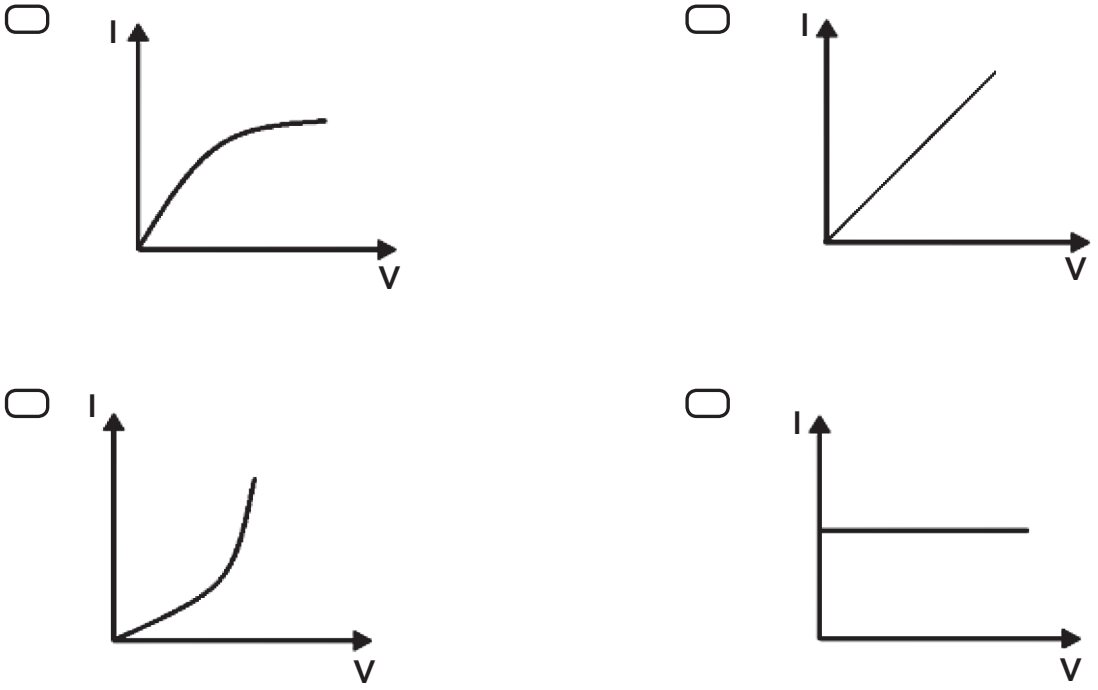
▢


▢


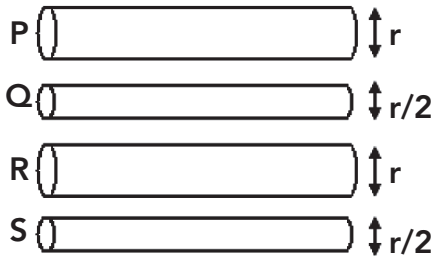
▢


▢


4. The graph that represents the current-voltage relationship for a device that obeys Ohm's law:



5. The opposite diagram shows four Copper conductors having same length, which conductor has the least resistance ?



P Q

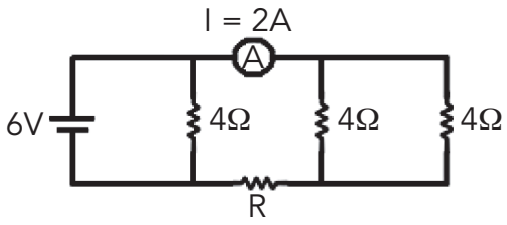
R S

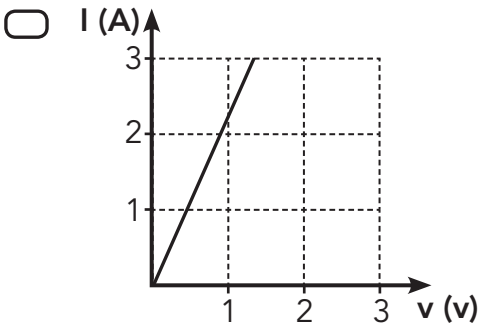
6. The potential difference between two points is (100 V). If a particle with a charge of (2×10^{-6} C) was transported from one of these points to the other, the magnitude of the work done will be:

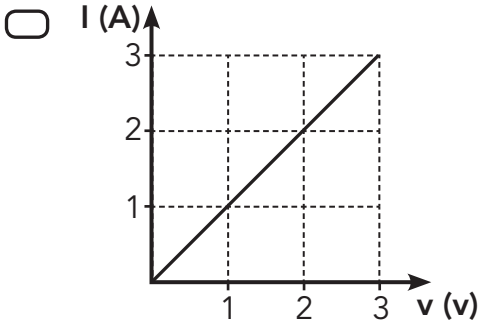
2×10^{-2} J 1×10^{-2} J

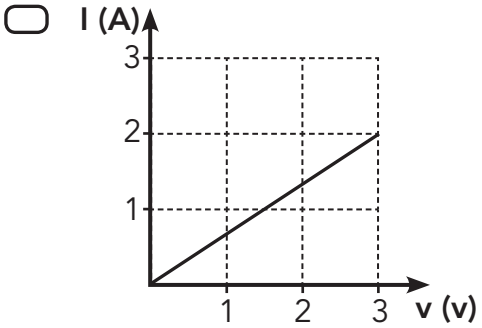
1×10^{-4} J 2×10^{-4} J

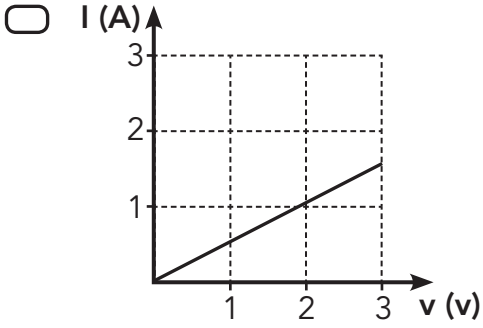
7. The graph that represents the value of (R) in the circuit shown opposite is:











8. One Ampere is equal to:

- ☐ C^2. s
- ☐ C.s
- ☐ s/C^2
- ☐ C/s

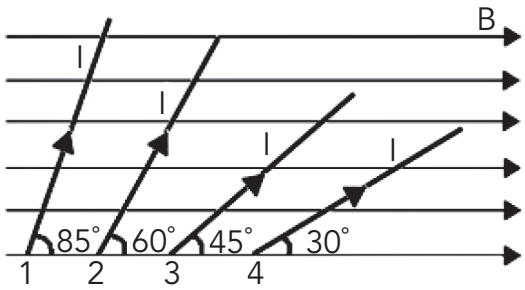
9. A capacitor stores a charge of (10 μC), when charged by a (40 V) supply. Its stored energy is:

- ☐ 4×10^{-4} J
- ☐ 2×10^{-4} J
- ☐ 4×10^{-6} J
- ☐ 2×10^{-6} J

10. Two identical capacitors are connected in series and the combination is connected in parallel to a third identical capacitor. The equivalent capacitance of this arrangement is:

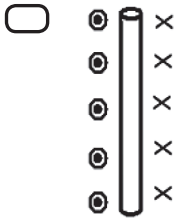
- ☐ 3C
- ☐ 2C
- ☐ 3C/2
- ☐ 2C/3

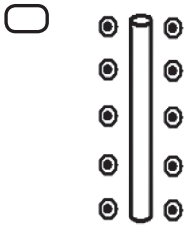
11. Four identical wires 1,2,3 and 4 carrying the same current are located in a uniform magnetic field as shown opposite. Which wire has the maximum magnetic force?

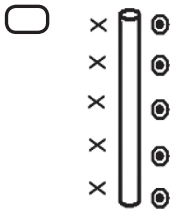


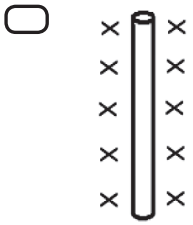
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

12. The diagram opposite shows a carrying current conductor. Which one of the following diagrams below shows the right drawing of the magnetic field around the conductor?

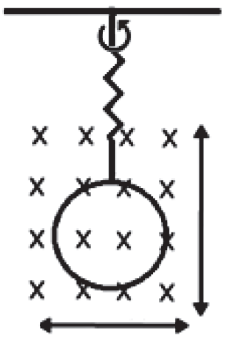






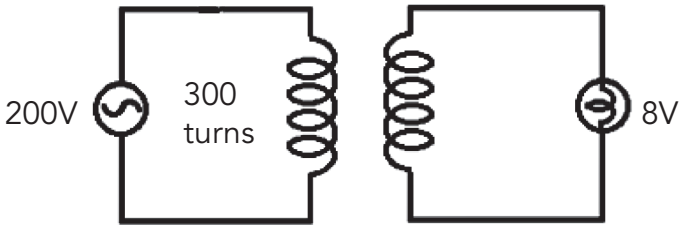


13. The diagram opposite shows a loop of wire in a uniform magnetic field. How must the loop moves to have changing in magnetic flux?



- ☐ Rotates around its axis.
- ☐ Swings from right to left.
- ☐ Oscillates up and dawn.
- ☐ Swings from left to right.

14. The diagram below shows an ideal transformer. How many turns should the secondary coil have to make the output voltage equal to (8V)?



- ☐ 300 turns.
- ☐ 25 turns.
- ☐ 12 turns.
- ☐ 5 turns.

Extended Questions

Write your answer for each of the three questions in the constructed response section in the space provided.

Be sure to show all your work, including the correct units where applicable.

Question Two (14 marks)

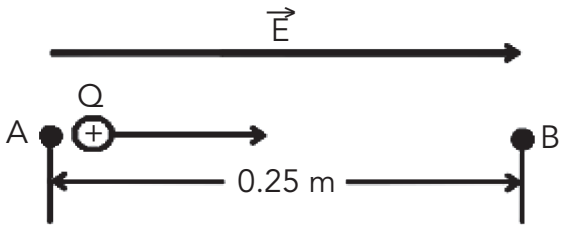
A) 1.

I. State Coulomb´s Law . (2 marks)

II. Explain.

Why the Perspex becomes positively charged when rubbed with a piece of cloth. (1 mark)

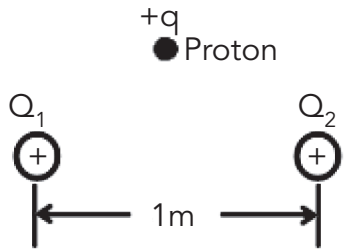
2. A uniform electric field has magnitude of (240 N/C) and is directed to the right as shown in the figure below. A particle with charge (+ 4.2 nC) moves along the straight line from (A) to (B).



I. Calculate the potential difference between the points (A) and (B). (2 marks)

II. Calculate the work done on the particle by the electric field. (2 marks)

B) The figure opposite shows two positive charges (Q_1 = 9 nC) and (Q_2 = 4 nC) separated by a distance of (1m). If a proton is passing between the two charges.



Calculate the distance from Q_1 where the proton will move without any deflection.
(3 marks)

C) 1.

I. what is meant by saying that the electrical current equals (5A)? (1 mark)

II. How does the cross-section area affect the resistance of any material. (1 mark)

2. A wire carries a steady current of (2A). How many electrons passes through the wire in (2s)? (2 marks)

Question Three: (14 marks)

A) 1. What will happen to the resistance of the semiconductors when it's temperature rises. (1 mark)

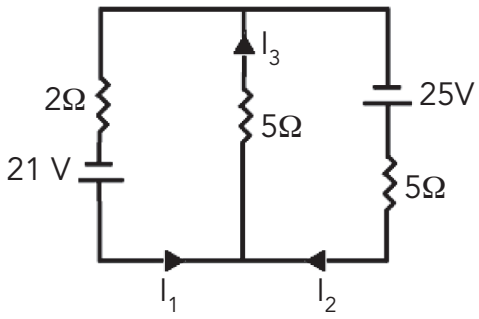
2. A light bulb is marked (60W , 120V), find out:

I. The current flowing in the bulb. (1 mark)

II. The bulb's resistance. (1 mark)

B) 1. state Kirchhoff's 2nd law. (2 marks)

2. For the circuit shown opposite find (I_1) and (I_3) when (I_2 = 2 A). (4 marks)



3. A battery of e.m.f (12 V) and internal resistance (2 Ω) is connected to a resistor of (10 Ω). Calculate the p.d. across the (10 Ω) resistance. (2 marks)

C) 1. What is meant by a capacitor has a capacitance of (1 Farad). (1 mark)

2. Calculate in (μF) the capacitance of a capacitor that have a charge of (1 mC) when the potential difference is (100V) . (2 marks)

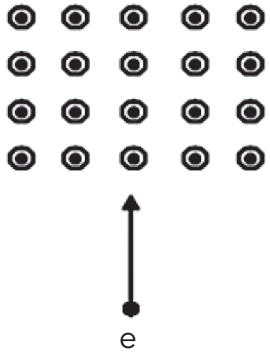
Question Four: (14 marks)

A) 1. The diagram below shows a bar magnet. Draw the magnetic field lines around it showing their direction. (1 mark)

2. An electron is moving with velocity of (2×10^7 m/s) perpendicularly to a magnetic field of (3 T).

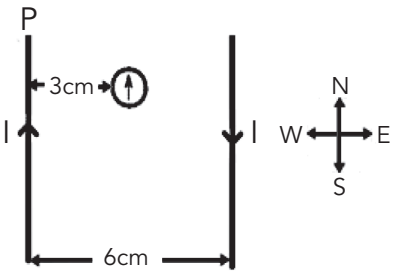
I. Calculate the force exerted on the electron. (2 marks)

II. If the electron is going north in an upward-direction field, determine the direction of the magnetic force on the electron. (1 mark)



B) 1. A magnetic field of (6×10^{-5} T) is exerting a force of (1.2×10^{-4} N) on a carrying current conductor, which is perpendicular to the field. Calculate the current of the conductor if the conductor is (1.5 m) long. (1 mark)

2. The opposite diagram shows two carrying conductors (P) and (Q), placed parallel to each other apart. A compass is placed between them. In which direction will the compass needle deflect if the wires are carrying the same current and flow in the opposite direction? (2 marks)

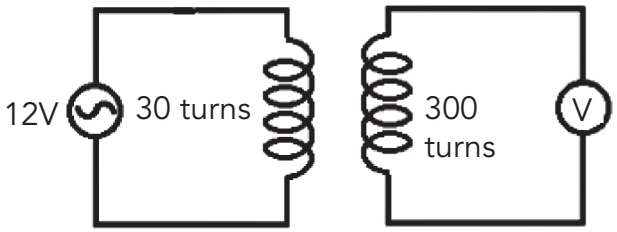


C) 1.

I. State Lenz's Law. (1 mark)

II. Define Tesla. (1 mark)

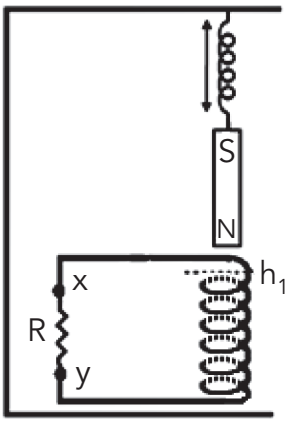
2. The diagram below shows a simple transformer.



I. What is the type of the transformer. (1 mark)

II. Find the reading of the voltmeter. (2 marks)

3. The opposite diagram shows a magnetic bar attached to a suspended spring over a solenoid. If the bar is pulled downwards to h_1 level and released.



I. What will be the direction of the current flowing through the resistor (R). (1 mark)

_____

II. Explain why. (1 mark)

_____

_____

_____

Good Luck

END OF EXAMINATION

FORMULA AND CONSTANTS

Forces and charge

$$F = K\frac{Q_1 Q_2}{r^2}$$

$$E = K\frac{Q}{r^2}$$

$$E = \frac{V}{d} = \frac{F}{Q}$$

$$v \text{ or } \varepsilon = \frac{W}{Q}$$

$$KE = \frac{1}{2}mv^2$$

$$\frac{1}{2}mv^2 = eV$$

$$W = q\Delta V$$

Magnetic forces and fields

$$F = BIL\sin\theta$$

$$\frac{F}{L} = \frac{\mu_o I_1 I_2}{2\pi r}$$

$$F = Bqv$$

Constants

$$e = 1.6\times10^{-19}C$$

$$K = 9\times10^{9}N.m^2/C^2$$

$$\mu_\circ = 4\pi\times10^{-7}T.m/A$$

$$m_{proton} = 1.673\times10^{-27}kg$$

Electricity

$$I = nAev = \frac{\Delta Q}{\Delta t}$$

$$V = IR$$

$$R = \rho\frac{L}{A}$$

$$P = VI = I^2R = \frac{V^2}{R}$$

$$W = VIt$$

$$W = \frac{1}{2}QV = \frac{1}{2}CV^2$$

$$\Sigma\varepsilon = \Sigma IR$$

$$V = \varepsilon - Ir$$

$$R = R_1 + R_2$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$C = C_1 + C_2$$

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$C = \frac{Q}{V}$$

$$V_{out} = V_{in}\frac{R_1}{R_1 + R_2}$$

Electromagnetic induction

$$\Phi = NAB$$

$$\varepsilon = -N\frac{\Delta\phi}{\Delta t}$$

$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}$$

Do not write in this space

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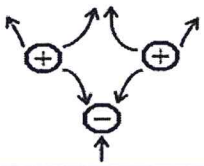
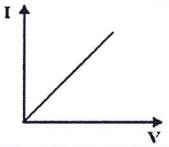
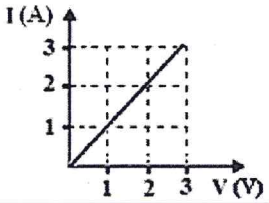
مُسوَّدَة

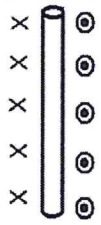
Physics 2012/2013 Bilingual Exams

1st semester , 2st session

Model Answers

Answer of Question One:(28 marks)

item	answer	answer	mark
1	D	Left | Right	2
2	B	2,1,3,4	2
3	A		2
4	B		2
5	C	R	2
6	D	2×10^{-4} J	2
7	B		2
8	D	C/s	2
9	B	2×10^{-4} J	2

10	C	3C/2	2
11	A	1	2
12	C		2
13	A	Rotates around its axis	2
14	C	12 turns.	2

Answer of Question Two:(14 marks)

item	answer	mark
(A) 1.I	The force between two charges is directly proportinal to each of the charges Q1 and Q2 inversely proportinal to the square of their separation (r^2).	1 1
(A) 1.II	Because the electrons transfer from Perspex to cloth.	1
(A) 2. I	$V_{(A-B)}$= E. d = 240 × 0.25 = 60 v	1+1
(A) 2.II	W = $V_{(A-B)}$. Q = 60 × 4.2 × 10^{-9} = 2.52 × 10^{-7}= 0.25× 10^{-6}J	1 1
(B)	Since the two charges are positive, so the Equilibrium point of force will be between them. F = E / Q = (E_1-E_2)/Q = 0 Therefore E_1- E_2= 0 ∴ E_1= E_2 ∴ $K\frac{Q_1}{r_1^2} = K\frac{Q_2}{r_2^2}$	½

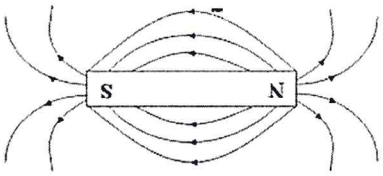
	$K \times 9\times 10^{-9}/(1- d)^2 = K \times 4\times 10^{-9}/d^2$ d= 0.4m 1- 0.4=0.6m	1 $\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$
(C) 1. I	The amount of charge of 5 coulombs that passes a point within 1 seconds.	1
(C) 1. II	when the cross-sectional area of any material increases the resistance of that material decreases	1
(C) 2	$\because Q = It$ $\therefore Q = 2\times 2$ $= 4C$ $\because n = \frac{Q}{q}$ $\therefore n = \frac{4}{1.6\times 10^{-19}}$ $= 2.5\times 10^{19}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

Answer of Question Three:(14 marks)

item	answer	mark
(A) 1	the resistance of the semiconductor decreases.	1
(A) 2 .I	$p = IV$ $\therefore I = \frac{P}{V}$ $= \frac{60}{120}$ $= 0.5A$	 $\frac{1}{2}$ $\frac{1}{2}$
(A) 2 .II	$P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P}$ $= \frac{(120)^2}{60}$ $= 240\Omega$	 $\frac{1}{2}$ $\frac{1}{2}$
(B) 1	Kirchhoff's 2nd law : around any closed loop in a circuit the sum of the emf's is equal to the sum of p.d.'s	2
(B) 2	$I_3=I_1+I_2 \rightarrow(1)$ $25-5I_2-5I_3=0 \rightarrow (2)$ $25-5\times2-5I_3=0$ $I_3=3A$ From (1): $I_3=I_1+I_2$ $\therefore I_1=1A$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1

(B) 3	$\because \varepsilon = I(R+r)$ $\therefore 12 = I(10+2)$ $\therefore I = 1A$ $\because V = IR$ $= 1X10$ $= 10\ V$	 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
(C) 1	Acapacitor stores (1 Coloumb) of charg when it is connected to (1 volt) power supply.	1
(C) 2	$C = \frac{1\times10^{-3}}{100}$ $= 1\times10^{-5}F$ $\therefore C = 10\mu F$	1 $\frac{1}{2}$ $\frac{1}{2}$

Answer of Question Four:(14 marks)

item	answer	mark
(A) 1		1
(A) 2 .I	$F = B \times Q \times v$ $= 3 \times 2 \times 10^{7} \times 1.6 \times 10^{-19}$ $\therefore F = 9.6 \times 10^{-12} N$	1 1
(A) 2 .II	To the west or to the left	1
(B) 1	$I = \frac{F}{B\ell}$ $= \frac{1.2 \times 10^{-4}}{6 \times 10^{-5} \times 1.5}$ $= 1.3A$	$\frac{1}{2}$ $\frac{1}{2}$
(B) 2	To east	2
(C) 1.I	The direction of the induced e.m.f. is such that it will try to oppose the change in flux that is producing it.	1
(C) 1.II	A magnetic flux density of (1T) produces a force of (1N) each meter of wire carrying a current of (1A) at(90˚) to the field.	1

(C) 2.I	Step-up transformer.	1
(C) 2.II	$\frac{Ns}{Np} = \frac{Vs}{Vp}$ $\therefore Vs = \frac{300 \times 12}{30}$ $= 120\ V$	1 1
(C) 3.I	From y to x	1
(C) 3.II	Because when the magnet get to the level (h_1) an induced current is produced because of changing in magnetic flux.	$\frac{1}{2}$ $\frac{1}{2}$

End of Answer Model