Training Models For third secondary

Physics

Model (3)- English

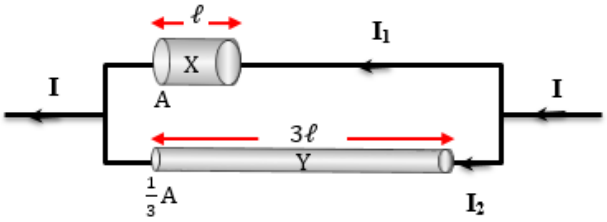
2025-2026

First: Objective questions (multiple choice)"all Question of one mark"

1 An electric conductor of length 1 m, cross-sectional area 2 mm^2, carries an electric current of intensity 2 A, and the potential difference across it is 6 V, it means that.....

A	the consumed electric power by the conductor is 3 w
B	the resistivity of the conductor material is 6 x 10^6 Ω.m
C	the conductivity of the conductor material is 1.667 x 10^5 $\Omega^{-1}.m^{-1}$
D	the resistance of the conductor is 12 Ω

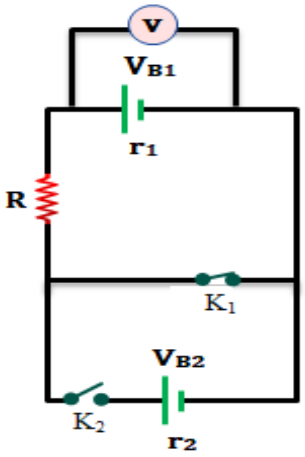
2 The figure shows a part of a closed electric circuit containing two metal conductors, X and Y, made of the same material, with cross-sectional areas (A) and ($\frac{1}{3}A$) respectively and lengths (ℓ) and (3ℓ) as shown in the figure.



So, the ratio between the intensity of the passing current through conductor (X) and that through (Y) [$\frac{I_1}{I_2}$] is equal to.....

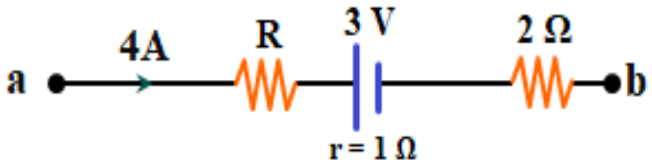
A	$\frac{1}{9}$
B	$\frac{9}{1}$
C	$\frac{1}{3}$
D	$\frac{3}{1}$

3 The electrical circuit shown in the figure consists of two batteries (V_{B1}) and (V_{B2}) with two internal resistors (r_1) and (r_2), a resistor (R), a voltmeter (V), and two switches (K_1) and (K_2). If you know that (V_{B2}) is greater than (V_{B1}). What happens to the voltmeter reading (V) when switch (K_2) is closed and switch (K_1) is opened?



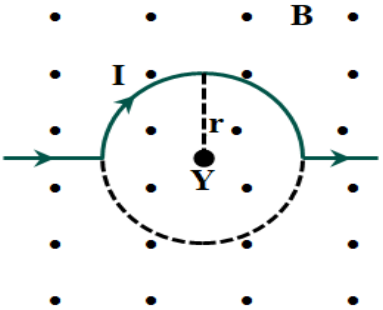
A	Decreases
B	Increases
C	Remains constant
D	Vanishes

4 The shown figure represents a part of closed electric circuit,



So, the value of the resistance R that makes the potential difference between two points (a) and (b) is 23 v is equal to.....

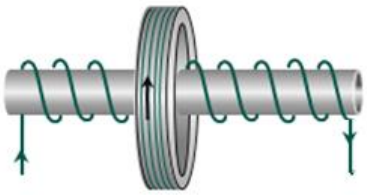
A	1 Ω
B	2 Ω
C	3 Ω
D	4 Ω

5	In the figure shown, a half-ring through which an electric current (I) flows is placed in an external magnetic field with a flux density B perpendicular out the plane of the page. If the direction of the resultant magnetic flux density at point Y is perpendicular out the plane of the page, which of the following choices is <u>correct</u>?	

A	$B < \frac{\mu I}{8 r}$
B	$B = \frac{\mu I}{8 r}$
C	$B < \frac{\mu I}{4 r}$
D	$B > \frac{\mu I}{4 r}$

6

The figure shows a solenoid with length L and number of turns N through which a direct current of intensity **I** flows. At the center of the solenoid, a circular coil was placed with radius 0.5L and number of turns N through which a current of intensity 0.5**I** flows.



The following changes were made:

i: Reducing the length of the solenoid by half.

ii: Reducing the diameter of the circular coil by half.

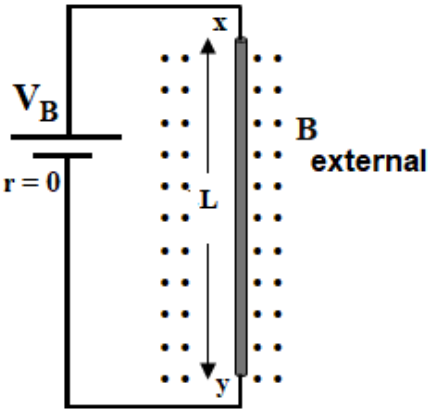
iii: Increasing the intensity of the current passing through the solenoid to twice its original value.

iv: Increasing the intensity of the current passing through the circular coil to twice its original value.

Which of the above changes lead to obtain zero net magnetic flux density at the center of the circular coil due to the two currents?

A	i or ii
B	i or iii
C	ii or iii
D	ii or iv

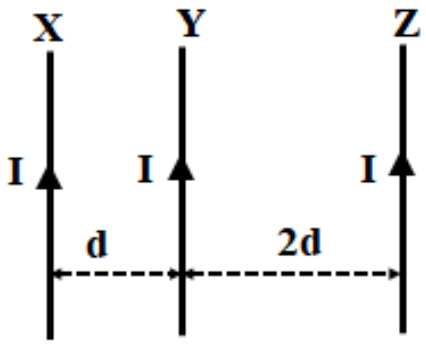
7 In the shown figure, a wire xy of length (L) and of uniform cross-section is connected to a battery with electromotive force (V_B) of negligible internal resistance and placed in a uniform magnetic field perpendicular out of the plane of the page, with a flux density B producing magnetic force acting on the wire equals F. If the wire has been drawn to a length of 2L and placed entirely in the same field and connected to the same battery, the magnitude of magnetic force acting on it .....



A	is halved
B	is quartered
C	is doubled
D	unchanged

8 The figure shows three parallel long straight wires in one plane. If wire Z is moved a distance $\left(\frac{1}{2}\,d\right)$ towards wire Y,

so the net magnetic force that acts per unit length on wire Y.....

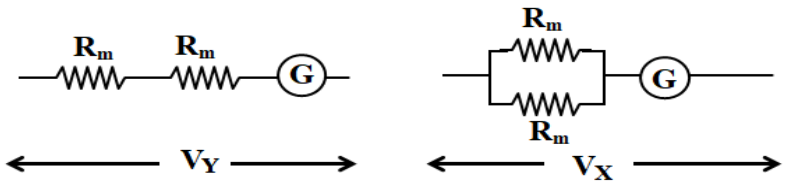


A	increases
B	decreases
C	remains constant
D	vanishes

9	A straight wire of length (ℓ) carries an electric current of intensity I. When it is reshaped into a circular loop and the same current passes through it, the magnitude of the magnetic dipole moment ($\|\overrightarrow{m_d}\|$) is determined by the relation .....

A	$\|\overrightarrow{m_d}\| = \frac{I\ell^2}{4\pi^2}$
B	$\|\overrightarrow{m_d}\| = \frac{I\ell}{4\pi^2}$
C	$\|\overrightarrow{m_d}\| = \frac{I\ell^2}{4\pi}$
D	$\|\overrightarrow{m_d}\| = \frac{I\ell}{4\pi}$

10	The following figure shows a galvanometer (G) with coil resistance R_g and the maximum voltage difference that can be measured by the galvanometer is V_g. To convert it into a voltmeter, it was connected to two resistors R_m where $R_m = 4\ R_g$, once to measure a maximum potential difference V_X, and once again to measure a maximum potential difference V_Y.



So, the ratio between ($\frac{Vx}{Vy}$) is equal to.....

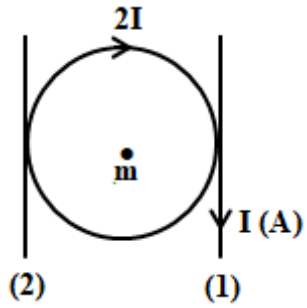
A	$\frac{1}{2}$
B	$\frac{1}{3}$
C	$\frac{1}{4}$
D	$\frac{1}{5}$

11 The figure shows a moving coil galvanometer whose coil resistance (R_g = 300 R), its pointer deflects to the end of its scale when an electric current of intensity I_g passes through it. When it is connected to a shunt resistance (R) to convert it into an ammeter to measure a maximum current of ($501I_g$), the device is damaged.

Then The value of the resistance X that should be connected in series with the galvanometer so that the device is not damaged is equal to .....

A	202 R
B	201 R
C	200R
D	199 R

12 The figure represents a metal ring through which an electric current (2I) passes, the generated magnetic field at the center of the ring (m) and of flux density (B). Two wires (1) and (2) are placed tangent to the ring and in the same plane as shown, and an electric current passes through each of them.



In order for the resultant magnetic flux density due to the three currents to remain equal to (B) at the center of the ring (m), the direction and intensity of the electric current passing through wire (2) are ..... and .....

	The direction of the current flow	The magnitude of the current intensity
A	Up of the page	I
B	Down of the page	I
C	Down of the page	2I
D	Up of the page	2I

13	**A student carries out an experiment, approaching two magnets, X and Y, toward a solenoid. Magnet X with a flux density of B and is approaching with velocity V toward the coil. Magnet (Y) with a flux density of ½ B, but it is approaching with velocity 4V toward the coil. In which case is a greater induced electromotive force generated, and why?**

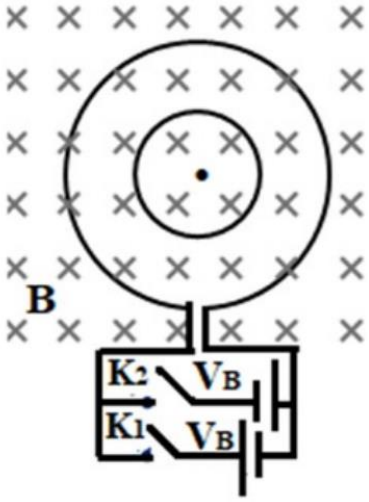
A	In case of magnet (X) as the flux density is greater
B	In case of magnet (X) as the change in the flux density is greater
C	In case of magnet (Y) as the change in the flux density is greater
D	In case of magnet (Y) as the rate of the change in the flux density is greater

14	**Two metal rods (P, Q) are moved at the same speed (V) perpendicularly in the same uniform magnetic field (B). The length of rod (P) is L while that of rod (Q) is 2L.** **If you know that the electric conductivity of rod (P)'s material is greater than that of rod (Q)'s material.** **Which of the following statements correctly expresses the induced electromotive force (emf) generated in the two rods?**

A	No emf is generated between the two terminals of rods P and Q because they are not part of a closed circuit.
B	The emf generated between the two terminals of each rod is equal because both move at the same speed in the same magnetic field.
C	(emf) generated between the two terminals of the rod Q is twice the (emf) generated between the two terminals of the rod P
D	(emf) generated between the two terminals of the rod Q is half the (emf) generated between the two terminals of the rod P

15

Two concentric metal rings at the same plane are exposed to a uniform magnetic field with flux density B and direction perpendicular into the page. The large ring is connected to two batteries with negligible internal resistance and the same electromotive force (V_B) and two open switches K_1 and K_2, as shown in the figure.



(Assuming that the magnetic field produced by the large ring is uniform over the entire area of the small ring).

- When only K_1 is closed, the larger ring produces a magnetic field with a flux density of 2B and an induced electromotive force (emf) is generated in the small ring.

When switch K_2 is closed and switch K_1 is open, the induced electromotive force in the small loop is equal to.....

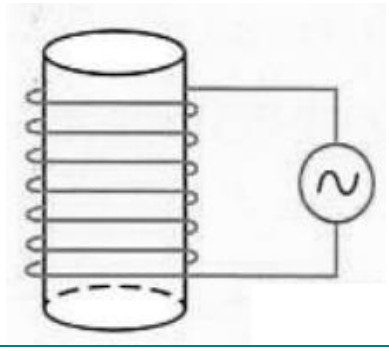
A	0.5 emf
B	emf
C	2 emf
D	3 emf

16

When the number of turns in an induction coil is doubled without changing its dimensions (length and cross-sectional area), its self-inductance coefficient.....

A	increases to 4 times the original
B	is doubled
C	is halved
D	is quartered

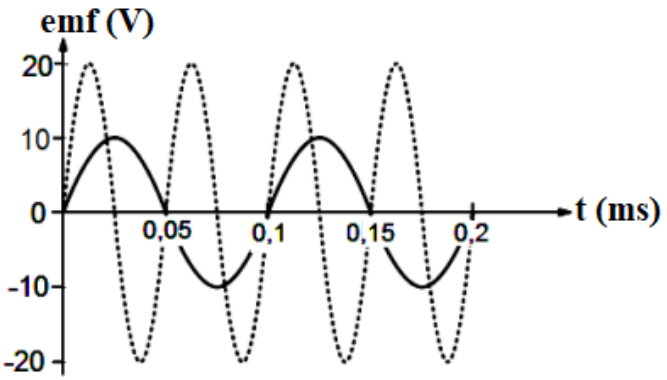
17 **The figure shows a simple induction furnace with an iron core connected to an AC power source. What happens to the eddy currents when the iron core is replaced with a plastic core?**



A	No eddy currents will be generated in the core.
B	Eddy currents will be generated, leading to core fusion.
C	Eddy currents will be generated, leading to an increase in core temperature.
D	Eddy currents will be generated, leading to a decrease in source frequency.

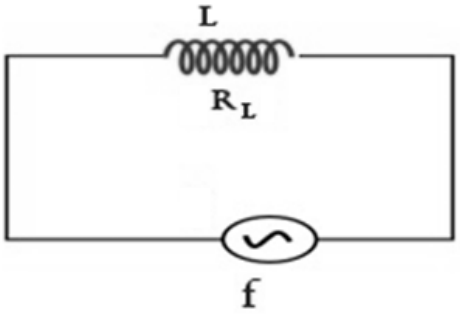
18 **In the graph, the solid curve shows how the instantaneous induced electromotive force produced by a simple generator changes over time. The dashed curve shows the output of the same generator after it has been modified.**

What modification was made?

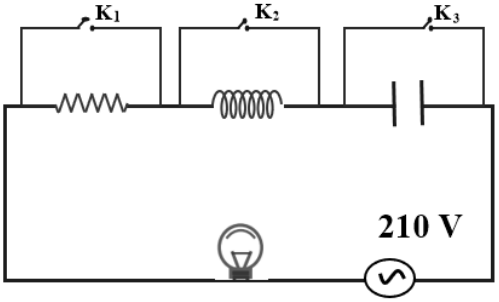


A	The area of the coil is doubled
B	The density of magnetic field is doubled
C	The number of turns is doubled
D	The angular velocity is doubled

19	**The electric motor coil is connected to a battery with an electromotive force of V and a switch, where the coil in the motor rotates between the poles of a U-shaped magnet, an induced electromotive force is generated in the coil. Which of the following statements is <u>correct</u>?**	
	A	At the moment the switch is closed, the backward induced electromotive force and current are very large.
	B	At the moment the switch is closed, the backward induced electromotive force and current are zero.
	C	At the moment the switch is closed, the backward induced electromotive force is zero while the current is very large.
	D	At the moment the switch is closed, the current is zero while the backward induced electromotive force is very large.

20	**The circuit shown represents an RL circuit consisting of an inductor with self-inductance L and its ohmic resistance R_L connected to an alternating current dynamo with frequency f. When the frequency of the dynamo is doubled, the phase angle between the total voltage and the current.....** 	
	A	Increases
	B	Decreases
	C	remains constant
	D	Vanishes

21 The figure is an electric circuit with a pure inductive coil with an inductive reactance of 400Ω, a capacitor of a capacitive reactance of 400Ω, a lamp, and a resistor with a resistance of 300Ω. In order for the electric bulb illumination to remain as it is, we should turn off.....

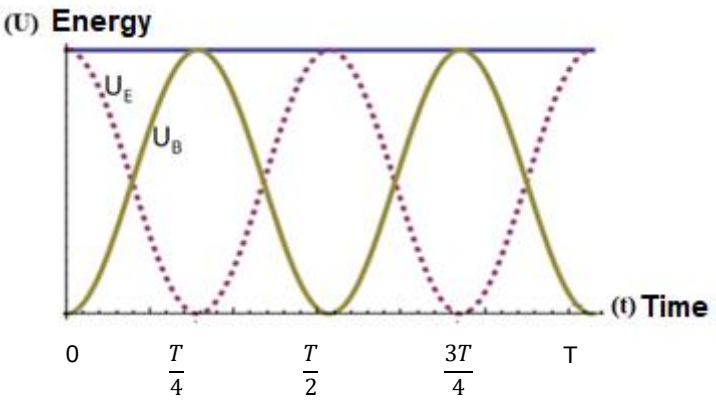


A	switch K_1 only
B	switch K_2 only
C	switches K_1 and K_2
D	switches K_2 and K_3

22 The graph shows that in a LC circuit, there is an exchange of energy stored in a charged capacitor and energy stored in an inductor with negligible resistance, assuming that the ohmic resistance of the circuit is negligible. If the periodic time is equal to T.

(U_E: represents the energy stored in the capacitor)

(U_B: represents the energy stored in the inductive coil)

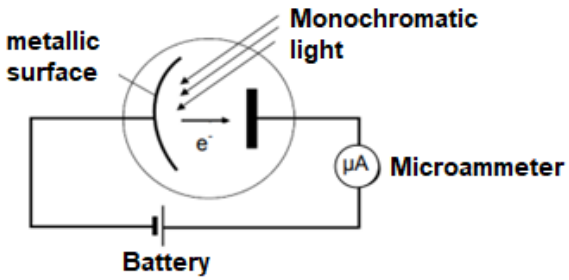


What is the time at which the energy is completely stored in the form of an electric field?

A	$\frac{3T}{4}$
B	$\frac{3T}{2}$
C	$\frac{5T}{4}$
D	$\frac{7T}{4}$

23

The figure shows a photoelectric cell. When monochromatic light with frequency (ν) and intensity (I) falls on a metal surface, the microammeter pointer (μA) deflects at an angle θ.



When the incident light is replaced with another monochromatic light with frequency (2ν) and intensity (I), the angle of deflection of the microammeter pointer (μA) .....

A	increases to 2 **θ**
B	decreases to 0.5 **θ**
C	remains **θ**
D	becomes zero

24

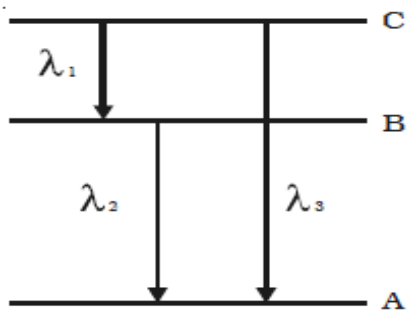
Two rays from two monochromatic light sources, X and Y, with equal force F, fall on a surface. If the wavelength of light X is less than the wavelength of light Y, and the rays are reflected 100% from the surface, then the ratio between .....

A	the power of the beam emitted from source x and the power of the beam emitted from source y is greater than one.
B	the power of the beam emitted from source x and the power of the beam emitted from source y is less than one.
C	the reflection rate of light photons x and the reflection rate of light photons y is greater than one.
D	the reflection rate of light photons x and the reflection rate of light photons y is less than one.

25 A hot body has a wavelength (λ) associated with maximum radiation intensity when its temperature is 6000 K. The wavelength associated with maximum radiation intensity when its temperature is 2000 K is equal to .....

A	$\frac{\lambda}{3}$
B	$3\,\lambda$
C	$\sqrt{3}\,\lambda$
D	$\frac{\lambda}{\sqrt{3}}$

26 A, B, and C are three energy levels in a given atom where $E_A < E_B < E_C$. If λ_1, λ_2, and λ_3 are the wavelengths of photons emitted from the transitions shown in the following diagram,



which of the following relationships is correct?

A	$\lambda_1 > \lambda_2 > \lambda_3$
B	$\lambda_3 > \lambda_2 > \lambda_1$
C	$\lambda_3 > \lambda_1 > \lambda_2$
D	$\lambda_2 > \lambda_1 > \lambda_3$

27	**In an experiment to produce X-rays by a Coolidge tube, if the shortest wavelength in the continuous spectrum of X-rays is 66.3 Picometer, this means that.....** **$(h=6.625\times10^{-34}\ J.s)$، $(c=3\times10^{8}\ m/s)$ ، $(e=1.6\times10^{-19}\ C)$**	
	A	the maximum frequency in the continuous spectrum is $4x10^{18}$ hz
	B	the maximum frequency in the continuous spectrum is $6x10^{18}$ hz
	C	the used voltage between the filament and target is 18.735 kv
	D	the used voltage between the filament and target is 12.735 kv

28	**The type of energy used to excite the atoms of the active medium in a liquid dye laser is .....**	
	A	electric energy
	B	chemical energy
	C	light energy
	D	thermal energy

29	**Which of the following statements about helium-neon lasers is <u>incorrect</u>?**	
	A	An inelastic collision between excited helium atoms and unexcited neon atoms, resulting in population inversion.
	B	The intensity of the laser beam changes with the change in the reflection coefficient of the semi-transparent mirror.
	C	Spontaneous emission is not necessary for achieving the population inversion.
	D	The purpose of the high percentage of helium atoms is to increase the efficiency of the excitation process.

30 The following diagrams represent the energy levels for the active medium in He-Ne laser that is used to produce a red laser beam.

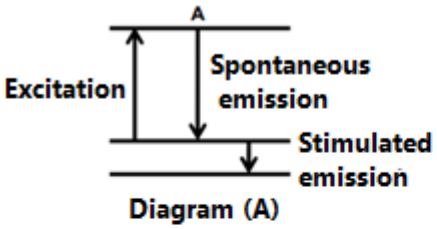


Diagram (A)

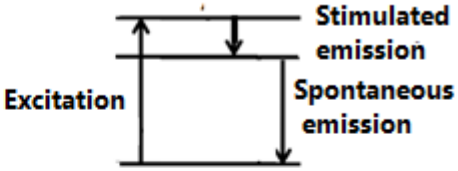


Diagram (B)

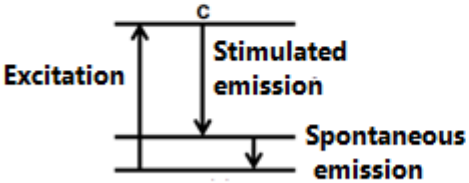


Diagram (C)

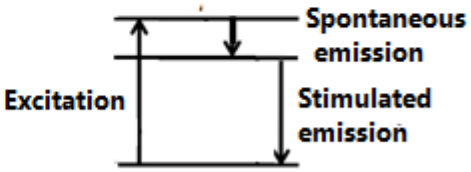
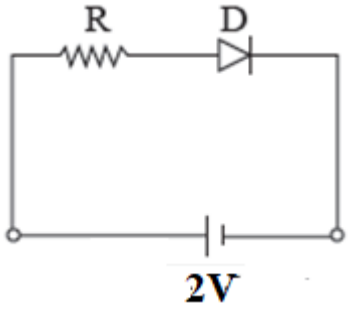


Diagram (D)

Which of the above diagrams is considered the best for explaining the production of red laser beam?

A	Diagram (A)
B	Diagram (B)
C	Diagram (C)
D	Diagram (D)

31 **In the figure, a direct current battery with an electromotive force of 2V and of negligible internal resistance is connected to an ideal diode (D)[whose resistance is zero at forward bias and infinite at reverse bias] and an ohmic resistor (R).**



Then the potential difference between the two ends of the resistor R is equal to.....

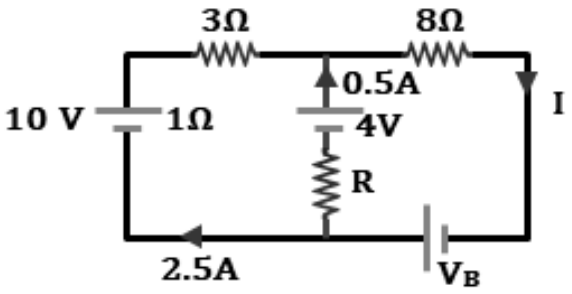
A	2V because the diode is ideal and connected forward.
B	1V because the diode is ideal and connected forward.
C	zero because the diode is ideal and connected backward.
D	2V because the diode is ideal and connected backward.

32 **In a npn transistor with a common emitter, the collector current intensity was 10mA. If 90% of the emitted electrons reached the collector, then the emitter current (I_E) and base current (I_B) would be.....**

	The emitter current (I_E)	**The base current (I_B)**
A	1.1 mA	11.1 mA
B	11.1 mA	1.1 mA
C	9 mA	1 mA
D	9.09 mA	0.91 mA

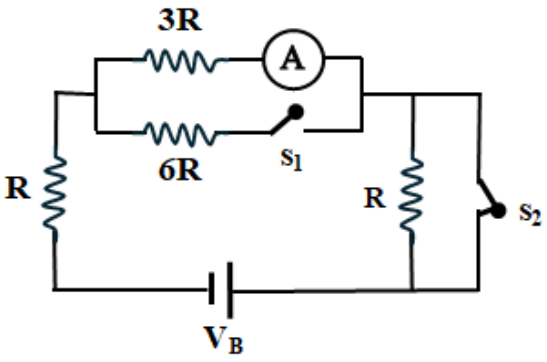
Second, objective questions (multiple choice) "Each question two marks"

33 In the shown electric circuit, the value of the electromotive force (V_B) is equal to.....



A	12 V
B	16 V
C	20 V
D	24 V

34 The electric circuit shown in the figure contains several resistors, an ammeter, and two switches, S_1 and S_2,(S_1 opened and and S_2 closed)connected to a battery to an electromotive force (V_B) of negligible internal resistance. The ammeter reading was I.



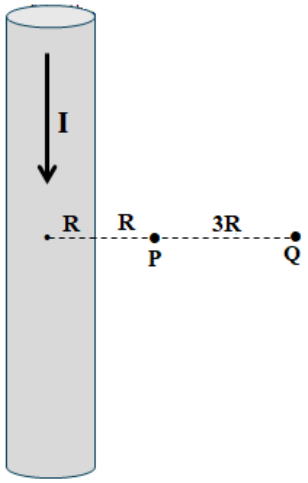
When closing switch S_1 and opening switch S_2, the ammeter reading becomes ... .

A	I
B	$\frac{2I}{3}$
C	$\frac{I}{2}$
D	$\frac{I}{3}$

35

The figure shows a long straight wire with a uniform cross-sectional radius (R) through which a direct current (I) flows in the direction shown.

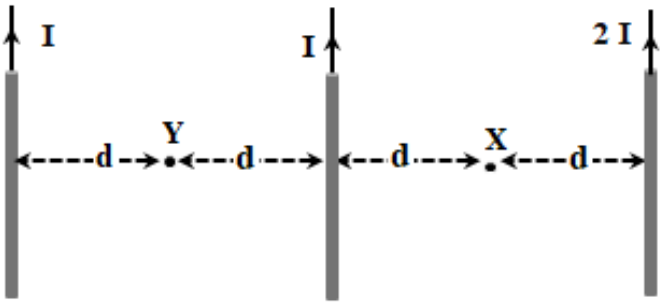
The relation between the magnetic flux density at point P (B_p) and the magnetic flux density at point Q (B_Q) is equal to .....



A	$B_P = (2)B_Q$
B	$B_P = (3)B_Q$
C	$B_P = (4)B_Q$
D	$B_P = (2.5)B_Q$

36

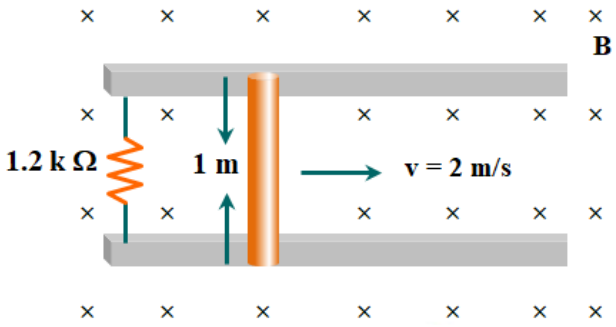
Three long straight wires are parallel to each other on the same plane, and an electric current of intensity (I) passes through each of them, as shown in the figure.



The ratio between the net magnetic flux densities at points X and Y, respectively, is equal to .....

A	$\frac{1}{1}$
B	$\frac{3}{2}$
C	$\frac{2}{3}$
D	$\frac{4}{9}$

37 In the figure, a metal rod slides at a speed of 2 m/s on two frictionless and negligible resistance metal rods separated by a distance of 1m, forming a closed loop. If the magnetic flux density is 1.5 T perpendicular into the plane of the page.



The consumed power in the resistance R and the direction of the induced current flow are.....

	The consumed power in the resistance R	The direction of the induced current
A	7.5 mW	Clockwise
B	15 mW	Clockwise
C	7.5 mW	Anticlockwise
D	15 mW	Anticlockwise

38 A step-up voltage electric transformer with 90% efficiency and its turn's ratio is 1:5. If the primary coil has an ohmic resistance of 0.2 Ω and that of the secondary coil is 2 Ω, then the ratio between .....

	The consumed power in the primary coil and that in the secondary coil is	The voltage across the primary coil and that across the secondary coil $\left(\frac{V_P}{V_S}\right)$ is
A	$\frac{5}{1}$	$\frac{1}{5}$
B	$\frac{2}{1}$	$\frac{2}{9}$
C	$\frac{5}{2}$	$\frac{1}{5}$
D	$\frac{5}{2}$	$\frac{2}{9}$

39	An AC dynamo coil consists of 12 turns, each with a cross-sectional area of 0.08 m^2, an internal resistance of 22Ω, and rotates at an angular velocity of 200 rad/s in a magnetic field of a flux density of $\frac{1000}{707}$ T. If it is connected to an external resistance of 78 Ω, the effective value of the current passing through the resistance is equal to.....

A	3.48 A
B	2.71 A
C	2.46 A
D	1.92 A

40	The two figures show two electric circuits, each containing three identical capacitors (C) connected together. The effective voltage of the AC source in circuit (1) is 2V, and the effective voltage of the AC source in circuit (2) is V, both sources have the same frequency.

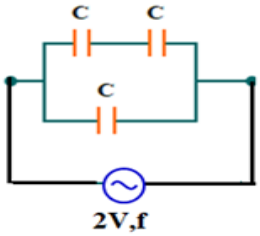


Figure (1)

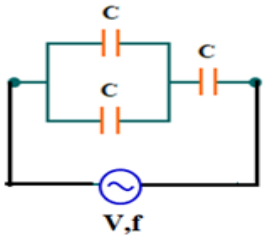


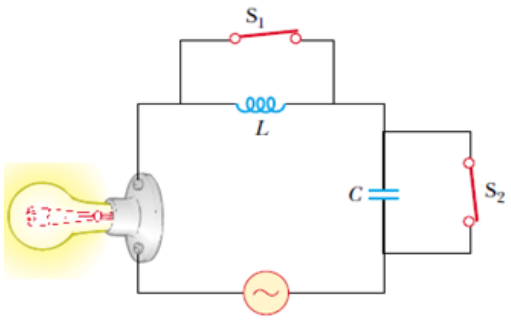
Figure (2)

So, the ratio between: $\frac{\text{The current in the shown circuit in figure (1)}}{\text{The current in the shown circuit in figure (2)}}$ = ...

A	$\frac{2}{9}$
B	$\frac{8}{9}$
C	$\frac{9}{8}$
D	$\frac{9}{2}$

41 **The circuit shown in the figure represents an RLC circuit containing a lamp (acting as an ohmic resistor), an inductor with negligible ohmic resistance, and a capacitor.**

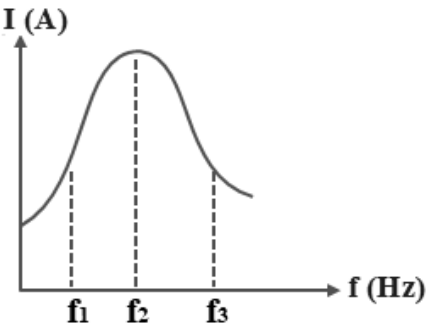
Which of the following statements is <u>true</u> regarding the illumination intensity of the electric lamp at .....?



	Opening the switch (S_1) only	Opening the switch (S_2) only
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

42 **An AC circuit has an inductor of negligible ohmic resistance, a variable capacitor, and a resistor connected in series. Using the following graph,**

which of the following statements is <u>true</u> when the frequency (f) increases from f_1 to f_3?



A	The impedance of the circuit decreases until it equals the ohmic resistance, then the impedance increases again.
B	The impedance of the circuit increases until it equals the ohmic resistance, then the impedance decreases again.
C	The total voltage lags the current at f_2, then the total voltage leads the current.
D	The circuit has ohmic properties at f_2, then it becomes capacitive circuit

43	An electron with mass (m_e) and a proton with mass (m_p) move with the same kinetic energy. If you know that $m_p = 1840\ m_e$. If the wavelength associated with the motion of the electron (λ_e) and the wavelength is associated with the motion of the proton (λ_p), so.....	
A	$\lambda_e = 1840\ \lambda_P$	
B	$\lambda_e = \sqrt{1840}\ \lambda_P$	
C	$\lambda_e = \frac{\lambda_P}{1840}$	
D	$\lambda_e = \frac{\lambda_P}{\sqrt{1840}}$	

44	Two crystals, one made of Germanium and the other of copper, contain a number of free electrons at a certain temperature. When the temperature of both the germanium and copper crystals is raised by the same value, so.....	
	the electric conductivity and the number of free electrons for the germanium crystal	the electric conductivity and the number of free electrons for the copper crystal
A	the conductivity increases while the number of free electrons remains constant	the conductivity increases while the number of free electrons remains constant
B	both the conductivity and the number of free electrons increase	the conductivity decreases while the number of free electrons remains constant
C	the conductivity decreases while the number of free electrons remains constant	both the conductivity and the number of free electrons decrease
D	the conductivity decreases while the number of free electrons increases	both the conductivity and the number of free electrons increase

Third, essay questions: each question has two marks.

45	In cathode ray tube, what will happen to the brightness of the fluorescent screen when.....? 1 - The grid negative potential increases 2 - The beam deflection system (electric and magnetic fields) is damaged

46	In Coolidge tube for producing X-rays. What will happen with the explanation for X-ray penetration when.....? 1- Increasing filament current 2- Increasing the potential difference between cathode and anode