Training exams For third secondary

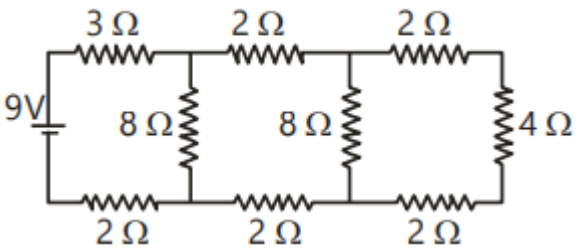
Physics- English

Model (4)- English

2025-2026

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

1	**Which of the following choices causes the electric resistance of a copper conductor to decrease to a quarter when its length and temperature remain constant?**	
	A	Increase the cross-sectional area of the conductor to a double
	B	Decrease the diameter of the conductor to a half
	C	Increase the diameter of the conductor to a double
	D	Decrease the cross-sectional area of the conductor to a quarter

2	**In the shown electric circuit, there are several resistors and a battery with electromotive force 9 V and a negligible internal resistance.** **Which of the following statements is <u>correct</u>?** 	
	A	The intensity of the passing current through the resistor 3 Ω is 0.5 A
	B	The intensity of the passing current through the resistor 3 Ω is 1.125 A
	C	The intensity of the passing current through the resistor 4 Ω is 0.5 A
	D	The intensity of the passing current through the resistor 4 Ω is 0.25 A

3

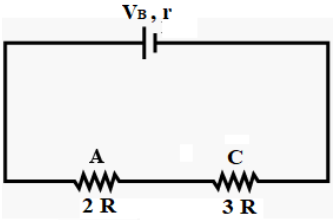
In the shown electric circuit, the battery has an electromotive force V_B and an internal resistance r. If:

V: the potential difference between the two ends of the battery.

V_A: the potential difference between the two ends of resistor A.

V_C: the potential difference between the two ends of resistor C.

I: total current intensity passing through the circuit)



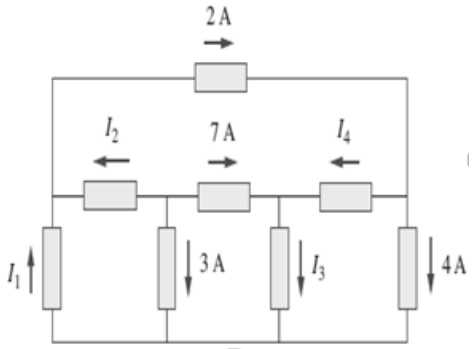
Which of the following relations is correct?

A	$V_A + V_C + I\,r = V$
B	$V = I\,(5R+r)$
C	$V_B = V_A + V_C$
D	$V_B = V_A + V_C + Ir$

4

The circuit shown in the figure contains several currents.

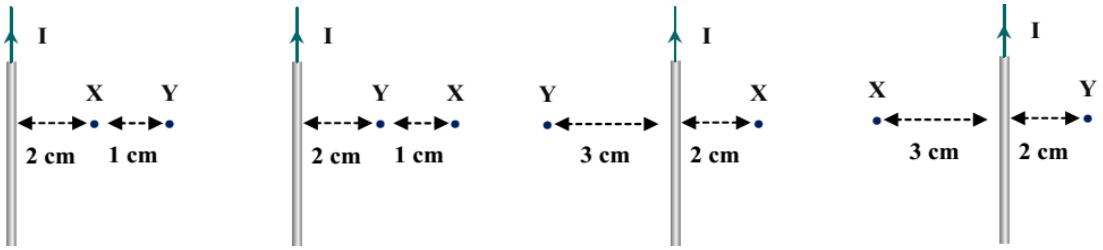
So, the value of I_3 is equal to .....



A	9 A
B	5 A
C	1 A
D	2 A

5

If the ratio between the magnetic flux density at points (x,y), which lie around a straight wire carrying an electric current, is $\left(\frac{B_x}{B_y} = \frac{2}{3}\right)$



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

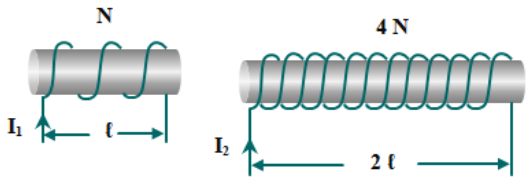
Which of the following figures correctly expresses the position of each of the two points?

A	Figures B and D
B	Figures B and C
C	Figures D and A
D	Figures A and C

6

The diagram illustrates two solenoids, and their coils insulated from each other and wound around a metal cylinder of the same type, an electric current passing through each of them.

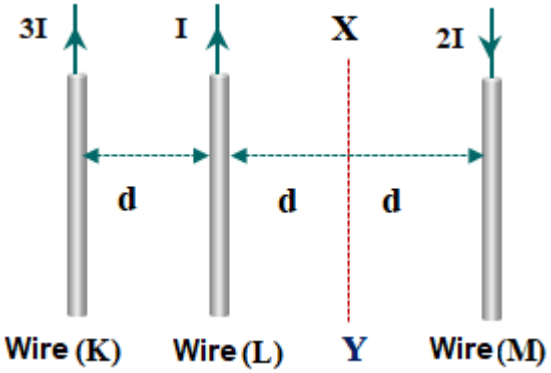
If you know that the flux density at the center of each coil is equal, what is the ratio between the current in each coil $(\frac{I_1}{I_2})$?



A	$\frac{2}{3}$
B	$\frac{1}{4}$
C	$\frac{2}{1}$
D	$\frac{8}{1}$

7

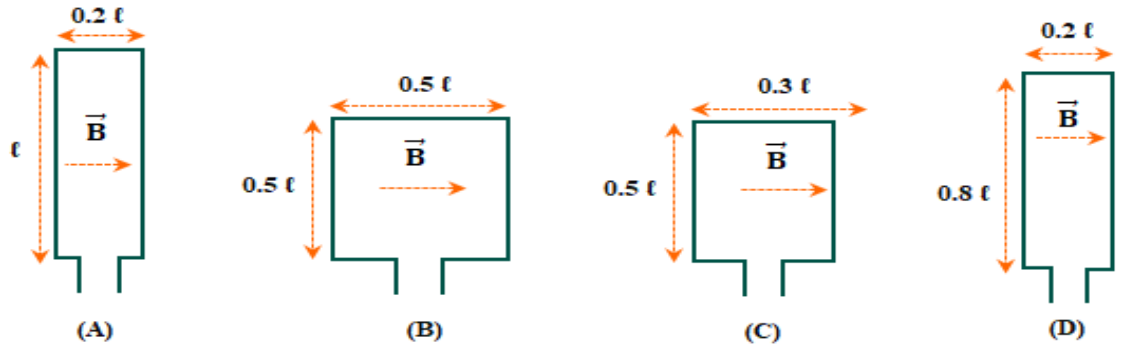
The figure shows three identical straight parallel wires placed in the same plane, each carrying an electric current. The net magnetic force acting on wire L is equal to F_1. If it is moved to position XY, the net magnetic force acting on it becomes F_2. Then .....



A	$F_2 > F_1$, at same direction of F_1
B	$F_1 > F_2$, at same direction of F_1
C	$F_2 > F_1$, at opposite direction of F_1
D	$F_1 > F_2$, at opposite direction of F_1

8

The following four figures A, B, C, and D show four rectangular coils from a single loop with the dimensions of the coils marked on them. Each coil carries an electric current of 1A and is placed in a uniform magnetic field with a flux density of B such that the direction of the magnetic field is parallel to the plane of the coils.



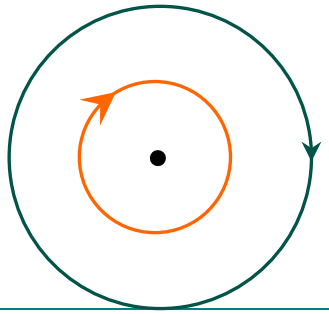
Which coil is affected by the greatest torque?

A	Coil A
B	Coil B
C	Coil C
D	Coil D

9 **Coaxial two long solenoids X and Y with the same number of turns per unit length (n), their radii (r) of 40 mm and 20 mm, respectively, and carry currents of intensity I_1 and I_2, respectively. The net magnetic flux density at a point on their common axis is zero when coil Y is placed inside coil X having the same axis.**
Which of the following statements is incorrect?

A	The direction of current flow I_1 is opposite to the direction of current flow I_2.
B	The magnetic field generated by the flow of current I_1 through coil X is equal to the magnetic field generated by the flow of current I_2 through coil Y.
C	The value of current intensity I_1 is equal to that of I_2
D	The value of current intensity I_1 is a twice of that of I_2

10 **Two concentric rings lie in the same plane; each carry a current (I) in the same direction. The diameter of the outer loop is twice that of the inner loop. If the magnetic flux density produced by the outer loop at the common center is equal to 2B,**
then the direction and magnitude of the resultant magnetic flux density at the center are .....



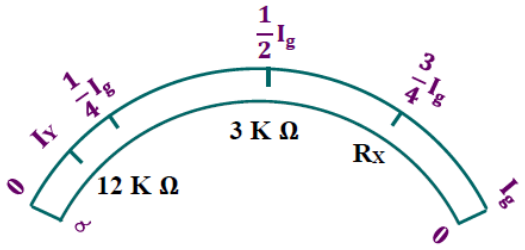
	The direction of the resultant magnetic flux density	The magnitude of the resultant magnetic flux density
A	Perpendicular to the plane of the two rings, into the page	6B
B	Perpendicular to the plane of the two rings, out the page	6B
C	Perpendicular to the plane of the two rings, into the page	2B
D	Perpendicular to the plane of the two rings, out the page	2B

11 **The sensitive galvanometer pointer deflects in a certain direction and settles at a certain reading when a direct current passes through it, while the electric motor coil continues to rotate without stopping when the same current passes through it.**
The main reason for the galvanometer pointer stopping and the motor coil rotating without stopping is .....

A	the presence of soft iron cylinder is only in the core of the galvanometer coil.
B	the presence of a cylinder split into two insulated equal halves in the motor coil only
C	there is a u-shaped magnet with concave poles in both the galvanometer and the motor coil.
D	the presence of a pair of spring coils in the galvanometer coil only creates a torque when current passes through.

12 **The figure represents the ohmmeter scale. If the external resistance 3kΩ causes the device pointer to deflect to $\frac{1}{2}$ of the scale.**

The values R_X and I_Y are.....



	R_x	I_Y
A	1000Ω	$\frac{1}{5}I_g$
B	2000Ω	$\frac{1}{6}I_g$
C	1000Ω	$\frac{1}{6}I_g$
D	2000Ω	$\frac{1}{5}I_g$

13	**A magnet is moved near a solenoid, generating an induced electromotive force of 4V between its two ends in 0.5 s. When the number of coil turns is doubled and the same magnetic flux changes within a period of 0.25 s,** **the average induced electromotive force becomes .....**

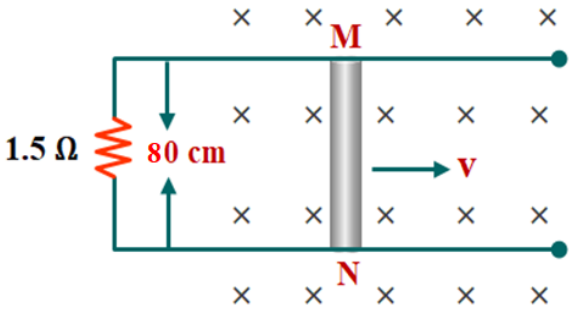
A	2 V
B	4 V
C	8 V
D	16 V

14	**Two circular coils (1), (2), their radii are r_1 and r_2, respectively, and they have the same number of turns. They are placed in a magnetic field perpendicular to their planes. When the magnetic flux density through them changes at the same rate, it is observed that the average induced emf in coil (1) is four times its value generated in coil (2).** **Then.....**

A	$r_1 = 2\, r_2$
B	$r_1 = \frac{1}{4} r_2$
C	$r_1 = 4\, r_2$
D	$r_1 = \frac{1}{2} r_2$

15

A metal conductor (MN) with a length of 40 cm and a resistance of 0.5 Ω moves in the direction shown in the figure at a speed (v) perpendicular to a uniform magnetic field with a flux density of 0. 5 T, and if the force acting on the wire to make it move at a constant speed is 0.16 N,

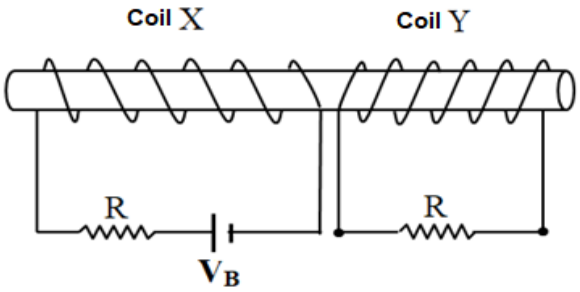


then the correct choice that correctly represents the value of the induced electromotive force (emf) generated between the two ends of the wire and the direction of the induced current in the circuit is .....

	The induced electromotive force is	The direction through the conductor in the circuit
A	0.6V	Clockwise
B	0.8V	Clockwise
C	0.6 V	Anticlockwise
D	0.8V	Anticlockwise

16

The figure shows two adjacent solenoids X and Y wound on a soft iron rod. If the mutual inductance coefficient between them is M.

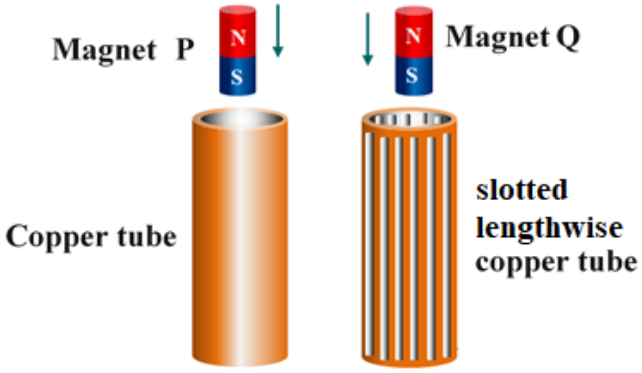


To increase the mutual inductance coefficient between them to 2M, it is necessary to.....
(Assume that the distance between the two coils remains constant)

A	Compress the coil Y to half its original length.
B	Compress the coil X to half its original length.
C	increase V_B of the source to double
D	increase the number of turns of each coil to double.

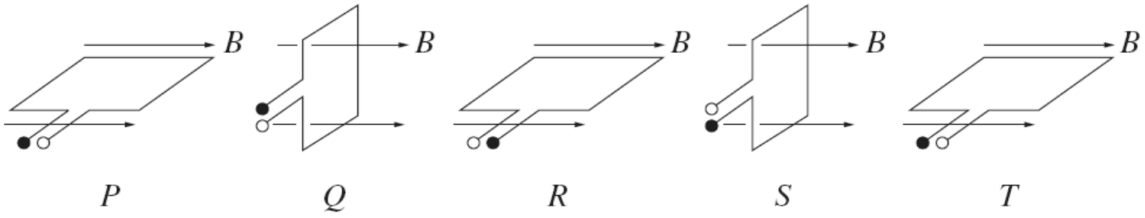
17

The figure illustrates an experiment to demonstrate the effect of eddy currents when two identical magnets (P and Q) are dropped freely at the same moment from the same height through two cylindrical copper tubes of the same dimensions, one of which is slotted lengthwise.
(There is no contact with the walls of the tubes during free fall).



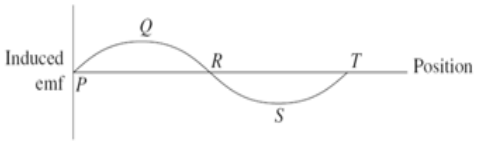
Which magnet reaches the bottom of the tube first and why?

A	Magnet P, where high eddy currents are generated in the tube through which it passes.
B	Magnet P, where low eddy currents are generated in the tube through which it passes.
C	Magnet Q, where high eddy currents are generated in the tube through which it passes.
D	Magnet Q, where low eddy currents are generated in the tube through which it passes.

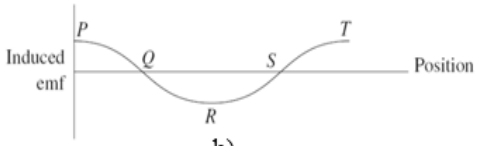


18 **The figures above illustrate the rotation of an alternating current generator coil (dynamo) at a constant rate in a uniform magnetic field.**

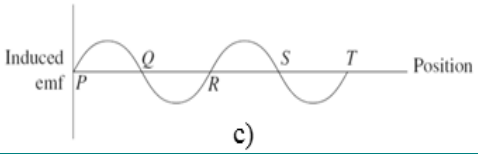
Which of the following graphs represents the relationship between induced electromotive force versus position?



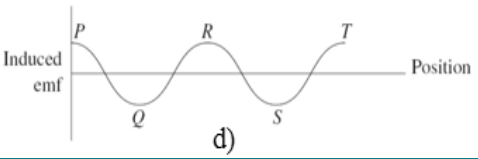
a)



b)



c)



d)

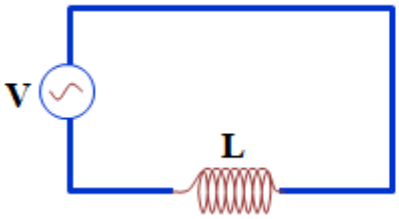
A	Graph (a)
B	Graph (b)
C	Graph (c)
D	Graph (d)

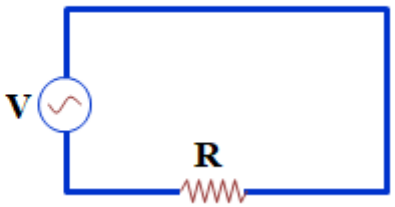
19 **At a power plant, voltage is generated at 11 kV, then raised to 220 kV before being transmitted over long distances through high-voltage lines.**

What is the main reason for using a transformer in this case?

A	To reduce the current intensity in transmission lines and thus reduces power loss.
B	To increase the current intensity to ensure voltage stability at the end of the line.
C	To convert alternating current to direct current before transmission.
D	To maintain a constant current frequency during transmission.

20 **The following figure shows two AC circuits, one containing an ohmic resistor (R) and the other containing an inductor (L) with negligible ohmic resistance. Assuming that the voltages of the two sources have the same phase,**

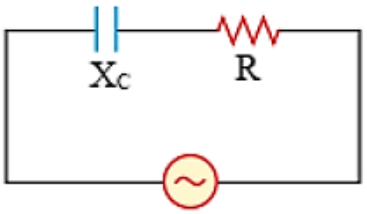




Which of the following is <u>correct</u>?

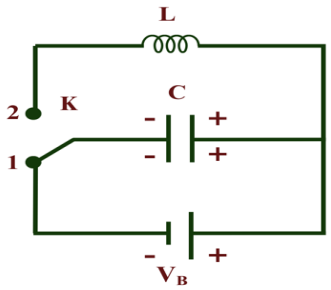
A	The current in the resistor leads the current in the coil by a quarter cycle.
B	The current in the resistor lags the current in the coil by a quarter cycle.
C	The current in the resistor is in phase with the current in the coil.
D	The phase angle between the current in the resistor and the current in the coil is 45°.

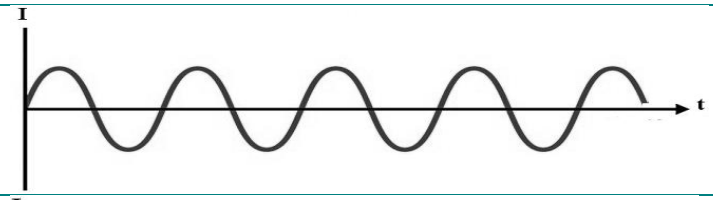
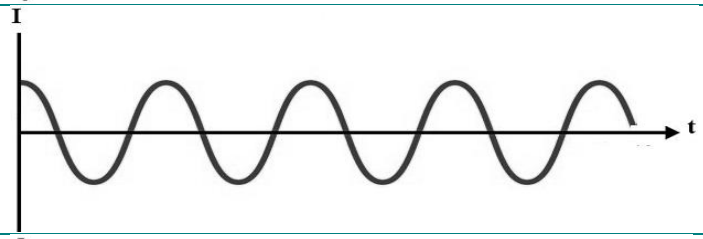
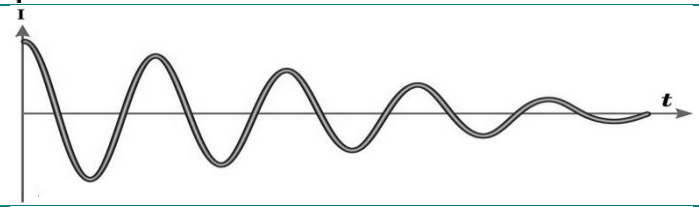
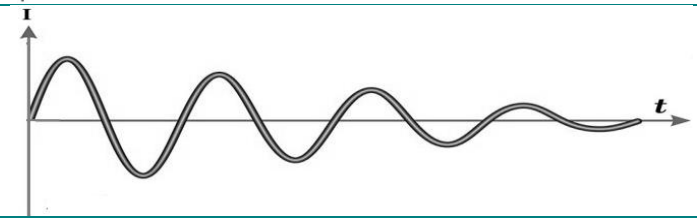
21 The figure represents an alternating current (AC) circuit containing a capacitor and an ohmic resistor. When a current with frequency f passes through it, then Xc = R. If the frequency is halved, so the ratio between the impedance in the second case and the impedance in the first case is equal to .....



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

22 The circuit shows an LC circuit (oscillating circuit) containing an inductor with self-inductance (L), a fully charged capacitor with capacitance (C) across switch K, and connecting wires with resistance R.
So, the graph that correctly represents the relationship between the intensity of the current passing through the inductor and the time from the moment switch K reaches position 2 is .....



A	
B	
C	
D	

23 **In a cathode ray tube, when the potential difference applied between the cathode and the anode is increased to four times its original value, the speed of the emitted electrons.....**

A	increases to four times its original value
B	is doubled
C	is halved
D	increases to sixteen times its original value

24 **Two light beams, X and Y, if source X produces 1.2×10^{15} photons/sec, while source Y produces 10^{15} photons/sec, and if the ratio between the wavelength of light emitted from source X and the wavelength of light emitted from source Y is $\frac{5}{6}$ respectively, then the ratio between: $\frac{\text{The power of the emitted ray from source X}}{\text{The power of the emitted ray from source Y}}$ = ...**

A	$\frac{36}{25}$
B	$\frac{6}{5}$
C	$\frac{5}{6}$
D	$\frac{25}{36}$

25 **The table shows the masses of some assumed particles that have the same type and quantity of charge. These particles are affected by the same potential difference.**

The particle	Its mass
A	3m
B	27 m
C	81m

Which of the following statements is <u>correct</u>?

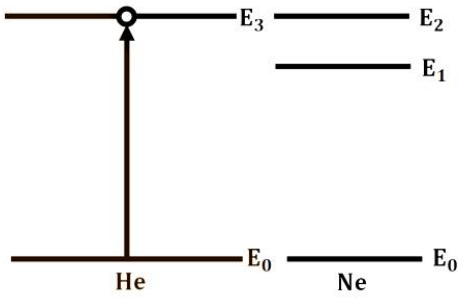
A	The kinetic energy of particle B is nine times the kinetic energy of particle A.
B	The kinetic energy of particle C is nine times the kinetic energy of particle A.
C	The wavelength associated with the motion of particle B is three times the wavelength associated with the motion of particle C.
D	The wavelength associated with the motion of particle A is three times the wavelength associated with the motion of particle B.

26	**In Bohr's hydrogen atom model, a photon in the visible region with a frequency of 6.17×10^{14} Hz is emitted when an electron is transmitted between two energy levels.** **What are the two energy levels between which the electron transmitted in the hydrogen atom?** **($h = 6.625\times10^{-34}$ J.s)**	
	A	The electron moves from level N to level K.
	B	The electron moves from level N to level L.
	C	The electron moves from level M to level K.
	D	The electron moves from level M to level L.

27	**Which of the following factors is necessary for the formation of a line emission spectrum?**	
	A	Heating a solid object to a high temperature
	B	Passing white light through a cold space
	C	Exciting separate gas atoms at low pressure
	D	Directing sunlight on a glass prism

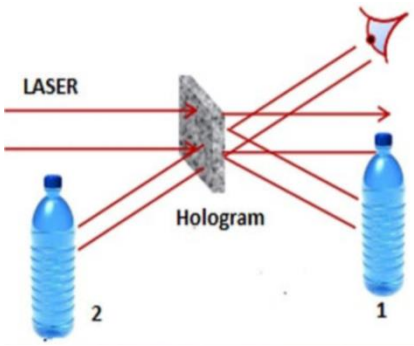
28	**Laser beam light is characterized by being monochromatic because.....**	
	A	The system is in a population inversion state.
	B	The excited electrons are in a metastable energy level.
	C	The emitted photon and the incident photon have the same phase.
	D	The emitted photons have the same energy as the incident photons when electrons transition from a higher energy level to a lower energy level.

29 **The figure shows the energy levels in helium and neon atoms. When helium atoms are excited to energy level (E_3). The transition accompanied by thermal energy is the transition of atoms from energy level .....**



A	E_0 to E_3
B	E_3 to E_2
C	E_1 to E_0
D	E_2 to E_1

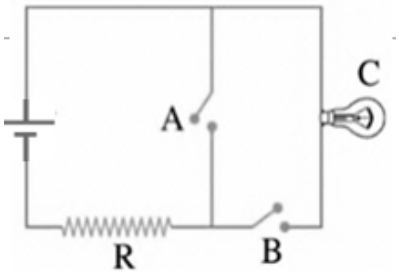
30 **The opposite shows two images (1, 2) when a laser beam falls on a three-dimensional image.**

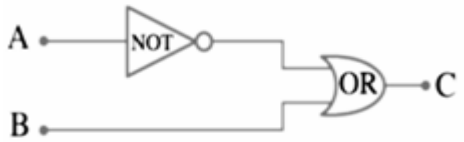
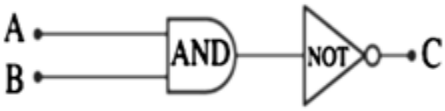
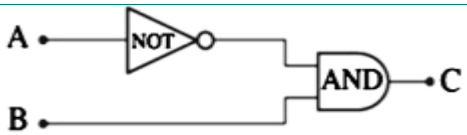


Which of the following choices shows the characteristics of each image?

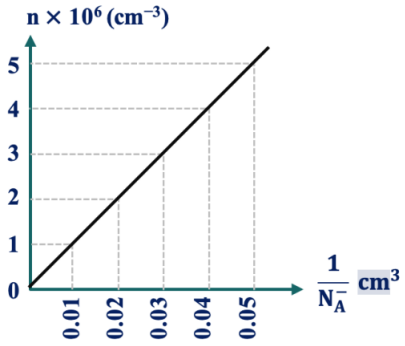
	Image (1)	**Image (2)**
A	Real	Virtual
B	Virtual	Real
C	Real	Virtual
D	Virtual	Real

31 In the following electric circuit, switches (A) and (B) represent the input, and lamp (C) represents the output. Which of the following groups of logic gates is equivalent to the circuit?



A	
B	
C	
D	

32 The graph illustrates the relationship between the concentration of free electrons (n) in a doped semiconductor crystal and the inverse concentration of acceptor atoms $\left(\frac{1}{N_A^-}\right)$ at a certain temperature,

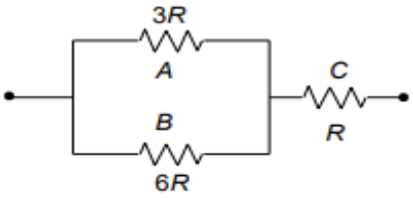


The concentration of holes in the pure semiconductor crystal at the same temperature = ...

A	$10^{-4}\ cm^{-3}$
B	$10^{4}\ cm^{-3}$
C	$10^{8}\ cm^{-3}$
D	$10^{12}\ cm^{-3}$

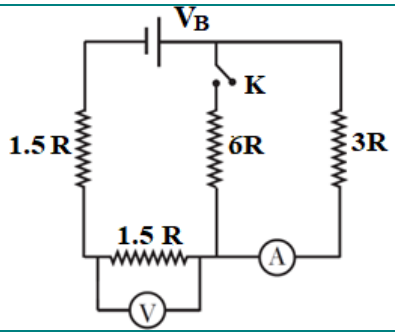
Second, objective questions (multiple choice) "Each question two marks"

33 The figure represents part of an electric circuit containing three resistors A, B, and C connected together as shown.
The ratio between the power lost in A:B:C, in that order, is.....



A	2: 4: 3
B	3: 2: 4
C	4: 2: 3
D	2: 3: 4

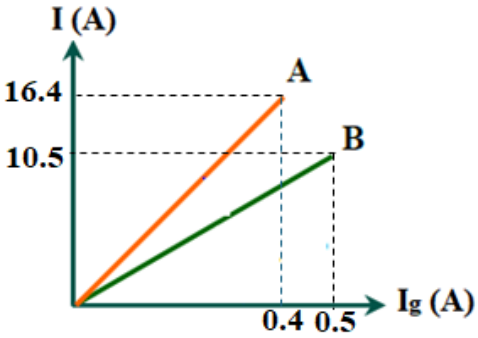
34 The figure represents an electric circuit containing a battery with an electromotive force V_B, of negligible internal resistance, several resistors connected together, and an open switch K.
When switch K is closed, ...



	The ammeter reading	The ratio between the voltmeter reading before and after closing the switch respectively
A	increases	$\frac{5}{6}$
B	decreases	$\frac{5}{6}$
C	increases	$\frac{3}{10}$
D	decreases	$\frac{3}{10}$

35

The graph illustrates the relationship between the ammeter reading (I) in an electric circuit and the intensity of the electric current (I_g) passing through the galvanometer coil inside the ammeter for ammeters A and B, each in a separate electric circuit, where the galvanometer is connected to a shunt resistance R_1 to be converted to ammeter (A) and the galvanometer is connected to a shunt resistance R_2 to be converted to ammeter (B).

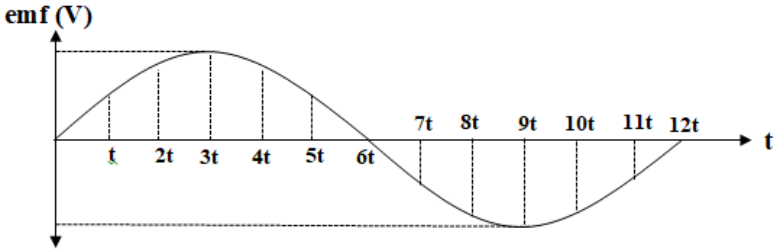


Then, the ratio $(\frac{R_2}{R_1})$ =.....

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

36

The graph shows the relationship between the instantaneous induced electromotive force generated in the AC dynamo coil and time during one cycle.



Then, the ratio $(\frac{\text{The average induced emf generated within the interval 2t to 7t}}{\text{The average induced emf generated within the interval 5t to 10t}})$ =.....

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

37

Figure (1) represents an electric circuit containing a battery, an inductor, and an ohmic resistor R. Figure (2) represents the relation between the rate of change in the current intensity of the inductor $\frac{\Delta I}{\Delta t}$ and the intensity of the current passing through it (I) when switch K is closed. So, ...

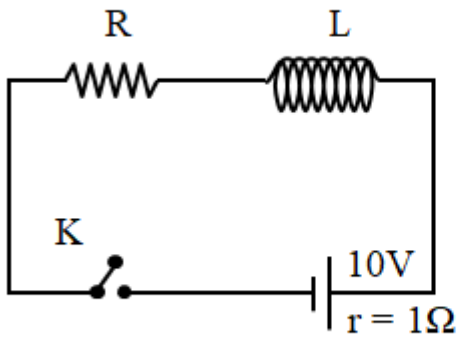


Figure (1)

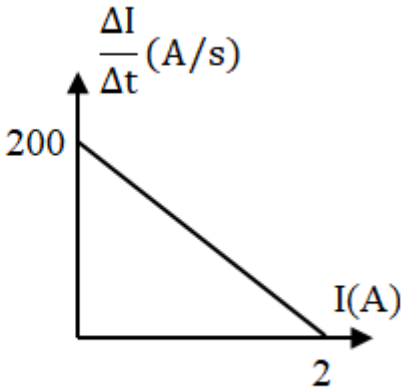
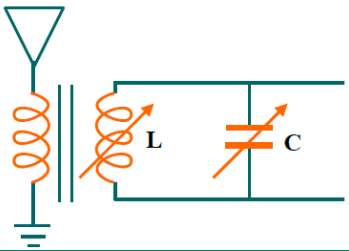


Figure (2)

	The value of the resistance (R) is	The inductance (L) of the inductor is
A	2 Ω	10 m H
B	3 Ω	45 m H
C	4 Ω	50 m H
D	2.5 Ω	65 m H

38

An oscillating circuit contains a capacitor (C), an inductor (L), and can receive a wave with frequency (f).
Which of the following changes would enable the circuit to receive a wave with a frequency of (0.5 f)?



	The inductance of the coil becomes	The capacitance of the capacitor becomes
A	8 L	0.25 C
B	0.125 L	4 C
C	8 L	0.5 C
D	0.125 L	2 C

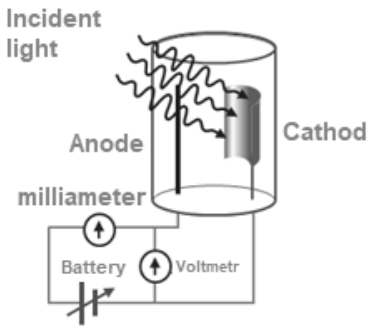
39 An induction coil with an inductance of 0.1H was connected to a direct current source with an electromotive force of 200 V, causing a current of 5A to flow in the circuit. When connected to an alternating current source (dynamo) with a maximum electromotive force of (282.84 V), a current with an intensity of 4 A passed through the circuit.
The frequency of the source and the phase angle between the total voltage and the current are approximately equal to.....

	The frequency of the source is	The phase angle between the total voltage and current is
A	92.8 Hz	55.55^{o}
B	48 Hz	36.87^{o}
C	24 Hz	38.66^{o}
D	20 Hz	31^{o}

40 An RLC circuit consists of components connected in series with a resistance of 100 Ω to an AC source with an effective voltage of 200 V and an angular velocity of 300 rad/s. When only the capacitor is removed, the current lags the total voltage by 60°. When only the inductor is removed, the current leads to the total voltage by 60°.
The power consumed in the circuit is equal to.....

A	50 W
B	100 W
C	200 W
D	400 W

41 The figure represents a photoelectric cell, when light rays fall separately to illuminate the metal surface of a photoelectric cell (cathode) with a critical wavelength (λ_c). Data on the intensity and wavelength of four light rays are recorded in the following table.



The incident light	Its wavelength	Its intensity
K	$\frac{2}{3}\lambda c$	High
L	$\frac{2}{3}\lambda c$	Low
M	$\frac{3}{2}\lambda c$	High
N	$\frac{3}{2}\lambda c$	Low

Which of these incident rays causes the greatest deflection of the milliammeter pointer in the shown photoelectric cell?

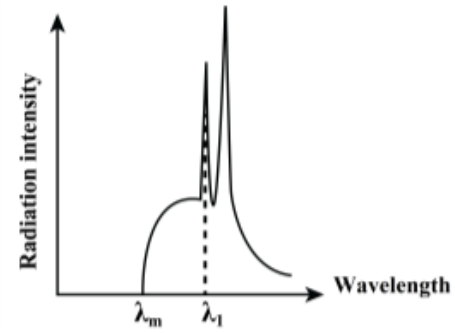
A	K
B	L
C	M
D	N

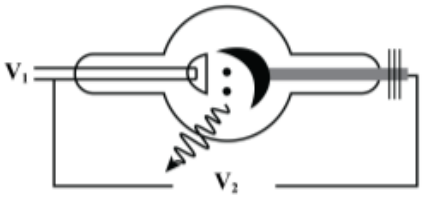
42 A photon of X-rays ($\lambda = 3$Å) collides with a static electron. If the increase in the electron's kinetic energy is equal to 1.1×10^{-16} J,
then the wavelength of the scattered photon is .....

A	1.1 Å
B	3 Å
C	3.6 Å
D	6.6 Å

43

The following diagram shows a Coolidge tube, and the adjacent graph represents the relation between radiation intensity and wavelength of the X-ray spectrum produced by the tube.



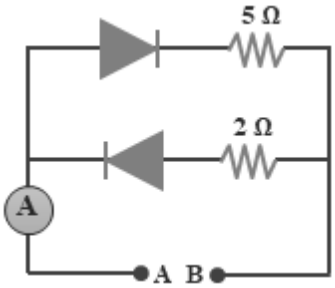


When the potential difference V_1 in the Coolidge tube shown increases, then the wavelength .....

A	λ_1 decreases
B	λ_1 increases
C	λ_m decreases
D	λ_m increases

44

In the figure, if the resistance of the diode is negligible in the forward connection and infinite in the reverse connection. If a battery with an electromotive force of 2V (of negligible internal resistance) is connected so that its positive pole is connected to terminal A,
the ammeter will read an electric current of intensity.....

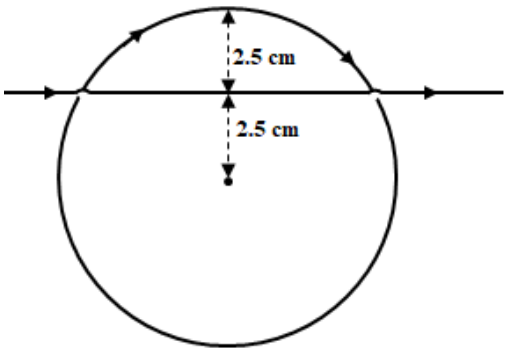


A	2A
B	0.4A
C	1.4A
D	Zero

Third, essay questions: each question two marks

45

The figure shows a ring and a straight wire in the same plane, each carrying an electric current of 2 A in the direction shown.



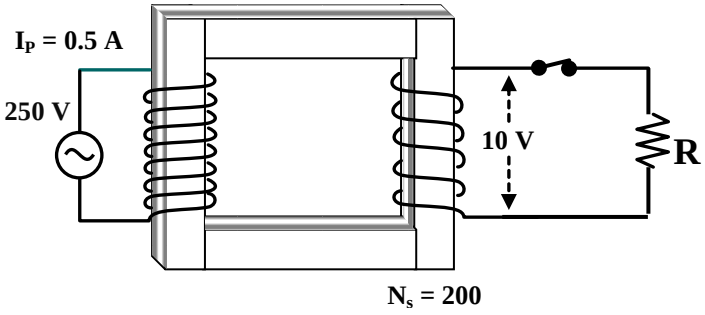
[a] Determine the direction of the resultant magnetic flux density at the center of the ring.

[b] Calculate the magnitude of the resultant magnetic flux density at the center of the ring.

(Given that: the magnetic permeability of air $\mu = 4\pi \times 10^{-7}$ T.m.A^{-1})

46

The figure shows a voltage step-down electric transformer of efficiency 80%



Calculate:

a) The number of the primary coil turns.

b) The value of the resistance R.