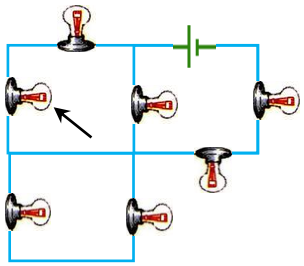
Training Models for third secondary

Physics

Model (7)

2025-2026

First: First, objective questions (multiple choice)"allQuestion of one mark"

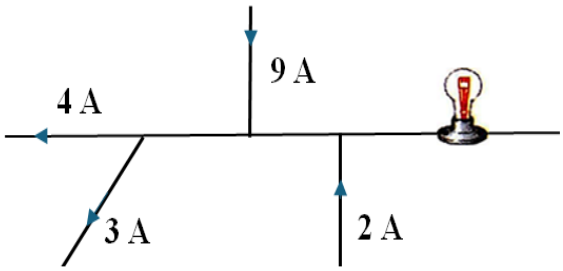
1	**Seven lamps are connected as shown in the figure.** **If the lamp indicated by the arrow burns out, the number of lamps that remain illuminated is.....** 

A	Zero	
B	3	
C	5	
D	7	

2	**A metallic wire has a resistance of 5 Ω. If the wire is reshaped so that its diameter is reduced to half of its original value, the increase in the resistance of the wire is equal to.....**

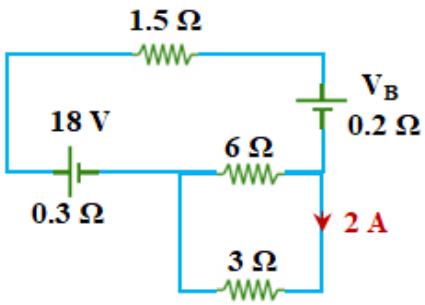
A	80 Ω
B	20 Ω
C	75 Ω
D	15 Ω

3 The figure represents a lamp whose filament has a resistance of 3 Ω, with several possible current paths. The power dissipated in the lamp is equal to.....



A	36 W
B	12 W
C	48 W
D	27 W

4 The figure represents a closed electric circuit containing two batteries, one of which has an unknown electromotive force V_B, and several resistors connected together as shown. The value of the electromotive force V_B of the battery is equal to.....

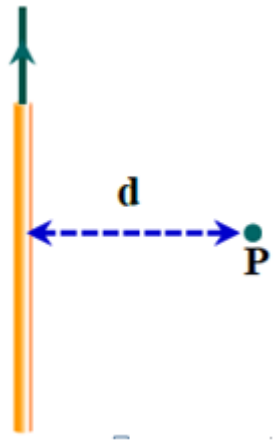


A	2 V
B	6 V
C	12 V
D	15 V

5	**A metallic loop of area A is placed perpendicular to a uniform magnetic field of flux density B, so that the magnetic flux linking the loop is ϕ_m. If the loop is rotated through an angle θ from the perpendicular position, the magnetic flux linking the loop becomes ½ ϕ_m.** **The value of the angle θ is.....**

A	30°
B	45°
C	60°
D	90°

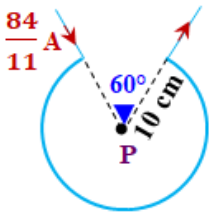
6	**The figure represents a straight wire carrying a current of magnitude I, producing a magnetic field at point P.** **Given that the indicated direction corresponds to the direction of motion of electron beam, the direction of the magnetic field at point P is.....**



A	Perpendicular to the plane of the page, out of the page
B	Perpendicular to the plane of the page, into the page
C	In the plane of the page, downward
D	In the plane of the page, upward

7 The figure represents a part of a circular ring of radius 10 cm, carrying a direct electric current of intensity $\frac{84}{11}$ A. The magnitude and the direction of the magnetic flux density at the center P are .....

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



	The magnitude of the magnetic flux density	The direction of the magnetic flux density
A	4×10^{-7} T	Perpendicular to the plane of the page, into the page
B	4×10^{-7} T	Perpendicular to the plane of the page, out of the page
C	4×10^{-5} T	Perpendicular to the plane of the page, into the page
D	**4×10^{-5} T**	Perpendicular to the plane of the page, out of the page

8 The following figures represent three square copper frames P, Q, and R.

Each square consists of two thick wires and two thin wires, all having the same length. A current of intensity **I** passes through each frame in the directions shown.

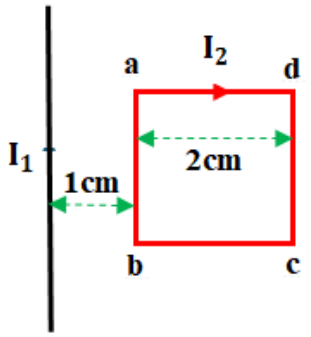
The magnetic flux density at the center is zero in.....

A	Figures P and Q only
B	Figures P and R only
C	Figures Q and R only
D	Figures P, Q, and R

9 The figure shows a long straight wire carrying a current of intensity I_1= 5 A. Beside it, at a distance of 1 cm, there is a square frame of side length 2 cm, carrying a current of intensity I_2 = 3 A, such that its sides ab and cd are parallel to the straight wire

The direction and magnitude of the resultant magnetic force exerted by the straight wire on the coil .....

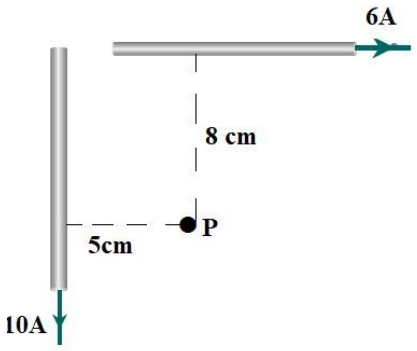
(The magnetic permeability of air is $\mu = 4\pi \times 10^{-7}$ T.m.A^{-1})



	Magnitude of the resultant force	Direction of this resultant force
A	4×10^{-6} N	Away from the coil
B	4×10^{-6} N	Toward the coil
C	8×10^{-6} N	Away from the coil
D	$\mathbf{8 \times 10^{-6}}$ **N**	Toward the coil

10 A long straight wire carries a current of 6 A in the positive direction of the X-axis, and another wire carries a current of 10 A in the negative direction of the Y-axis. If the two wires in the plane of the page as shown in the figure, so the magnitude and direction of the resultant magnetic field produced by the two wires at a point (P) locates 8 cm from the X-axis and 5 cm from the Y-axis are

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

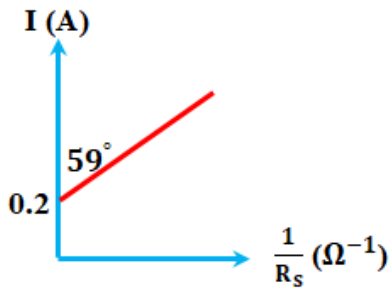


A	55×10^{-6} T , perpendicular into the plane of the page
B	55×10^{-6} T , perpendicular out the plane of the page
C	25×10^{-6} T , perpendicular into the plane of the page
D	25×10^{-6} T , perpendicular out the plane of the page

11 A solenoid has 2000 turns and a length of 40 cm. A direct electric current of intensity **I** passes through it, producing a magnetic field at the midpoint of its axis with a flux density of 0.22 T.
The intensity of the current **I** equals .....
(The magnetic permeability of air is $\mu = 4\pi \times 10^{-7}$ T.m.A^{-1})

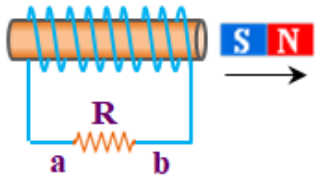
A	10 A
B	35 A
C	70 A
D	140 A

12 The graph represents the relationship between the maximum electric current measured by an ammeter and the reciprocal of the shunt resistance.
The resistance of the galvanometer (R_g) is equal to:



A	8.3 Ω
B	2.6 Ω
C	3 Ω
D	4 Ω

13 The figure represents a magnet moves away from a solenoid in the indicated direction with a speed v, producing an induced charge Q that flows through the resistance R. If the experiment is repeated with the same magnet that is moving away from the solenoid at a speed 2v, the magnitude of the induced charge flowing through the resistance R will be.....

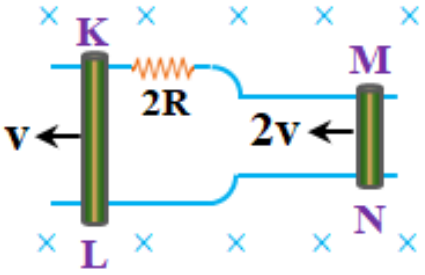


A	0.5Q
B	Q
C	2Q
D	4Q

14 The figure represents the conductor KL moves with a speed (v) along a metallic frame, while the conductor MN moves with a speed 2v along the same frame in the direction shown.

Both conductors are made of copper and have the same cross-sectional area. The length of conductor KL is 2ℓ, while the length of conductor MN is ℓ.

The magnitude of the induced current flowing through the resistance 2R equals .....

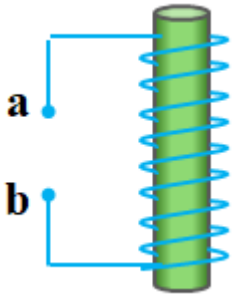


A	Zero
B	$\frac{B.\ell.v}{R}$
C	$\frac{3B.\ell.v}{2R}$
D	$\frac{3B.\ell.v}{R}$

15	**Two adjacent coils are wound on a core of soft iron. The terminals of the primary coil are connected in series with a switch and a battery of electromotive force V_B. At the instant the primary circuit is closed, an induced emf of 5 V is produced across the terminals of the secondary coil.** **Given that the self-inductance of the primary coil is 0.04 H, and the mutual inductance between the two coils is 0.02 H, so the value of the electromotive force of the battery V_B equals .....**

A	2.5 V
B	5 V
C	10 V
D	20 V

16	**The figure represents a coil of insulated copper wire with a large number of turns is wound around a soft iron core. When the coil is connected to a DC source of electromotive force 100 V, the temperature of the soft iron core is t_1. When the same coil is connected to an AC source with an effective electromotive force of 50 V, the temperature of the soft iron core is t_2. The ratio $\frac{t_1}{t_2}$ is.....**



A	greater than one
B	less than one
C	equal to one
D	equal to zero

17	**In AC dynamo, the ratio between the average emf generated during one-third cycle starting from the perpendicular position and that generated during one-third cycle starting from the parallel position is .....**

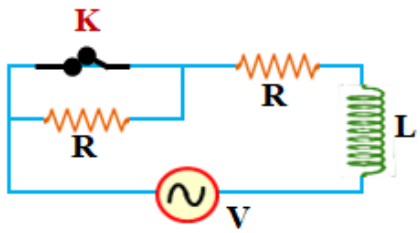
A	more than one
B	less than one
C	equals to one
D	equals to zero

18	**If six coils are used in a DC dynamo, the angle between each two successive coils is.....**

A	15°
B	30°
C	45°
D	60°

19	**An electric transformer steps up the voltage from 120 V to 1200 V and steps down the current from 32 A to 2 A. So, the percentage of electrical power lost is equal to....**

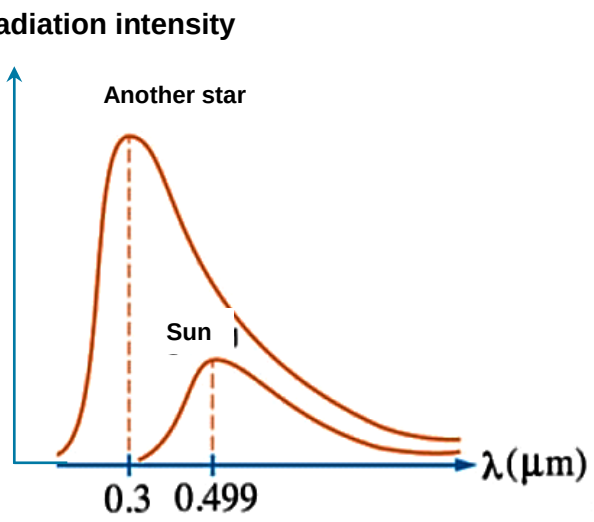
A	27.5%	
B	32.5%	
C	**37.5%**	
D	**62.5%**	

20	**In the electric circuit shown, when the switch K is opened, the phase angle between the total voltage V and the current I.....** 	
	A	Increases
	B	Decreases
	C	Remains unchanged
	D	Becomes zero

21	**An AC circuit consists of a ohmic resistance R, an inductor with inductive reactance 3R, and a capacitor with capacitive reactance 2R, all connected in series. Then.....**	
	A	The total current leads the total voltage by an angle of 78.7°
	B	The total voltage leads the total current by an angle of 78.7°
	C	The total current leads the total voltage by an angle of 45°
	D	The total voltage leads the total current by an angle of 45°

22	**In the hot wire ammeter, after a period from passing a current through the device, its pointer settles on the scale due to .....**	
	A	connecting a resistance R in parallel with the platinum–iridium wire
	B	an increase in the temperature of the wire as a rise in the surrounding temperature
	C	the magnetic torque produced by the current equals the torsion torque
	D	the electrical energy dissipated in the wire equals the radiated thermal energy lost by it in the same time interval

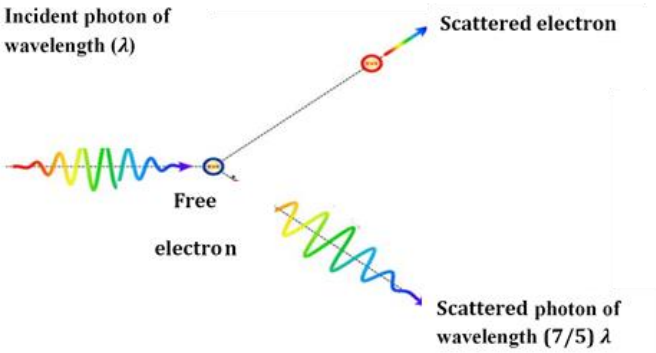
23 The figure represents the relationship between the intensity of radiation emitted by both the Sun and another star and the wavelength of this radiation. Given that the surface temperature of the Sun is 6000 K. Using the data shown in the figure , so the surface temperature of the other star.....



A	9980 K
B	8920 K
C	11250 K
D	8540 K

24 An electron is accelerated from rest through a potential difference of 1200 V.
The de Broglie wavelength associated with the motion of the electron is equal .....
($h = 6.625\times10^{-34}$ J.s, $m_e = 9.1\times10^{-31}$ kg, $e = 1.6\times10^{-19}$ C)

A	3.03×10^{-7} m
B	6.06×10^{-7} m
C	3.22×10^{-41} m
D	3.54×10^{-11} m

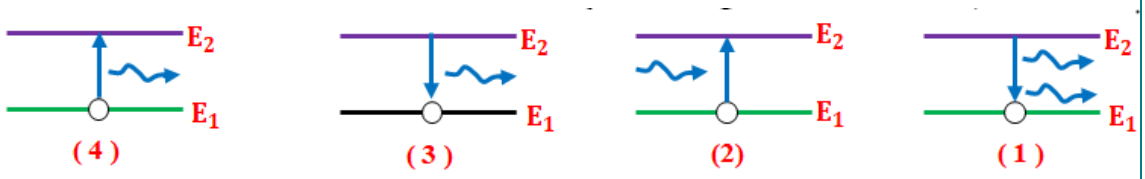
25	**The figure shows the collision of an X-ray photon with a free electron. The data of the incident photon and the scattered photon are as shown in the figure. Therefore, the incident photon loses ..... after colliding with the electron.**	

A	$\frac{2}{5}$ of its original energy
B	$\frac{2}{7}$ of its original energy
C	$\frac{3}{5}$ of its original energy
D	$\frac{5}{7}$ of its original energy

26	**What is the minimum amount of energy that an electron in a hydrogen atom in the ground state, must absorb in order to be completely freed from the attraction of the nucleus?**
A	**−10.2 eV**
B	**+10.2 eV**
C	**−13.6 eV**
D	**+13.6 eV**

27	**In a Coolidge tube used for the production of X-rays, if the potential difference between the filament and the target material is 148 kV, the minimum wavelength of the X-ray spectrum is approximately.....** **($h = 6.625\times10^{-34}$ J.s, $m_e = 9.1\times10^{-31}$ kg, $e = 1.6\times10^{-19}$ C)**

A	2.8×10^{-11} nm
B	1.3×10^{21} nm
C	8.4×10^{-3} nm
D	4.2×10^{-1} nm

28	**Which of the figures represents a state of energy absorption by the atom?** 

A	(1)
B	(2)
C	(3)
D	(4)

29	**If a laser beam is incident on one face of a triangular glass prism, the beam will emerge from the prism.....**

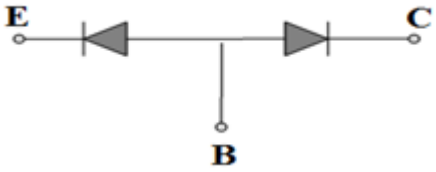
A	along its original straight path without refraction
B	deviated from its path with a large angle of dispersion
C	deviated from its path without dispersion
D	disperses into different colors

30	In the process of 3D imaging of an object using a laser, the path difference between the rays reflected from the object is equal to $(\frac{2}{3}\lambda)$. The phase difference between these rays is equal to.....	
	A	$\frac{3}{2}\pi$
	B	$\frac{3}{4}\pi$
	C	$\frac{4}{3}\pi$
	D	π

31	Two students, X and Y, connected a diode in series with a battery and a sensitive galvanome When student X performed the experiment, the galvanometer pointer showed no deflection. However, when student Y performed the same experiment using the same apparatus under the same conditions, the galvanometer pointer deflected to a half of its full-scale. The <u>main reason</u> for this difference is that.....	
	A	Student Y connected the diode in reverse bias with the battery
	B	Student X connected the diode in reverse bias with the battery
	C	Student X connected the diode in reverse bias with the galvanometer
	D	Student Y connected the diode in reverse bias with the galvanometer

32

The figure shows a npn transistor represented as two equivalent diodes, where E denotes the emitter, B the base, and C the collector.



I. The impurities concentration in the emitter is greater than that in the collector.

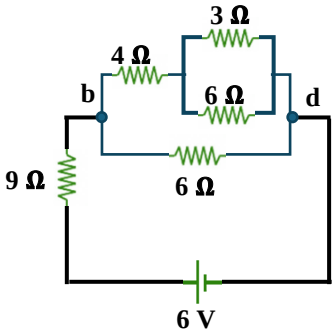
II. The emitter–base junction is forward biased, whereas the collector–base junction is reverse biased.

III. Electrons are injected from the emitter into the base, where recombination occurs, consuming a percentage from the electrons.

Which of the above statements correctly explains why the width of the emitter–base depletion region (EB) is smaller than that of the collector–base depletion region (CB)?

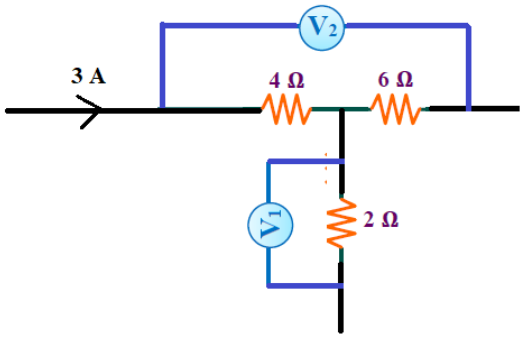
A	I and II only
B	I and III only
C	II and III only
D	I, II, and III

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

33	From the opposite figure, the equivalent resistance between points b and d and the current in the circuit, respectively, are equal to: 

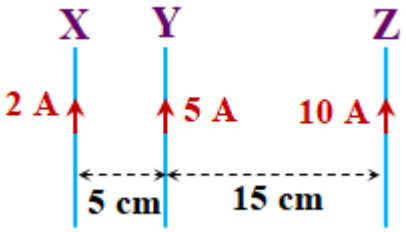
A	12 Ω – 0.5 A
B	12 Ω – 1 A
C	3 Ω – 0.5 A
D	3 Ω – 1 A

34 The opposite figure represents a part of a closed electric circuit. If the reading of voltmeter V_2 is zero, then the reading of voltmeter V_1 is equal to.....

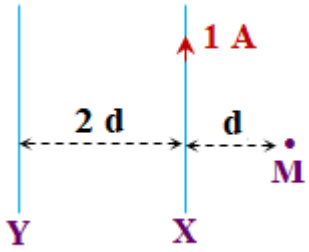


A	Zero
B	2 V
C	**10 V**
D	**12 V**

35 The opposite figure represents three parallel wires carry the electric currents.
The magnetic force acting per unit length on wire (y) is equal to.....



A	2.67×10^{-5} N/m
B	4.67×10^{-5} N/m
C	3.78×10^{-5} N/m
D	3.42×10^{-5} N/m

36	**The figure represents two long parallel straight wires X and Y are separated by a distance of 2d. wire X carries an electric current of 1 A. What must be the magnitude and direction of the electric current flowing in wire Y so that the resultant magnetic flux density at point M is zero?** 

A	2 A downward
B	2 A upward
C	3 A downward
D	3 A upward

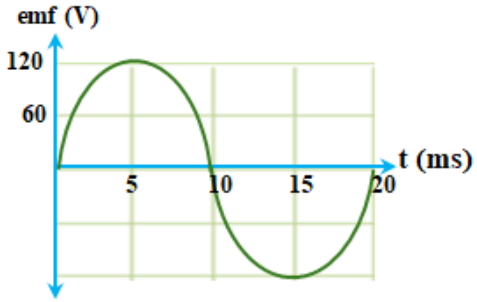
37	**An electric motor consists of a single coil connected to a commutator. The motor starts rotating from the position where the coil is parallel to the magnetic field.** **At the instant when the coil becomes perpendicular to the magnetic field, all of the following become zero, except.....**

A	The magnetic torque
B	The magnetic dipole moment
C	The force acting on the two longitudinal sides of the coil
D	The speed of rotation

38	A dynamo coil starts rotating from the vertical position with a frequency of 50 Hz and produces a maximum induced emf of 100 V. The time required for the induced emf to reach 50 V for the fourth time from the start of rotation equal .....

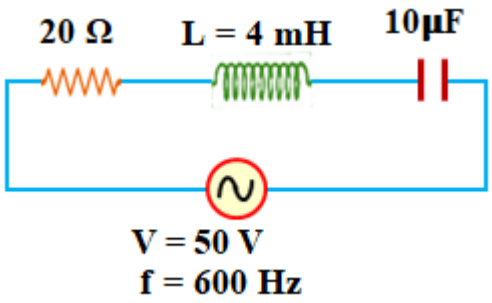
A	$\frac{1}{150}\ s$
B	$\frac{11}{200}\ s$
C	$\frac{1}{600}\ s$
D	$\frac{11}{600}\ s$

39	The graph represents the relationship between the instantaneous induced electromotive force (emf) produced by an AC dynamo and time (t) during one complete cycle. If the area of the dynamo coil is $\frac{4}{\pi}\ m^2$ and the number of turns of the coil is 250, the magnetic flux density in which the dynamo coil is rotating equals .....



A	1.2×10^{-3} T
B	2.6×10^{-3} T
C	3.8×10^{-3} T
D	4.2×10^{-3} T

40 The figure shows an RLC circuit connected to an AC source with effective electromotive force of 50 V and a frequency of 600 Hz.
Using the data given in the figure, the potential difference across the capacitor equals <u>about</u> .....



A	43.4 V
B	50 V
C	57.5 V
D	32.8 V

41 An electric circuit consists of an inductor with negligible ohmic resistance and a self-inductance of 50 mH, connected in series with an ohmic resistor of resistance 10 Ω, a capacitor of capacitance 0.005 nF, and an AC source of voltage 20 V.

	The frequency of the AC source at resonance	The magnitude of the current flowing in the circuit at resonance
A	100.6 Hz	**1 A**
B	3.18×10^5 Hz	**2 A**
C	3.18×10^3 Hz	**1 A**
D	$\mathbf{10.06 \times 10^5}$ **Hz**	**2 A**

42 If the maximum potential difference between the plates of a fully charged capacitor in an oscillatory (LC) circuit is 20 V, and the maximum energy stored in the capacitor in the form of an electric field is 160 μJ.

When the potential difference between the capacitor plates becomes 8 V, and the energy stored in the capacitor is 30 μJ, then .....

Assuming that the ohmic resistance of the coil and the connecting wires is negligible.

	The energy stored in the inductor in the form of a magnetic field	The induced electromotive force generated in the inductor
A	130 μJ	12V
B	30 μJ	12V
C	130 μJ	8V
D	30 μJ	8V

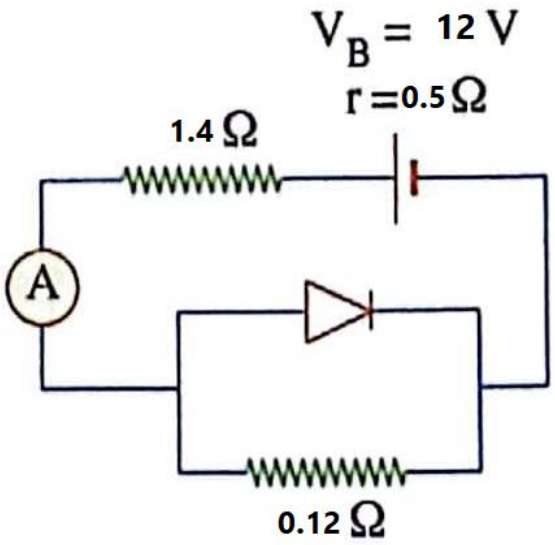
43 A light beam of wavelength λ is incident on a sodium surface whose work function is 2.3 eV. The maximum speed of the emitted photoelectrons is 1.2×10^{6} m/s.

The wavelength λ of the incident light equals .....

A	388 nm	
B	367 nm	
C	540 nm	
D	194 nm	

44

In the shown electric,
If the diode resistance at forward bias is 0.6 Ω while that at reverse bias is infinite, so the reading of the ammeter is equal to.....



A	3 A
B	5.94 A
C	6 A
D	6.32

Third, essay questions: each question two marks.

45	A photon (X) has a wavelength of 320 nm, and another photon (Y) has a wavelength λ. If the momentum of photon (X) is three times the momentum of photon (Y), Calculate: 1- The wavelength of photon (Y) 2- Identify the region of the electromagnetic spectrum to which it belongs.

46	Consider the following four possible electronic transitions of a hydrogen atom: 1. From n= 2 to n= 5 2. From n= 3 to n= 6 3. From n= 7 to n= 4 4. From n= 4 to n= 1 a) In which transition does the atom absorb the maximum possible energy? b) What is the amount of that energy (in joules)?