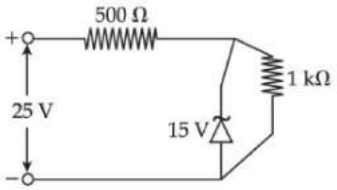
CUET UG 2023 Physics Question Paper PDF (May 22, 2023) (Shift 3)

Q1. A Zener diode is used in a voltage regulator circuit as shown below. Its breakdown voltage is 15 V. What is the current flowing through the Zener diode?



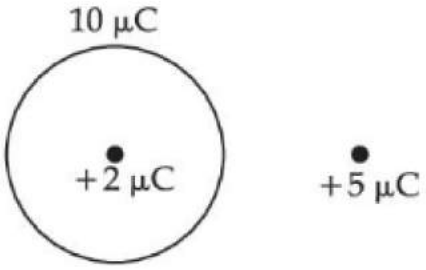
(a) 5 mA
(b) 10 mA
(c) 15 mA according
(d) 20 mA

Q2. Match **List - I** with **List - II**

List-I		**List-II**	
(A)	Microwave	(I)	Radar System for Aircraft Navigation
(B)	UV Rays	(II)	To study crystal structure
(C)	X-Rays	(III)	Radioactive decay of Nucleus
(D)	Gamma-Rays	(IV)	Lasik eye surgery

Choose the **correct** answer from the options given below:
(a) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(b) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)
(c) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)
(d) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

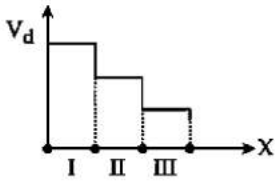
Q3. A thin metallic spherical shell contains a charge +10 μC on it. A point charge +2 μC is placed at the centre of the shell and another charge +5 μC is placed outside it as shown. The force on the charge +2 μC at the centre is:



(a) Towards the Left
(b) Towards the Right
(c) Upwards
(d) zero

Q4. Energy of a photon corresponding to a wavelength of 600 nm is 2.08 eV. The energy of a photon of wavelength 400 nm will be:
(a) -1.39 eV
(b) 3.12 eV
(c) 4.68 eV
(d) 0.92 eV

Q5. Figure shows drift speed V_d of conduction electrons in a copper wire versus position (X) for the three sections. Then,



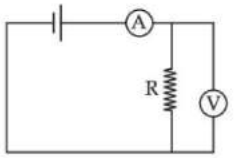
(A) Radius of III > Radius of II > Radius of I
(B) Electric Field in III > Electric Field in II > Electric Field in I
(C) Radius of wire is same in all sections
(D) Conductivity is same in all sections

Choose the **correct** answer from the options given below:
(a) (D) only
(b) (B) and (D) only
(c) (A) and (D) only
(d) (B) and (C) only

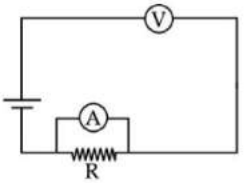
Q6. A square shaped wire loop of side L is carrying a current I. What is the magnetic field at the point of intersection of diagonals of the square wire loop?
(a) $\frac{\mu_0 I}{\pi L\sqrt{2}}$
(b) $\frac{2\sqrt{2}\,\mu_0 I}{\pi L}$
(c) $\frac{2\mu_0 I}{\pi L}$
(d) $\frac{\sqrt{2}\,\mu_0 I}{\pi L}$

Q7. Which of the following circuits cannot be used to measure the resistance of resistor R?

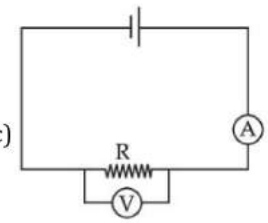
(a)



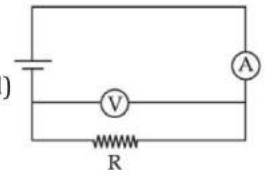
(b)



(c)



(d)



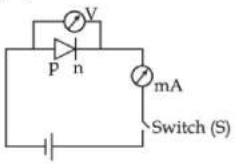
Q8. Which of the following change is observed when light travels from air to glass?
(a) speed of light only
(b) frequency of light only
(c) wavelength of light only
(d) wavelength and speed of light only

Q9. The same current is flowing in two AC circuits. The first circuit contains a pure inductor and the second, a capacitor. If the frequency of the AC is increased, then the current will.
(a) increase in the first but decrease in the second
(b) increase in both
(c) decrease in both
(d) decrease in the first and increase in the second

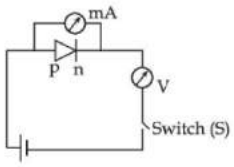
Q10. Which of the following is an example of nuclear fusion?
(a) Formation of $^{144}_{56}$Ba and $^{89}_{36}$Kr from $^{235}_{92}$U
(b) Formation of $^{235}_{94}$Pu from $^{235}_{92}$U
(c) Formation of $^{4}_{2}$He from $^{2}_{1}$H
(d) Formation of water from hydrogen and oxygen

Q11. The temp at which the resistance of a conductor becomes 30% more than that of its resistance at 47°C will be:
(Given the value of temperature coefficient of resistance of the conductor is $2 \times 10^{-4} K^{-1}$.)
(a) 1847 K
(b) 1820 K
(c) 1547 K
(d) 1500 K

Q12. Choose the correct experimental circuit arrangement for studying V-I characteristics a p-n junction diode in forward bias:
(a)



(b)



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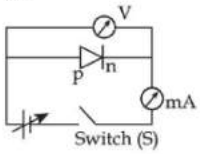
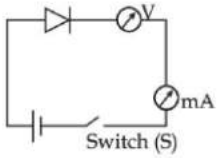


(d)



Q13. If the 8th bright band of wavelength λ_1 coincides with 9th bright brand of wavelength λ_2 in a Young's double slits experiment, then the possible wavelength of two lights is:
(a) $\lambda_1 = 450\ nm, \lambda_2 = 400\ nm$
(b) $\lambda_1 = 400\ nm, \lambda_2 = 450\ nm$
(c) $\lambda_1 = 425\ nm, \lambda_2 = 450\ nm$
(d) $\lambda_1 = 400\ nm, \lambda_2 = 425\ nm$

Q14. A ray of light passes through an equilateral glass prism in such a manner that the angle of incidence is equal to the angle of emergence and each of these angles is equal to $\left(\frac{3}{4}\right)^{th}$ of the angle of prism.
The angle of deviation is:
(a) 45°
(b) 70°
(c) 39°
(d) 30°

Q15. A transformer has an efficiency of 80%. It works at 3 kW and 120 V. If the secondary voltage is 240 V, what will be the secondary current?
(a) 2.5 A
(b) 12.5 A
(c) 25 A
(d) 10 A

Q16. During the p-n junction formation, when an electron diffuses from n $n \rightarrow p$, it leaves behind an:
(a) ionised acceptor on n-side
(b) ionised donor on n-side
(c) ionised donor on p-side
(d) ionised donor on n-side and p-side both

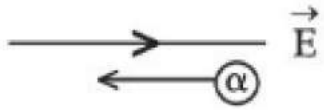
Q17. A particle moves three times as fast as an electron. The ratio of the de Broglie wavelength of the particle to that of the electron is 1.813×10^{-4}. The mass of the particle is:

(a) $1.67 \times 10^{-27}\ kg$
(b) $1.675 \times 10^{-31}\ kg$
(c) $1.675 \times 10^{-29}\ kg$
(d) 1.675×10^{-30} kg

Q18. The half-life of a radioactive substance is 10 days. How many days will it take to disintegrate 3/4 of its initial value?
(a) 5 days
(b) 10 days
(c) 20 days
(d) 15 days

Q19. The magnitude of a magnetic force on a current carrying conductor is given by:
(a) $q\frac{dV}{dx}$
(b) q vB sinθ
(c) ilB sinθ
(d) q(E+VB sinθ)

Q20. In the figure, an α-particle moves a distance l in a uniform electric field $\vec{E}$ as shown. Does the Electric Field do a positive or a negative work on the α-particle? Does the electric potential energy of the α-particle increase or decrease?



(a) Negative, increases
(b) Positive, decreases
(c) Negative, decreases
(d) Positive, increases

Q21. Two coherent light beams of intensities I and 4 I are superimposed. The maximum and minimum possible intensities in the resulting pattern are:
(a) 5 I and 3 I
(b) 5 I and I
(c) 9 I and I
(d) 9 I and 3 I

Q22. Eight identical spherical drops, each having a potential of 9 V are combined together to form a single large drop. The potential of this large drop will be:
(a) 4.5 V
(b) 18 V
(c) 36 V
(d) 72 V

Q23. Match **List - I** with **List - II**

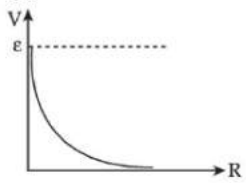
List-I		**List-II**	
(A)	Minimum magnetic moment associated with orbital motion of electron in 1st orbit is	(I)	greater than one
(B)	Paramagnetic materials have relative permeability	(II)	Meissner's effect
(C)	Magnetic moment per unit volume of the material is called	(III)	Bohr Magneton
(D)	Perfect diamagnetism of superconductors	(IV)	Intensity of magnetisation

Choose the **correct** answer from the options given below:
(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
(c) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
(d) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

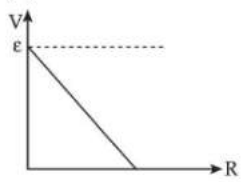
Q24. Under the influence of a uniform magnetic field, a charged particle moves with a constant speed v in a circle of radius r. The time period of the revolution of the particle:
(a) depends on v and not on r
(b) is independent of both v and r
(c) depends on r and not on v
(d) depends on both v and r

Q25. A uniformly charged conducting sphere of radius 1.3 m has a surface charge density of 70 μC m^{-2}.
What is the total electric flux leaving the surface of the sphere?
(a) $5.9 \times 10^{8}\ N\ m^2\ C^{-1}$
(b) $1.7 \times 10^{-8}\ N\ m^2\ C^{-1}$
(c) $1.7 \times 10^{8}\ N\ m^2\ C^{-1}$
(a) $6.4 \times 10^{-8}\ N\ m^2\ C^{-1}$

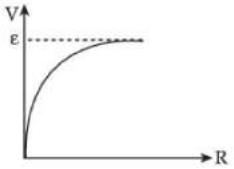
Q26. Cell having an emf E and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by:
(a)



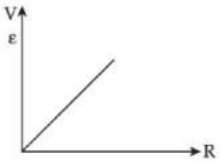
(b)



(c)



(d)



Q27. What is the approximate earth's dipole moment, if the earth's magnetic field at the Equator is approximately 0.5 G and diameter is 15.0×10^6m?

(a) 5.9×10^8 Am^2
(b) 6.5×10^{30} Am^2
(c) 2.1×10^{23} Am^2
(d) 1.05×10^{23} Am^2

Q28. When a capacitor is subjected to a D.C. source it takes small time internal to get fully charged up. During this small-time interval there is no passage of charge through dielectric, yet we use a term - displacement current. This term is used because:

(a) There is a slow motion of charge from one plate to another
(b) There is a continues change of electric field between plates and hence electric flux
(c) The electric charge from battery stops moving
(d) There is temporary breakdown of dielectric

Q29. A 25 μF capacitor, a 0.10 H inductor and a 25 Ω resistor is connected in series with an ac source of emf $\varepsilon = 310 \sin 314$ t. What is the frequency of AC source?

(a) 314 Hz
(b) 100 Hz
(c) 50 Hz
(d) 310 Hz

Q30. Match **List - I** with **List - II**

List-I		**List-II**	
(A)	Range	(I)	Range of frequencies over which communication system works
(B)	Band width	(II)	The largest distance between transmitter and receiver
(C)	Attenuation	(III)	A device that has input in electrical form or provides Output in electrical form
(D)	Transducer	(IV)	Loss of strength of a signal during propagation

Choose the **correct** answer from the options given below:

(a) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)
(b) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
(c) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(d) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

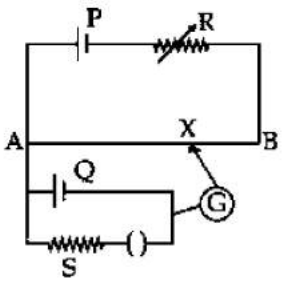
Q31. In an AC generator when the plane of the armature is perpendicular to the magnetic field, what will the magnitude of the magnetic flux passing through the coil and the emf induced in the coil be?

(a) Both the magnetic flux and the induced emf are maximum
(b) Both the magnetic flux and the induced emf are zero
(c) The magnetic flux is zero and the induced emf is maximum
(d) The magnetic flux is maximum and the induced emf is zero

Q32. A carrier wave of peak voltage 14 V is used to transmit a message. What should be the peak voltage of the modulating signal in order to have a modulation index of 70%?

(a) 20.0 V
(b) 2.0 V
(c) 9.8 V
(d) 4.2 V

Q33. In the potentiometer circuit the balance point is at X. The balance point will be shifted right towards B when:



(A) Resistance R is increased keeping all other parameters constant
(B) Resistance S is increased keeping all other parameters constant
(C) Cell P is replaced by another cell whose emf is lower than Q
(D) The polarity of Q is reversed

Choose the **correct** answer from the options given below:

(a) (A) only
(b) (B) and (D) only
(c) (A), (B) only
(d) (B) and (C) only

Q34. Kirchhoff's First Law, $\sum I = 0$ at a junction deal with conservation of:
(a) Charge
(b) Energy
(c) Momentum
(d) Angular Momentum

Q35. According to Einstein's photoelectric equation, the plot of the Kinetic Energy of the emitted photoelectrons from a metal versus the frequency of the incident radiation gives a straight line whose slope:
(a) depends on the nature of the metal used
(b) depends on the intensity of the radiation
(c) depends both on the intensity of the radiation and the metal used
(d) is the same for all metals and independent of the intensity of the radiation

Q36. Which of the following spectral series is found in the visible region of the hydrogen spectrum?
(a) Lyman
(b) Balmer
(c) Paschen
(d) Pfund

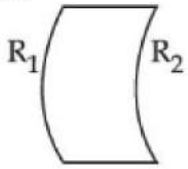
Q37. If a match box of size 5 cm × 4 cm × 1 cm is filled with nuclear matter, what will be its expected mass? The density of the nuclear matter is approximately 2.3×10^{17} kg m^{-3}.
(a) 4.6×10^{12} mg
(b) 4.6×10^{12} μg
(c) 4.6×10^{12} g
(d) 4.6×10^{12} kg

Q38. The force between two electric charges is expressed by the equation:
$F = \frac{k\, q_1\, q_2}{r^2}$
Which of the following is a correct statement?
(a) The equation applies to point charges
(b) k is Boltzmann's constant
(c) r is the radius of the spheres on which the two charges are placed
(d) The equation can only be applied to uniform

Q39. Electrostatics deals with the study of forces, fields and potential arising from static charges. Which of the following statements are correct?
(A) Electrostatic force is a conservative force
(B) Charge is quantized because only integral number of electrons can be transferred from one body to the other
(C) In a uniform electric field E, an electric dipole experiences a torque and a net force F.
(D) The electric field lines start from positive charges and end at negative charges. If there is a single charge, these may start or end at infinity.
(E) If the uniform surface charge density of an infinite plane sheet is positive, the electric field is directed away from the plate.

Choose the **correct** answer from the options given below:
(a) (B), (C) and (E) only
(b) (A), (C) and (D) only
(c) (A), (B), (D) and (E) only
(d) (A), (B) and (C) only

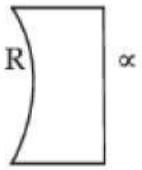
Q40. Which of the following spherical lenses does not exhibit dispersion? The radii of curvature of the surfaces of the lenses are given in diagrams.
(a)



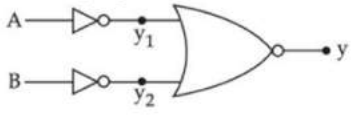
(b)

(c)

(d)



Q41. Choose the logic gate represented by the following combination of logic gates.



(a) NOR
(b) NAND
(c) AND
(d) OR

Q42. A plane electromagnetic wave of frequency 50 MHz travels in free space along the x-direction. At a particular point in space and time $\vec{E} = 9.3\,\hat{j}\ V\ m^{-1}$. What is $\vec{B}$ at this point?
(a) $(3.1 \times 10^{-8}\hat{k})$T
(b) $(3.1 \times 10^{-8}\hat{\imath})$T

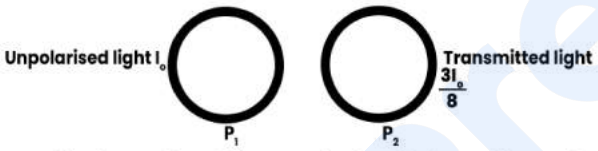
(c) $(3.1 \times 10^{8}\hat{k})$T
(d) $(3.1 \times 10^{-8}\hat{j})$T

Q43. In Bohr's atomic model, the radius of the first orbit isr_0. The radius of the third orbit will be:
(a) $3\ r_0$
(b) $9\ r_0$
(c) r_0
(d) $r_{0/3}$

Q44. Which of the following statement is NOT true, when two capacitors charged to different potential are connected in parallel by a conducting wire?
(a) Some energy is lost
(b) The charge lost by one is equal to the charge gained by the other
(c) Both the capacitors acquire a common potential
(d) The potential lost by one is equal to the potential gained by the other

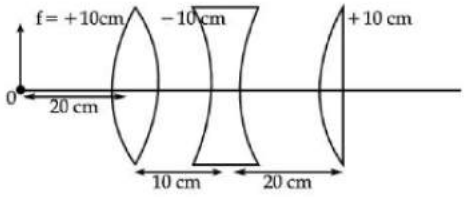
Q45. A magnet suspended freely at the Equator will set itself _____ to the surface of Earth, while one suspended at pole will stand _____.
(a) vertical, parallel
(b) parallel, parallel
(c) parallel, vertical
(d) vertical, vertical

Q46. P_1 and P_2 are two polaroids



The intensity of the unpolarised is Io and intensity of the transmitted height is $\frac{3Io}{8}$. The angle bet-ween axis of P_1 and P_2 is:
(a) 30°
(b) 90°
(c) 45°
(d) 60°

Q47. What would be the position of image formed by the lens combination given in the figure below?



(a) 10 cm to the right of third lens
(b) 7 cm to the right of third lens
(c) 7 cm to the left of third lens
(d) at ∞ to right of third lens

Q48. Two coils of self-inductances L_1 and L_2 are kept close to each other so that the effective flux in one is completely linked with the other. What is the mutual inductance M between them?
(a) L_1L_2
(b) $L_1L_2^{-1}$
(c) $(L_1L_2)^2$
(d) $(L_1L_2)^{1/2}$

Q49. The objective of a reflecting telescope is a:
(a) Convex lens
(b) Concave mirror
(c) Concave lens
(d) Prism

Q50. A boat is moving due east in a region where the Earth's magnetic field is 5.0×10^{-5} $NA^{-1}m^{-1}$ due north and horizontal. The boat carries a vertical aerial 2 m long. If the speed of the boats is 1.5 ms^{-1}, the magnitude of the induced emf is:
(a) 0.50 mV
(b) 0.15 mV
(c) 1.00 mV
(d) 0.75 mV