CUET UG 2023 Physics Question Paper PDF (Jun 09, 2023) (Shift 3)

Q1. In an LCR circuit, which of the following expression has the dimension of frequency:

(a) $\sqrt{\frac{L}{C}}$

(b) $\frac{C}{R}$

(c) $\frac{1}{\sqrt{RC}}$

(d) $\frac{1}{\sqrt{LC}}$

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

	LIST – I		**LIST – II**
(A)	$[M^0 L^{-2} T^0 A^1]$	(I)	Conductance
(B)	$[M^{-1} L^{-2} T^3 A^2]$	(II)	Electrical conductivity
(C)	$[M L^3 T^{-3} A^{-2}]$	(III)	Current density
(D)	$[M^{-1} L^{-3} T^{+3} A^{+2}]$	(IV)	Specific resistance

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

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

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

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

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

Q3. What is the force between two small charged spheres having charges of 4×10^{-7}C and 6×10^{-7}C placed 60 cm apart in air?

(a) $3 \times 10^{-3} N$

(b) $4 \times 10^{-3} N$

(c) $6 \times 10^{-3} N$

(d) $9 \times 10^{-3} N$

Q4. Which of the following scientists has not contributed significantly to photoelectric effect?

(a) Wilhelm Hallwacks

(b) Philipp Lenard

(c) Albert Einstein

(d) C.J. Davission

Q5. Two spheres of silver of same radii, one solid and the other hollow are charged to the same potential, then:

(a) solid sphere will have more charge

(b) hollow sphere will have more charge

(c) both spheres will have same charge

(d) solid sphere will have charge inside as well as on the surface

Q6. The resistivity of a potentiometer wire is $10^{-7}\ \Omega\, m$ and its cross-section area is $10^{-6}\ m^2$. When a current of 0.1 A follows through the wire, its potential gradient is:

(a) 10^{-1} V/m

(b) 10^{-2} V/m

(c) 10^{-4} V/m

(d) 10 V/m

Q7. The two coherent monochromatic light beams of intensities I and 4I are superposed. The maximum and minimum possible intensities in the resulting beams are:

(a) 5 I and I

(b) 9 I and I

(c) 5 I and 3 I

(d) 9 I and 3 I

Q8. The shortest wavelength present in the Lyman series of spectral lines is:

(Given Rydberg constant $R = 1.097 \times 10^7\ m^{-1}$)

(a) 9.1×10^{-8} m

(b) 1.2×10^{-7} m

(c) 8.2×10^{7} m

(d) 9.1×10^{8} m

Q9. Sodium has a work function of 2 eV. Calculate the maximum energy and speed of the emitted electrons, when sodium is illuminated by radiation of wavelength 150 nm:

(a) 7.5×10^{-19} J and 3.2×10^{3} m/s

(b) 13.2×10^{-19} J and 1.5×10^{6} m/s

(c) 7×10^{-15} J and 1.2×10^{4} m/s

(d) 3.5×10^{-19} J and 2.4×10^{6} m/s

Q10. The metre bridge wire is made of alloys such as nichrome because they have:

(a) high temperature coefficient of resistance and high resistivity

(b) low temperature coefficient of resistance and low resistivity

(c) low temperature coefficient of resistance and high resistivity

(d) high temperature coefficient of resistance and low resistivity

Q11. Match **List – I** with **List – II.**

	LIST – I		**LIST – II**
(A)	Purely resistive AC circuit	(I)	No power dissipation
(B)	Purely inductive or capacitive AC circuit	(II)	Power is dissipated only in Resistor
(C)	LCR series AC circuit	(III)	Maximum power dissipation
(D)	Power dissipated at resonance in LCR series circuit	(IV)	Power is dissipated in L and C

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

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

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

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

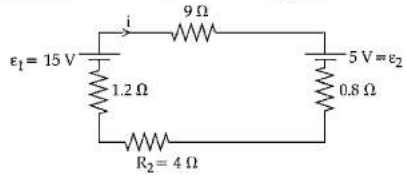
(d) (A)-(III), (B)-(I), (C)-(II), (D)-(III)

Q12. What will be the minimum length of antenna required to transmit a radio signal of frequency 10 MHz?

(a) 30 m

(b) 15 m
(c) 7.5 m
(d) 60 m

Q13. The current flow in the circuit of two battery with internal resistance and two external resistance as shown in figure will be



(a) 1.5 A
(b) 0.67 A
(c) 0.9 A
(d) 1.0 A

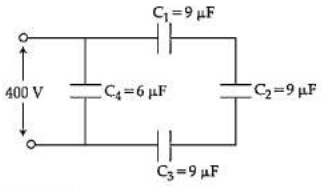
Q14. A very long solenoid has 800 turns per unit length. A current of 1.6 A flows through it. Then the magnetic induction in the middle of the solenoid on its axis is approximately:
(a) 16×10^{-4} T
(b) 8×10^{-4} T
(c) 32×10^{-4} T
(d) 4×10^{-4} T

Q15. The critical angle of a medium for a specific wavelength, if the medium has relative permittivity 3 and relative permeability $\frac{4}{3}$ for this wavelength, will be:
(a) 15°
(b) 30°
(c) 45°
(d) 60°

Q16. An insulating rod of length L carries charge q distributed uniformly on it. The rod is pivoted at one end and is rotated at a frequency f about a fixed perpendicular axis. Then the magnetic dipole moment of the system is:
(a) πqfL^2
(b) $\frac{1}{3}\pi qfL^2$
(c) qfL
(d) qfL^2

Q17. The wave length of Red light in the visible region is about 760 nm the energy of photon in that case will be:
(a) 2.43 eV
(b) 3.18 eV
(c) 1.64 eV
(d) 2.68 eV

Q18. A network of three capacitors each 9 μF connected in series and the fourth capacitor of 6 μF is supplied 400 V as shown in figure. The ratio of charge on the capacitor C_1 to the capacitor C_4 is:



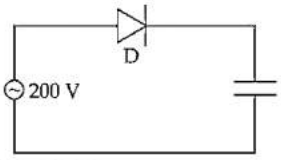
(a) 1 : 3
(b) 1 : 4
(c) 4 : 1
(d) 1 : 2

Q19. After how many half-lives a radioactive substance will decay to 6.25% of its original value:
(a) One half life
(b) Two half lives
(c) Three half lives
(d) Four half lives

Q20. A 20-watt, 50 V lamp is to be connected to AC mains of 250 V, 50 Hz. Calculate the value of series capacitor to run the lamp.
(a) 1.4 μF
(b) 2.1 μF
(c) 3.5 μF
(d) 4.9 μF

Q21. Charge on a conducting metal sphere is present:
(a) on the surface of the sphere
(b) inside the sphere
(c) outside the sphere
(d) both inside and outside the sphere

Q22. An a.c. source of 200 V is connected through a diode 'D' to a capacitor as shown in figure. Find the maximum potential difference across the capacitor:



(a) 100 V
(b) 200 V
(c) 283 V
(d) 310 V

Q23. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than 2480 nm is incident on it. The band gap for the semiconductor is:
(a) 0.5 eV
(b) 0.7 eV
(c) 0.9 eV
(d) 1.1 eV

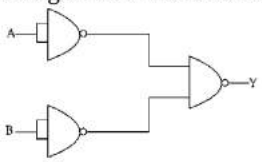
Q24. Energy gap between valence band and conduction band of a semiconductor is approximately:
(a) zero
(b) 4 eV
(c) 1 eV
(d) 10 eV

Q25. Match **List – I** with **List - II**

	LIST – I (Type of EM Wave)	**LIST – II (Application)**	
(A)	Microwaves	(I)	Cellular phones
(B)	Radio waves	(II)	Greenhouse effect
(C)	Infrared waves	(III)	Eye surgery
(D)	Ultraviolet rays	(IV)	Ovens

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

Q26. The given combination represents the following gate:



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

Q27. Heavy water and _____ is one of the substances used as moderator in reactors.
(a) Sea water
(b) Titanium
(c) Graphite
(d) Cobalt

Q28. Diameter of the objective lens of a telescope is 250 cm. For light of wavelength 600 nm, coming from a distant object, the limit of resolution of the telescope is close to:
(a) 1.5×10^{-7} rad
(b) 2×10^{-7} rad
(c) 3×10^{-7} rad
(d) 4.5×10^{-7} rad

Q29. A source emits sound of frequency 600 Hz inside water. The frequency heard in air (velocity of sound in water is 1500 m/s and velocity of sound in air is 300 m/s) will be:
(a) 300 Hz
(b) 600 Hz
(c) 900 Hz
(d) 1200 Hz

Q30. An electron enters a crossed electrical and magnetic field region with a speed of 100 m s^{-1} along + x-axis and passes undeviated. The strength of magnetic field is 5.0 T and it acts along + z-axis. Give the electrical field in vector notations indicating its magnitude as well as direction:
(a) $(500\ \text{V m}^{-1})\hat{j}$
(b) $-(500\ \text{V m}^{-1})\hat{k}$
(c) $(100\ \text{V m}^{-1})\hat{j}$
(d) $-(100\ \text{V m}^{-1})\hat{k}$

Q31. An AC current is given by $I = i_1 \cos\omega t + i_2 \sin\omega t$
The rms current is given by:
(a) $\frac{1}{\sqrt{2}}(i_1 + i_2)$
(b) $\frac{1}{\sqrt{2}}(i_1 + i_2)^2$
(c) $\frac{1}{\sqrt{2}}(i_1^2 + i_2^2)^{\frac{1}{2}}$
(d) $\frac{1}{2}(i_1^2 + i_2^2)^{\frac{1}{2}}$

Q32. Frequencies in the UHF range normally propagate by means of:
(a) Ground waves
(b) Sky waves
(c) Surface waves
(d) Space waves

Q33. Which of the following is **not** an EM wave?
(a) X-rays
(b) Gamma rays
(c) Microwaves
(d) Cathode rays

Q34. The least distance of distinct vision of a person is 50 cm. He wants to read a book placed at 25 cm.
The focal length of the spectacles would be:
(a) + 25 cm
(b) – 25 cm
(c) + 50 cm
(d) – 50 cm

Q35. The current flowing through a wire as a function fo time is given as: $I = 3t^2 + 2t + 5$The charge flowing through any cross-section of the wire in first 2 s is:
(a) 5 C
(b) 17 C
(c) 16 C
(d) 22 C

Q36. When a ray of light enters a glass slab from air:
(a) its wavelength decreases
(b) its wavelength increases
(c) its frequency increases
(d) neither its wavelength nor its frequency changes

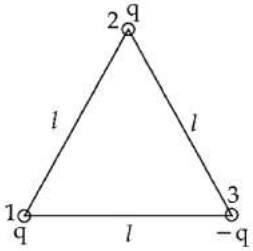
Q37. Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively, illuminate a metal of work function 0.5 eV. The ratio of the maximum KE of the emitted electrons will be:
(a) 1 : 5
(b) 1 : 4
(c) 1 : 2
(d) 1 : 1

Q38. The capacities of two capacitors are C_1 and C_2 and their respective potentials are V_1 and V_2. If they are connected with a wire, then the loss of energy is given by:
(a) $\frac{C_1C_2(V_1+V_2)}{2(C_1+C_2)}$
(b) $\frac{C_1C_2(V_1-V_2)}{2(C_1+C_2)}$
(c) $\frac{C_1C_2(V_1-V_2)^2}{2(C_1+C_2)}$
(d) $\frac{(C_1+C_2)(V_1-V_2)}{C_1C_2}$

Q39. We can reduce eddy currents in the core of transformer by:
(a) increasing the number of turns in the secondary coil
(b) taking laminated core
(c) making step down transformer
(d) using a weak AC at high potential

Q40. A piece of copper and another of germanium are cooled from room temperature to 100 K. The resistance of:
(a) copper increases and germanium decreases
(b) copper decreases and germanium increases
(c) each of them increases
(d) each of them decreases

Q41. Three charges q, −q, q placed at the vertices of an equilateral triangle as shown in figure. What is the magnitude of force on charge placed at position 3 due to the presence of other two charges?



(a) $\frac{1}{2\pi\varepsilon_o}\frac{q^2}{l}$
(b) $\frac{\sqrt{3}}{4\pi\varepsilon_0}\frac{q^2}{l^2}$
(c) $\frac{\sqrt{5}}{8\pi\varepsilon_o}\frac{q}{\sqrt{l}}$
(d) $\frac{1}{4\pi\varepsilon_o}\frac{q^2}{\sqrt{l}}$

Q42. Which of the following radiations will have maximum penetration power?
(a) X-rays
(b) α-rays
(c) β-rays
(d) γ -rays

Q43. A hot wire voltmeter measures the voltage across the inductor, the capacitor and the resistor as 150 V, 100 V and 50 V across a series, LCR circuit. If resistance is 100 Ω, the current in the circuit is:
(a) 1.5 A
(b) 1 A
(c) 0.5 A
(d) 0.7 A

Q44. Speed of Electromagnetic wave is **Not** the same:
(a) in all media
(b) for all intensities in vacuum
(c) for all frequencies in vacuum
(d) for all wavelengths in vacuum

Q45. What uniform magnetic field applied perpendicular to a beam of electrons moving at 1.3×10^6 m/s, is required to make the electrons travels in a circular arc of radius 0.35 m?
(a) 2.1×10^{-5} G
(b) 6×10^{-5} T
(c) 2.1×10^{-5} T
(d) 6×10^{-5} G

Q46. In a double slit experiment, the distance between slits is increased 10 times whereas their distance from screen is halved, then what is the fringe width?
(a) it remains same
(b) become $\frac{1}{10}$
(c) become $\frac{1}{20}$
(d) become $\frac{1}{90}$

Q47. A tiny spherical oil drop of mass 8 mg is kept suspended by applying a potential difference of 100 V between two metallic plates kept separated by a distance 1 cm. The number of electrons on the oil drop are: (Take $g = 10ms^{-2}$)
(a) 5×10^{10}
(b) 5×10^{8}
(c) 5×10^{12}
(d) 5×10^{13}

Q48. A strong magnetic field is applied on a stationary electron:
(a) The electron moves in the direction of the field
(b) The electron moves in an opposite direction
(c) The electron remains stationary
(d) The electron starts spinning

Q49. The focal length of the objective of a microscope if f_o and that of the eye piece if f_e. The aperture of objective is d_o and that of eye piece is d_e. Which of the following relation is **correct?**
(a) $f_o > f_e, d_o > d_e$
(b) $f_o < f_e, d_o < d_e$
(c) $f_o > f_e, d_o < d_e$
(d) $f_o < f_e, d_o > d_e$

Q50. Time period of oscillation of a bar magnet in a uniform magnetic field is T_o. The magnet is cut into 3 equal parts transverse to its length. The new time period of oscillation of one part will be:
(a) T_o
(b) $\frac{T_o}{2}$
(c) $\frac{T_o}{3}$
(d) $\frac{T_o}{4}$