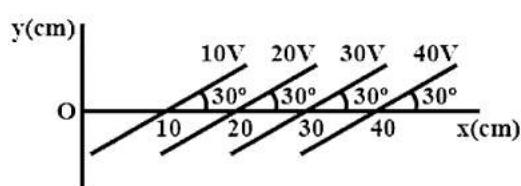


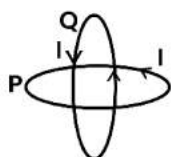
CUET UG 2023 Physics Question Paper PDF (May 21, 2023) (Shift 3)

- Q1.** The magnetic flux(Φ) is:
 (a) Scalar quantity and its SI unit is Wb/m^2 .
 (b) Vector quantity and its SI unit is Tm^2 .
 (c) Scalar quantity and its SI unit is Tm^2 .
 (d) Vector quantity and its SI unit is Wb/m^2 .

- Q2.** Some equipotential surfaces are shown. What is the magnitude and direction of electric field?



- (a) 200 V/m making an angle of 120° with x-axis
 (b) 100 V/m making an angle of 30° with x-axis
 (c) 200 V/m making an angle of 300° with x-axis
 (d) 100 V/m making an angle of 60° with x-axis
- Q3.** A ray is incident normally on the face of an triangular prism of refracting angle of 60° . The refractive index of the prism is $\frac{2}{\sqrt{3}}$. The angle of deviation will be:
 (a) 60°
 (b) 30°
 (c) 45°
 (d) 90°
- Q4.** Which of the following pair of nuclides are Isobars?
 (a) ${}^2_1\text{H}$, ${}^3_1\text{H}$
 (b) ${}^3_1\text{H}$, ${}^3_2\text{He}$
 (c) ${}^{198}_{80}\text{Hg}$, ${}^{179}_{79}\text{Au}$
 (d) ${}^1_1\text{H}$, ${}^3_1\text{H}$
- Q5.** Two identical circular wires P and Q each of radius R and carrying current I are kept in perpendicular planes such that they have a common centre as shown in figure. Find the magnitude and direction of the net magnetic field at the common centre of the two coils



- (a) zero

- (b) $\frac{\sqrt{3}\mu_0 I}{2R}$, $\beta = 60^\circ$
 (c) $\frac{\mu_0 I}{\sqrt{2}R}$, $\beta = 45^\circ$
 (d) I , $\beta = 90^\circ$

- Q6.** The increased resistance of a wire if its length is doubled and original cross-sectional area is halved will be:

Given R — original resistance of wire)

- (a) $\left(\frac{3}{4}\right)R$
 (b) $\frac{R}{4}$
 (c) 4R
 (d) 3R

- Q7.** Transverse nature of electromagnetic waves are/is evident by:

- A. Interference
 B. Dispersion
 C. Polarisation
 D. Diffraction

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

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

- Q8.** Which of the following statements are correct?

- A. The relative motion between a magnet and a coil is responsible for induction of electric current in the coil.
 B. Magnetic flux is a vector quantity.
 C. In a closed coil, the magnitude of emf induced is equal to the time rate of change of magnetic flux.
 D. Eddy currents oppose the magnetic braking effect in trains.
 E. Lenz's law gives the polarity of the induced emf clearly.

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

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

- Q9.** A molecule of a substance has a permanent electric dipole moment of magnitude 10^{-31} Cm. A mole of this substance is 100% polarised by applying a strong

electrostatic field of magnitude 10^8 Vm^{-1} . The direction of field is suddenly changed by all angle of 60° . Find the heat released by substance in aligning its dipoles along the new direction of the field.

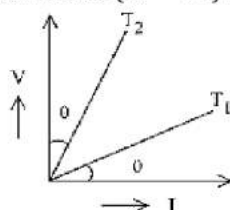
[Take 1 mole = 6×10^{23} molecules]

- (a) -9 J
- (b) -3 J
- (c) 9 J
- (d) 3 J

Q10. An electric dipole of dipole moment $\vec{P}$ is rotated in an electric field of magnitude E from the most stable orientation to most unstable orientation. The work done in the process is:

- (a) pE
- (b) $2pE$
- (c) $-2pE$
- (d) $-pE$

Q11. V-I graph for a platinum wire at temperatures T_1 and T_2 is shown in the given figure. The temperature difference ($T_2 - T_1$) is proportional to:



- (a) $\sin 2\theta$
- (b) $\cos 2\theta$
- (c) $\tan 2\theta$
- (d) $\cot 2\theta$

Q12. Arrange the following EM waves increasing order of their frequency?

- A. Ultraviolet rays
- B. Gamma rays
- C. Radio waves
- D. Infrared waves
- E. X-rays

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

- (a) $C < E < A < D < B$
- (b) $B < E < A < D < C$
- (c) $C < D < A < E < B$
- (d) $B < A < C < D < E$

Q13. The amplitude of the magnetic field of a harmonic electromagnetic wave in vacuum is $B_0 = 610 \text{ nT}$. The amplitude of the electric field of the wave is:

- (a) $5 \times 10^{14} \text{ NC}^{-1}$
- (b) $203 \times 10^{-17} \text{ NC}^{-1}$

(c) 183 NC^{-1}

(d) 610 NC^{-1}

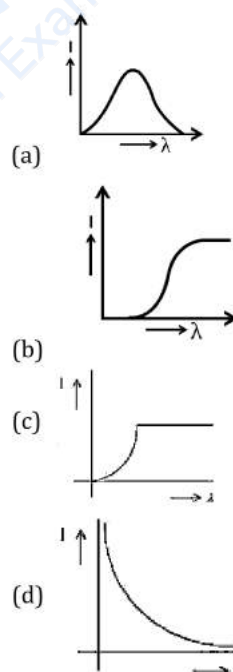
Q14. Which of the following statements are correct:

- A. In semiconductor diodes carriers are generated by photo-excitation.
- B. When the photo diode is illuminated with light with energy (E) > Energy gap (E_g) of the semiconductor, then electron-hole pairs are generated.
- C. Photovoltaic devices convert electricity into optical radiation.
- D. Photodiode can be used as a photodetector to detect optical signal
- E. Zener diode specification should be taken as per the required output voltage.

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

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

Q15. The anode voltage of a photocell is kept fixed. The wavelength, of light falling on the cathode is gradually changed. The plate currents I of the photocell varies as follows.



Q16. The kinetic energy of an electron in the ground state of hydrogen atom is 13.6 eV. The potential energy (PE) and total energy (E) of electron in this state is

- (a) P.E = -13.6 eV, E = 27.2 eV

- (b) P.E = +13.6 eV, E = -27.2 eV
 (c) P.E = +27.2 eV, E = -13.6 eV
 (d) P.E = -27.2 eV, E = -13.6 eV

- Q17.** A dentist has a small mirror of focal length 1.6 cm. He observes the cavity in the tooth of a patient by holding the mirror at a distance of 8 mm. from the cavity. The magnification is:
 (a) 1
 (b) 1.5
 (c) 2
 (d) 13
- Q18.** Which of the following frequency would be suitable for the beyond the horizon communication using sky waves?
 (a) 1000 GHz
 (b) 1 GHz
 (c) 10 MHz
 (d) 10 kHz

Q19. Match List - I with List - II

List-I		List-II	
(A)	Impedance of a series RLC circuit at resonance	(I)	Voltage across L & C are 180° out of phase.
(B)	For a series LC circuit	(II)	Current in L & C are 180° out of phase
(C)	For a parallel LC circuit	(III)	Minimum
(D)	Reactance of a capacitor in DC circuit	(IV)	Infinite

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

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

- Q20.** In a p-n junction under equilibrium:
 (a) Diffusion current dominates
 (b) Drift current dominates
 (c) No net current flows
 (d) Depending upon the semiconductor either diffusion current or drift current dominates.
- Q21.** Choose the correct statement(s)
 A. In photo electric effect, the minimum negative potential to the plate A for which photocurrent is zero is called saturation potential
 B. Maximum kinetic energy of photoelectrons is directly proportional to intensity of incident radiation.
 C. $K_{max} = eV_0$.

- D. Photocurrent becomes zero at stopping potential.
 E. For different intensities of light, stopping potential is different.

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

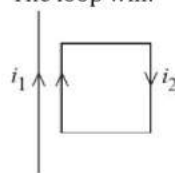
- (a) C & D only
 (b) B and E only
 (c) D and E only
 (d) C, D & E only

- Q22.** The half-lives of 2 radioactive specimen are $T_1 = 5$ years. and $T_2 = 7.5$ years. The ratio of their disintegration constants and λ_1 and λ_2 is:
 (a) $\frac{3}{2}$
 (b) $\frac{2}{3}$
 (c) 1: 1
 (d) 0.693

- Q23.** The depletion layer has large electrical resistance because:
 (a) It contains few ions as charge carriers.
 (b) It has few holes as charge carriers.
 (c) It has no charge carriers.
 (d) It contains few electrons as charge carriers.

- Q24.** If the frequency of light in a photoelectric experiment is doubled the stopping potential will be:
 (a) be doubled
 (b) be halved
 (c) becomes more than the double
 (d) becomes less than the double

- Q25.** In the situation shown in the figure, the straight wire is fixed but the loop can move under magnetic farce. The loop will:



- (a) remains stationary
 (b) moves towards the wire
 (c) moves away from the wire
 (d) rotates about the wire

- Q26.** An a.c voltage is applied to a resistor of resistance 5Ω and an inductor having inductive reactance of 5Ω connected in series. The phase difference between applied voltage and the current in the circuit is:
 (a) $\frac{\pi}{3}$
 (b) $\frac{\pi}{4}$
 (c) $\frac{\pi}{2}$
 (d) Zero

Q27. Which quantity is increased in a step-down transformer?

- (a) Power
- (b) Current
- (c) Frequency
- (d) Voltage

Q28. Magnetic susceptibility χ of a given material is -0.5 . Identify the magnetic material.

- (a) Paramagnetic
- (b) Diamagnetic
- (c) Ferromagnetic
- (d) Diamagnetic and Ferromagnetic both

Q29. If U_E electric field energy density and U_m magnetic field energy density. Then

- (a) $\frac{U_E}{U_m} > 1$
- (b) $\frac{U_E}{U_m} = 1$
- (c) $\frac{U_E}{U_m} < 1$
- (d) $\frac{U_E}{U_m}$ is variable

Q30. Match List - I with List - II

List-I		List-II	
(A)	Electric field outside a uniformly charged thin spherical shell	(I)	Zero
(B)	Electric field inside the uniformly charged thin spherical shell	(II)	$\frac{\lambda}{2\pi\epsilon_0 r} \hat{n}$
(C)	Electric field due to an infinitely long straight uniformly charged wire.	(III)	$\frac{\sigma}{2\epsilon_0} \hat{n}$
(D)	Electric field due to a uniformly charged infinite plane sheet	(IV)	$k \frac{q}{r^2} \hat{r}$

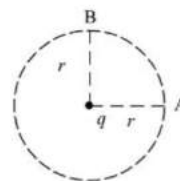
Choose the **correct** answer from the options given below:

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

Q31. A potential difference of 3 V is applied across a conductor of resistance 1.5Ω . The number of electrons flowing through it in one second would be:

- (Given charge of an electron: $e = 1.6 \times 10^{19}$ C)
- (a) 16×10^{19}
 - (b) 4.5×10^{19}
 - (c) 1.25×10^{19}
 - (d) 4.8×10^{19}

Q32. What is the work done in moving a δq charge from A to B?



- (a) 0
- (b) $\frac{kq\delta q}{r}$
- (c) $\frac{kq\delta q}{\sqrt{2}r}$
- (d) $\frac{2kq}{r}$

Q33. Which of the following is NOT a property of charges?

- (a) Quantisation
- (b) Scalar
- (c) Additive
- (d) affected by frames of reference

Q34. Choose the **correct** statements:

- A. Diamagnetic substances have non zero resultant magnetic moment.
- B. The magnetisation of a paramagnetic material is inversely proportional to the absolute temperature T.
- C. At high enough temperature, a ferromagnet becomes a paramagnet.
- D. Magnetic permeability of ferromagnets: $\mu \gg 1$
- E. Susceptibility of Diamagnetic, $\chi \gg 1$

- (a) A & C only
- (b) A, C & D only
- (c) D & E only
- (d) B, C & D only

Q35. If charge is moving parallel to uniform magnetic field, its path will be:

- (a) straight line
- (b) circular
- (c) helical
- (d) elliptical

Q36. Using the given information, calculate the mass defect of $^{16}_8\text{O}$ nucleus in MeV/c^2 .

mass of electron, $m_e = 0.00055u$

mass of proton, $m_p = 1.00727u$

mass of neutron, $m_n = 1.00866u$

experimental mass of nucleus = $15.99053u$

$1u = 931.5\text{MeV}/c^2$ (where u = atomic mass unit)

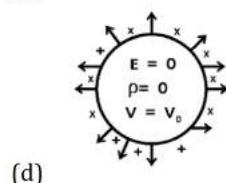
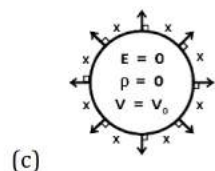
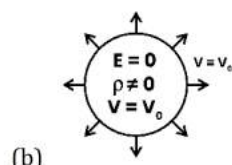
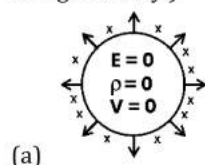
Choose the correct answer from the options given below:

- (a) $150.5 \text{ MeV}/c^2$
- (b) $127.5 \text{ MeV}/c^2$
- (c) $107.5 \text{ MeV}/c^2$
- (d) $680.0 \text{ MeV}/c^2$

Q37. The capacitance of a capacitor becomes $\frac{7}{6}$ times its original value if a dielectric slab of thickness $t = \frac{2}{3}d$ is introduced in between the plates: where d is the separation between the plates. The dielectric constant of the slab is:

- (a) $\frac{11}{7}$
- (b) $\frac{7}{11}$
- (c) $\frac{11}{14}$
- (d) $\frac{14}{11}$

Q38. Which of the following diagram correctly shows the electrostatic properties of a charged conductor. (Given V_0 = potential on the surface of conductor; ρ = Volume charge density.)



Q39. A p-n junction diode can be used:

- (a) to convert dc voltage into ac voltage
- (b) to convert ac voltage into dc voltage
- (c) to decrease the amplitude of ac voltage
- (d) to decrease the frequency of ac voltage

Q40. A telescope has an objective of focal length 30 cm and an eyepiece of focal length 3.0 cm. It is focused on a scale distant 2.0 m. For seeing with relaxed eye, the separation between the objective and eyepiece would be:

- (a) 35.3 cm
- (b) 38.3 cm
- (c) 37 cm

(d) 30 cm

Q41. The colour of the third band of a colour coded carbon resistor of resistance $2.3 \times 10^2 \Omega$ would be:

- (a) Red
- (b) Yellow
- (c) Blue
- (d) Brown

Q42. Young's double slit experiment is performed using a source of white light.

- A. The center fringe will be white.
- B. The fringe next to the center fringe will be violet.
- C. The fringe next to the center fringe will be red.
- D. There will be no completely dark fringe,
- E. The center fringe will be of no colour.

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

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

Q43. A message signal of peak value 2 V is used to modulate a carrier wave of peak value 10 V. The modulation index of the amplitude modulated wave is:

- (a) 0.2
- (b) 5
- (c) 0.66
- (d) 1.5

Q44. When the electron in hydrogen atom jumps from the 2nd orbit to the 1st orbit, the wavelength of the radiation emitted is λ . When the electron jumps from the 3rd orbit to 1st orbit, the wavelength of emitted radiation is :

- (a) $\frac{27}{32} \lambda$
- (b) $\frac{27}{5} \lambda$
- (c) $\frac{4}{5} \lambda$
- (d) $\frac{3}{2} \lambda$

Q45. What should be the size of an obstacle to observe diffraction?

- (a) has no relation with the wavelength
- (b) should be exactly half of the wavelength
- (c) should be of the same order as wavelength
- (d) should be much larger than the wavelength

Q46. The bottom of a container is a 6 cm thick glass ($\mu = 1.5$) slab. The container contains a thick layer of water ($\mu_w = 1.33$), 4 cm on top of the glass. What is the apparent position of a scratch on the outer surface of the bottom of the glass slab when viewed through the container?

- (a) 1 cm
- (b) 2 cm
- (c) 3.5 cm
- (d) 3 cm

Q47. The sensitivity of a potentiometer can be increased by:

- (a) Decreasing the length of potentiometer wire only.
- (b) Increasing the potential gradient of the potentiometer wire of fixed length.
- (c) Decreasing the potential gradient of the potentiometer of fixed length.
- (d) Increasing the current in the potentiometer wire circuit.

Q48. A monochromatic visible light consists of

- (a) light of a single wavelength with all the colours of spectrum of white light.
- (b) light of many wavelengths with a single colour.

- (c) light of many wavelengths with all the colours of spectrum of white light
- (d) light of a single colour and single wavelength

Q49. Current carrying wire produces:

- (a) Electric field only
- (b) Magnetic field only
- (c) Both Electric and Magnetic field
- (d) Electric flux only

Q50. Two lenses of power 3D and -1D are kept in contact. The focal length of the combined lens would be:

- (a) 50 cm
- (b) 200 cm
- (c) 100 cm
- (d) 400 cm