CUET UG 2023

Previous Year Question

1.Choose the correct statements.

A. The total charge in an isolated system remains constant.
B. When charge is transferred to a conductor, it stays at the same place without getting distributed over the entire surface.
C. One coulomb of negative charge is equal to the charge of 6.25×10186.25 \times 10^{18}6.25×1018 electrons.
D. Electric field is a scalar field.
E. Potential difference between two dipole moments exists irrespective of external electric field.

Options:

1. B, C, D and E only
2. A, D and E only
3. B and D only
4. A, C and E only

2.Choose the correct statements about Gauss's law.

1. Gauss law is true for any open surface.
2. Gauss law includes the charges enclosed by the surface for evaluation of electric flux through the surface.
3. Gauss law can be used to calculate magnetic field due to steady current.
4. Gauss law is not based on the inverse square dependence on distance contained in Coulomb's law.

Options:

1. 1
2. 2
3. 3
4. 4

3.If three charged particles are in equilibrium, then:

1. All charged particles have equal charge.
2. All the charged particles have the same sign and the distances between consecutive charged particles are same.
3. All the charged particles have some sign.
4. All the charged particles cannot have the same sign.

4.An isolated sphere has a capacitance of 60 pF. What is the radius of the sphere?

1. 540 cm
2. 54 cm
3. 0.054 cm
4. 0.54 cm

5.The electric field intensity due to an infinite thin plane sheet of surface charge density σ\sigmaσ is:

1. σε0\frac{\sigma}{\varepsilon_0}ε0σ
2. σ2ε0\frac{\sigma}{2\varepsilon_0}2ε0σ
3. −σε0-\frac{\sigma}{\varepsilon_0}−ε0σ
4. −2σε0-\frac{2\sigma}{\varepsilon_0}−ε02σ

6.Three capacitors of capacitances 2 μF, 6 μF and 12 μF are connected in series.
If a 7 V battery is connected across the combination, find the potential difference across the 6 μF capacitor.

1. 1 V

2. 2 V
3. 3 V
4. 4 V

7.Kirchhoff's Second Law is based on the law of conservation of:

1. Charge
2. Energy
3. Momentum
4. Mass and energy

8.Identify the graph showing the temperature dependence of resistivity for a typical semiconductor.

1. Linearly increasing graph
2. Linearly decreasing graph
3. Exponential decrease
4. Exponential increase

9.In a potentiometer arrangement a cell of 1.5 V gives balance point at 45 cm.
If the balance point shifts to 75 cm, the emf of second cell is:

1. 2.5 V
2. 1.0 V
3. 1.1 V
4. 1.5 V

10.A room heater rated 750 W, 220 V and a bulb rated 200 W, 220 V are connected in series with a 220 V supply.
Power consumed by the bulb and heater respectively:

1. 124.8 W, 124.8 W
2. 33.25 W, 124.8 W
3. 124.8 W, 33.25 W
4. 33.25 W, 33.25 W

11.A cell of emf E and internal resistance r is connected to resistances R_1 and R_2.
If power consumed is same in both cases, the internal resistance is:

1. R1R2\sqrt{R_1R_2}R1R2
2. R1R2R1+R2\frac{R_1R_2}{R_1+R_2}R1+R2R1R2
3. R1+R2R_1+R_2R1+R2
4. R1−R22\frac{R_1-R_2}{2}2R1−R2

12.A bar of iron is placed in a uniform magnetic field parallel to the plane of paper.
Field lines passing through it will look like:

1. Straight parallel lines
2. Curved lines diverging outward
3. Curved lines converging inward
4. Straight lines unchanged

13.To protect a galvanometer from large current, which should be connected?

1. Low resistance in series

2. High resistance in series
3. High resistance in parallel
4. Low resistance in parallel

14.The charge which is a source of electric field but not magnetic field is:

1. Charge moving in straight line
2. Charge at rest
3. Charge moving in circular path
4. Oscillating charge

15.In a thin conducting wire carrying current, magnetic field induction along the conductor should be:

1. Zero
2. Constant
3. Positive
4. Negative

16.The coercivity of a bar magnet is 140 A/m.
To demagnetize it using a solenoid of length 1.6 m having 112 turns, the current required is:

1. 9 A
2. 2.25 A
3. 2 A
4. 1.25 A

17.Magnetic field at point P in the given current-carrying wire arrangement is:

1. μ0I4πR(3π)\frac{\mu_0 I}{4\pi R}(3\pi)4πRμ0I(3π)
2. μ0I4πR(2π+2)\frac{\mu_0 I}{4\pi R}(2\pi+2)4πRμ0I(2π+2)
3. μ0I4πR(2π−2)\frac{\mu_0 I}{4\pi R}(2\pi-2)4πRμ0I(2π−2)
4. 3μ0I2R\frac{3\mu_0 I}{2R}2R3μ0I

18.Which of the following is not an application of eddy currents?

1. Transformers
2. Speedometers
3. Magnetic brakes
4. Induction furnace

19.If the rms voltage is 100√2 V, the peak voltage is:

1. 200 V
2. 100 V
3. 141 V
4. 70.5 V

20.A square loop of copper is pulled through a region of uniform magnetic field.
Rank the pulling forces required in different regions.

1. FA=FB=FC=FDF_A = F_B = F_C = F_DFA=FB=FC=FD

2. FC>FB>FD>FAF_C > F_B > F_D > F_AFC>FB>FD>FA
3. FC>FD>FB>FAF_C > F_D > F_B > F_AFC>FD>FB>FA
4. FD>FB>FA=FCF_D > F_B > F_A = F_CFD>FB>FA=FC

21.Find the effective impedance in the circuit if the source is
(a) DC source and
(b) High-frequency AC source.

1. For DC: (Z = R_2 + R_3) ; For AC: (Z = R_1 + R_3)
2. For DC: (Z = R_1) ; For AC: (Z = R_2 + R_3)
3. For DC: (Z = \infty) ; For AC: (Z = 0)
4. For DC: (Z = 0) ; For AC: (Z = \infty)

22.In AC circuits, the relation (Z = \sqrt{R^2 + (X_L - X_C)^2}) holds when:

A. AC circuit containing R and L in series
B. AC circuit containing R and C in series
C. AC circuit containing L and C in series
D. AC circuit containing R, L and C in series

Options:

1. A and C only
2. A and B only
3. A, B and D only
4. A, B, C and D only

23.When 100 V dc current is applied, the current in a coil is 1 A.
When 100 V ac is applied, the current becomes 0.5 A.
If frequency is 50 Hz, find the impedance and inductance.

1. 200 Ω and 0.55 H
2. 100 Ω and 0.86 H
3. 200 Ω and 1.0 H
4. 100 Ω and 0.93 H

24.Match List-I with List-II.

List I	List II
A. X-rays	I. (10^{14} – 3×10^{14}) Hz
B. Microwaves	II. (10^{8} – 3×10^{11}) Hz
C. Radiowaves	III. (10^{15} – 5×10^{19}) Hz
D. Infrared	IV. (5×10^{11} – 10^{14}) Hz

Options:

1. A-III, B-II, C-I, D-IV
2. A-II, B-I, C-IV, D-III
3. A-I, B-II, C-IV, D-III
4. A-IV, B-III, C-II, D-I

25.An electromagnetic wave travelling in vacuum is described by
(E = E_0 \sin(kx - \omega t)) and (B = B_0 \sin(kx - \omega t)).

Which relation is correct?

1. (E_0 = B_0 c)
2. (E_0 = B_0 / c)
3. (E_0 B_0 = ck)
4. (E_0 / B_0 = \sqrt{\mu_0 / \varepsilon_0})

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26.Light travelling from one medium to another will show total internal reflection in which pair?

1. Air → water
2. Air → glass
3. Water → glass
4. Glass → water

27.A slit of width (a) is illuminated with light of wavelength (\lambda).
The angular width of the first diffraction maximum is:

1. (\frac{2\lambda}{\sqrt{3}a})
2. (\frac{\lambda}{\sqrt{3}a})
3. (\frac{\sqrt{3}\lambda}{a})
4. (\frac{\sqrt{3}\lambda}{2a})

28.In Young's double-slit experiment, light of wavelength 640 nm produces fringes of width 0.8 mm.
Fringe width using wavelength 720 nm will be:

1. 2.4 mm
2. 2.7 mm
3. 0.9 mm
4. 0.3 mm

29.An astronomical telescope has objective focal length 50 cm and eyepiece focal length 2 cm.
Angular diameter of the Moon is (1/2^\circ).
The angular size of image formed is:

1. 27°
2. 13.5°
3. 1°
4. 11.2°

30.A spherical air lens of radii (R_1 = R_2 = 10) cm is in glass ((\mu = 1.5)).
If the focal length in air is (f_1), when liquid fills the space the focal length becomes (f_2).
Correct pair is:

1. (f_1 = 15) cm, (f_2 = 30) cm
2. (f_1 = -15) cm, (f_2 = -30) cm
3. (f_1 = -15) cm, (f_2 = 15) cm
4. (f_1 = -30) cm, (f_2 = -15) cm

31.Linear magnification produced by a mirror m = −1.5.
Which case corresponds?

1. Convex mirror with object between F and 2F
2. Concave mirror with object between F and pole
3. Convex mirror with object at infinity
4. Concave mirror with object anywhere

32.The type of wavefront emerging from a distant light source is:

1. Cylindrical
2. Plane
3. Diverging spherical
4. Converging spherical

33.For a proton, electron and alpha particle having same kinetic energy, the de-Broglie wavelength relation is:

1. (\lambda_\alpha < \lambda_p < \lambda_e)
2. (\lambda_e < \lambda_p < \lambda_\alpha)
3. (\lambda_p < \lambda_\alpha < \lambda_e)
4. (\lambda_\alpha < \lambda_e < \lambda_p)

34.Correct curve between stopping potential (V_0) and intensity of incident radiation is:

1. Straight decreasing line
2. Straight increasing line
3. Saturation curve
4. Horizontal line

35.Which statements about photoelectric effect are correct?

A. Photocurrent depends on intensity of light
B. Maximum kinetic energy depends on frequency
C. Photoelectric emission occurs due to absorption of photon
D. Emission occurs after some delay

Options:

1. A, B and C only
2. B, C and D only
3. A, C and D only
4. A, B and D only

36.Energy released when two nuclei of masses (m_1) and (m_2) combine to form nucleus of mass (M):

1. ((m_1 + m_2 - M)c^2)
2. ((M - (m_1 + m_2))c^2)
3. ((M - m_1 + m_2)c^2)
4. ((M + m_1 - m_2)c^2)

37.The nuclear force is:

1. Strong, short range, charge independent
2. Attractive, long range
3. Strong, attractive and charge dependent
4. Strong, short range and repulsive

38.Energy levels of hydrogen atom are shown. Which wavelength corresponds to the transition shown?

(Options correspond to the labelled transitions in the diagram.)

39.Match the following nuclear reactions.

List I	List II
A. (^{222}Rn → ^{218}Po)	α particle
B. (^{214}Bi → ^{214}Po)	β particle
C. (^{234}Th → ^{234}U)	γ particle
D. (^{22}Na → ^{22}Ne)	β^+ particle

Options:

1. A-II, B-III, C-IV, D-I
2. A-III, B-II, C-IV, D-I
3. A-II, B-I, C-IV, D-III
4. A-I, B-III, C-II, D-IV

40.Which of the following statements is not correct?

1. Pure silicon doped with trivalent impurity gives p-type semiconductor.
2. Majority carriers in n-type semiconductor are holes.
3. Minority carriers in p-type semiconductor are electrons.
4. Resistivity of intrinsic semiconductor decreases with temperature.

41.Identify the logic operation carried out by the circuit shown.

1. AND
2. NAND
3. NOT
4. OR

42.In the circuit shown, potential difference between A and B is:

1. 0 V
2. 2 V
3. 4 V
4. 8 V

43.Match List-I with List-II.

List I	List II
Zener diode	Detect equal signals
LED	Remote control
Rectifier	Converts AC to DC
Photodiode	Light detector

44.The height of a TV tower is 180 m. Maximum transmission distance is:

1. 18 km
2. 90 km
3. 48 km
4. 64 km

45.

Match List-I with List-II.

List I	List II
Modulation	Retrieval of information
Baseband	Original signal
Demodulation	Extraction of signal
Bandwidth	Frequency range

46.Two charges (+q) and (-3q) are kept 2 cm apart. Distance of the point where potential becomes zero:

1. 6 cm
2. 4 cm
3. 3 cm
4. 2 cm

47.For electrons mobility:

A. decreases with increase in potential difference
B. increases with increase in potential difference
C. does not depend on potential difference
D. decreases with temperature
E. increases with temperature

Options:

1. A and E only
2. B and E only
3. C and D only
4. C and E only

48.Displacement current due to time varying electric field is:

1. (\frac{d\phi_E}{dt})
2. (\varepsilon_0 \frac{d\phi_E}{dt})
3. (\mu_0 \varepsilon_0 \frac{d\phi_E}{dt})
4. (\phi_E \frac{d}{dt})

49.From the graph between magnification (m) and image distance (v) for a thin lens, the focal length is:

1. (\frac{b^2}{ac})
2. (\frac{b^2 c}{a})
3. (\frac{a}{c})
4. (\frac{b}{c})

50.Match List-I with List-II using Bohr's atomic model.

List I	List II
Radius of electron orbit	Directly proportional to (n^2)
Angular momentum	(nh/2\pi)
Velocity of electron	Inversely proportional to (n)
Energy of electron	Inversely proportional to (n^2)

Options:

1. A-I, B-II, C-III, D-IV
2. A-II, B-I, C-III, D-IV
3. A-IV, B-III, C-II, D-I
4. A-I, B-III, C-II, D-IV