CUET UG 2024

Previous Year Question

1.Two charged particles placed at distance **d** exert force **F**. If each charge is doubled, to keep the force unchanged the distance should be:

A. 4d
B. 2d
C. d
D. d/2

2.Two capacitors **2 μF and 3 μF** are in series across voltage **V**. Relation between potentials V_1, V_2 and energies U_1, U_2 is:

A. $V_1/V_2 = U_1/U_2 = 2/3$
B. $V_1/V_2 = U_1/U_2 = 3/2$
C. $V_1/V_2 = 2/3$ and $U_1/U_2 = 3/2$
D. $V_1/V_2 = 3/2$ and $U_1/U_2 = 2/3$

3.Two large parallel plates have surface charge densities **+σ and −σ**. A charge **q** is placed at points P_1, P_2, P_3. The forces F_1, F_2, F_3 respectively are:

A. $F_1=0, F_2=0, F_3=0$
B. $F_1=0, F_2\neq0, F_3=0$
C. $F_1\neq0, F_2\neq0, F_3\neq0$
D. $F_1=0, F_2=0, F_3\neq0$

4.Two metallic spheres of radii R_1 **and** R_2 touch and are separated. Final charge ratio Q_1/Q_2 is:

A. R_2/R_1
B. $< R_2/R_1$
C. $> R_2/R_1$
D. R_1/R_2

5.Two resistors **100 Ω and 200 Ω** are in series with **20 V** battery. A **200 Ω voltmeter** is across the 200 Ω resistor. Voltmeter reading:

A. 4 V
B. 20/3 V
C. 10 V
D. 16 V

6.Current through **4/3 Ω external resistance** connected to two cells (2V,1Ω) and (1V,2Ω) in parallel is:

A. 1 A
B. 2/3 A
C. 3/4 A
D. 5/6 A

7.A wire stretched so its **radius becomes half**. New resistance **R′**, resistivity **ρ′**, power rating **P′**:

A. $\rho'=2\rho, R'=2R, P'=2P$
B. $\rho'=\rho/2, R'=R/2, P'=P/2$
C. $\rho'=\rho, R'=16R, P'=P/16$
D. $\rho'=\rho, R'=R/16, P'=16P$

8.Increasing order of magnetic susceptibility:

A. Paramagnetic, Diamagnetic, Ferromagnetic
B. Ferromagnetic, Paramagnetic, Diamagnetic
C. Diamagnetic, Paramagnetic, Ferromagnetic
D. Diamagnetic, Ferromagnetic, Paramagnetic

9.Force between two parallel current-carrying wires is proportional to:

A. L only
B. I_1I_2 only
C. I_1I_2L
D. $L/(I_1I_2)$

10.Magnetic field at center of circular loop with two semicircular resistances **2R and R** carrying current **3I**:

A. $\mu_0 I/4r$ (out of plane)
B. $\mu_0 I/4r$ (into plane)
C. $\mu_0(3I)/4r$ (out of plane)
D. $\mu_0(3I)/4r$ (into plane)

11.Square loop side **1 cm**, current **10 A**, magnetic field **0.2 T** parallel to plane. Torque:

A. 0
B. 2×10^{-4} Nm
C. 2×10^{-2} Nm
D. 2 Nm

12.In AC circuit, current leads voltage by **π/2**. Circuit is:

A. Purely resistive
B. R = reactance
C. Purely inductive
D. Purely capacitive

13.Flux change **15 Wb** when current changes **0 →10 A in 0.25 s**. Mutual inductance:

A. 120 H
B. 12 H
C. 1.5 H
D. 0.75 H

14.Direction of induced current in two changing loops (figure case):

A. Clockwise in both
B. Anticlockwise in both
C. Clockwise in (a), anticlockwise in (b)
D. Anticlockwise in (a), clockwise in (b)

15.Match frequency vs opposition graphs with:

I. Impedance
II. Capacitive reactance
III. Inductive reactance
IV. Resistance

Options given.

16.Ratio of energy density **electric : magnetic** in EM wave:

A. 1:1
B. 1:c
C. c:1
D. $1:c^2$

17.Correct EM spectrum decreasing wavelength:

A. Radio → X → IR → Microwave → Visible
B. IR → Microwave → Radio → X → Visible
C. Radio → Microwave → IR → Visible → X
D. X → Visible → IR → Microwave → Radio

18.Match EM waves with production:

Microwaves
Infrared
X-rays
Radio waves

Devices include LC oscillator, magnetron etc.

19.Curved surface separating air and medium (μ=4/3). Object at **20 cm**. Image distance from **P**:

A. 16 cm left in air
B. 16 cm right in water
C. 20 cm right in water
D. 20 cm left in air

20.Power of lens for fixed radii of curvature:

A. $\propto (\mu-1)$
B. $\propto \mu^2$
C. $\propto 1/\mu$
D. $\propto \mu^{-2}$

21.Correct graph of **v vs u** for convex lens.

22.Single slit diffraction:

Slit width = 0.1 mm
Screen distance = 50 cm
Central maxima width = 5 mm

Wavelength:

A. 2.5×10^{-7} m
B. 4×10^{-7} m

C. 5×10^{-7} m
D. 7.5×10^{-7} m

23.Radiation frequency $2\nu_0$ incident on metal (threshold ν_0):

A. No emission
B. KE = $h\nu_0$ for all electrons
C. Max KE = $h\nu_0$
D. Max KE = $2h\nu_0$

24.Photoelectric current vs distance graph when source moved away.

25.If accelerating potential doubled, **de Broglie wavelength**:

A. Same
B. Double
C. Four times
D. Decreases

26.Electron KE in ground state = K. Potential and total energy:

A. −2K, −K
B. +2K, −K
C. −K, +2K
D. +K, +2K

27.Density ratio of nuclei with mass numbers **A and B**:

A. A:B
B. $\sqrt{A}:\sqrt{B}$
C. $A^2:B^2$
D. 1:1

28.Shortest wavelengths in hydrogen series decreasing order:

A. Pfund, Balmer, Brackett, Lyman
B. Pfund, Brackett, Balmer, Lyman
C. Balmer, Pfund, Lyman, Brackett
D. Pfund, Brackett, Lyman, Balmer

29.Dopants for **n-type silicon**:

A. Arsenic & Phosphorus
B. Indium & Phosphorus
C. All four
D. Phosphorus & Boron

30.Match graphs with:

Forward biased diode
Zener diode
Photodiode
Solar cell

31.A wire carrying current **I** is bent as shown and placed in a uniform magnetic field **B** coming out of the plane. The force on the wire is:

A. 4BIR, vertically downward
B. 3BIR, vertically upward
C. BI(2R + πR), vertically downward
D. 2πBIR, from P to Q

32.The refractive index of an equilateral prism is $\sqrt{2}$. The angle of minimum deviation is:

A. 60°
B. 75°
C. 30°
D. 90°

33.Transfer of integral number of _____ is evidence of quantization of electric charge.

A. photons
B. nuclei
C. electrons
D. neutrons

34.A **4 mm thick dielectric slab** is introduced between capacitor plates separated by **4 mm**. To restore the original capacitance, plate separation must increase by **3.2 mm**. The dielectric constant is:

A. 2
B. 5
C. 3
D. 7

35.A copper ball (density **8 g/cc**, diameter **1 cm**) is immersed in oil (density **0.8 g/cc**).
If electric field **600 N/C upward** keeps it suspended, charge on the ball is:

A. 2×10^{-6} C
B. 2×10^{-5} C
C. 1×10^{-5} C
D. 1×10^{-6} C

36.A metal wire is under constant potential difference. When temperature increases:

A. Drift velocity increases, thermal velocity decreases
B. Drift velocity decreases, thermal velocity decreases
C. Drift velocity increases, thermal velocity increases
D. Drift velocity decreases, thermal velocity increases

37.(From circuit diagram in the paper) The equivalent resistance between A and B is:

A. 9 Ω
B. 18 Ω
C. 4 Ω
D. 14 Ω

38.A cell of emf **1.1 V** and internal resistance **0.5 Ω** is connected to **0.5 Ω** wire.
Another identical emf cell is added in series but current remains same.
Internal resistance of second cell:

A. 1 Ω
B. 2.5 Ω
C. 1.5 Ω
D. 2 Ω

39.In Wheatstone bridge:

P = 3 Ω
Q = 3 Ω
R = 3 Ω
S = 4 Ω

Resistance needed to shunt **S** for balance:

A. 14 Ω
B. 12 Ω
C. 15 Ω
D. 7 Ω

40.Magnetic moment of a bar magnet is **M**. If bent into a semicircle, the new magnetic moment is:

A. Mπ
B. M/2
C. M
D. 2M/π

41.Ferromagnetic material used in transformers should have:

A. Low permeability & high hysteresis loss
B. High permeability & low hysteresis loss
C. High permeability & high hysteresis loss
D. Low permeability & low hysteresis loss

42.A conducting ring of radius **r** is placed in a changing magnetic field perpendicular to the plane.
If rate of change of magnetic field is **x**, electric field induced is:

A. πrx
B. πrx/2
C. 2πrx
D. 4r/x

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43.A coil of **inductance 0.5 H** connected to AC source of **50 Hz**.
Inductive reactance will be:

A. 75 V
B. 150 V
C. 100 V
D. 200 V

44.(From circuit diagram in the paper) Determine current in the circuit.

Options provided in paper.

45.Lower half of a convex lens is made opaque. The image formed will:

A. No change in image
B. Only half image formed
C. Image intensity reduces

Options:

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

46.Two slits **0.1 mm apart**, screen distance **2 m**, wavelength **500 nm**. Fringe width:

A. 1 cm
B. 0.15 cm
C. 15 cm
D. 0.1 cm

47.Astronomical telescope:

Objective focal length = **10 m**
Eyepiece focal length = **10 cm**

Tube length and magnification respectively:

A. 20 cm, 1
B. 1000 cm, 1
C. 1010 cm, 1
D. 1010 cm, 100

48.According to **Bohr's model**, which are correct?

(A) Radius $\propto n^2$
(B) Speed $\propto 1/n$
(C) Energy $\propto -1/n^2$
(D) Radius $\propto n$

Options:

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

49.For a **full-wave rectifier**, if AC frequency = **50 Hz**, ripple frequency is:

A. 50 Hz
B. 100 Hz
C. 25 Hz
D. 0 Hz