

JEE MAIN Sample Paper Physics

Duration: 1 Hour

Maximum Marks: 100

Instructions

1. This paper contains TWO sections: Section A and Section B.
2. Section A contains 20 Multiple Choice Questions (MCQs).
3. Section B contains 5 Numerical Value Questions.
4. All questions are compulsory.
5. Each correct answer carries **+4 marks**.
6. Each incorrect answer carries **-1 mark**.
7. No negative marking for unattempted questions.

Section A — Multiple Choice Questions

- Q1.** A particle of mass m moves in circular path radius r , centripetal acceleration $a_c = k^2 r t^2$. Power delivered: [2024]
- (A) $mk^2 r^2 t$
(B) $mk^2 r^2 t^2$
(C) $mk^2 r t$
(D) Zero
- Q2.** Ratio of B-field at center of circular loop to distance $x = R\sqrt{3}$ on axis: [2023]
- (A) 8:1
(B) 4:1
(C) 2:1
(D) $\sqrt{2} : 1$
- Q3.** Glass slab 3 cm, refractive index 1.5 on ink mark. Apparent raise: [2022]
- (A) 1 cm
(B) 2 cm
(C) 1.5 cm
(D) 0.5 cm
- Q4.** Adiabatic expansion, temperature drops to $1/4$. Most probable speed: [2025]
- (A) Halved
(B) Doubled
(C) One-fourth
(D) Unchanged
- Q5.** Radioactive materials X_1, X_2 decay constants $10\lambda, \lambda$. Same initial nuclei. Time for $N_1/N_2 = 1/e$: [2021]
- (A) $1/(11\lambda)$
(B) $1/(9\lambda)$
(C) $11/(10\lambda)$
(D) $1/(10\lambda)$

- Q6.** Parallel plate capacitor, separation d to $2d$, battery connected. Work done: [2024]
- (A) $\epsilon_0 AV^2/(2d)$
 (B) $\epsilon_0 AV^2/(4d)$
 (C) $-\epsilon_0 AV^2/(4d)$
 (D) Zero
- Q7.** Step-up transformer 220 V line, load 2 A, turns ratio 1:25, efficiency 100%. Primary current: [2023]
- (A) 50 A
 (B) 25 A
 (C) 0.08 A
 (D) 12.5 A
- Q8.** Work function 4.0 eV. Longest wavelength: [2022]
- (A) 310 nm
 (B) 400 nm
 (C) 540 nm
 (D) 220 nm
- Q9.** Magnetic susceptibility paramagnetic, -73°C : 0.0075. At 127°C : [2025]
- (A) 0.00375
 (B) 0.0150
 (C) 0.0050
 (D) 0.01125
- Q10.** Error in radius 2%, error in volume: [2024]
- (A) 2%
 (B) 4%
 (C) 6%
 (D) 8%
- Q11.** Particle starts from rest, $a = 4t + 3$. Velocity at $t = 2$ s: [2021]
- (A) 14 m/s
 (B) 10 m/s
 (C) 12 m/s
 (D) 16 m/s
- Q12.** Two soap bubbles radii a, b combine to radius c : [2023]
- (A) $c^2 = a^2 + b^2$
 (B) $c = a + b$
 (C) $c^3 = a^3 + b^3$
 (D) $c^2 = b^2 - a^2$
- Q13.** Long wire, bent to circle of one turn: B at center B . Bent to n turns: B at center: [2022]
- (A) nB
 (B) n^2B
 (C) $2nB$
 (D) $2n^2B$
- Q14.** LCR series at resonance: [2024]
- (A) Phase difference $\pi/2$
 (B) Impedance maximum
 (C) Current in phase with voltage
 (D) Voltage across L zero
- Q15.** Two coherent sources, intensity ratio 1:4, I_{max}/I_{min} : [2025]
- (A) 9:1
 (B) 3:1
 (C) 5:1
 (D) 25:9
- Q16.** Escape velocity v_e , planet mass and radius double. Escape velocity: [2021]
- (A) v_e
 (B) $2v_e$
 (C) $v_e/2$
 (D) $\sqrt{2}v_e$

- Q17.** CE amplifier, input 200 , load 20 k, $\beta = 100$. Voltage gain: [2023]
 (A) 1000
 (B) 5000
 (C) 10000
 (D) 2000

- Q18.** Simple pendulum length L , max angular displacement θ . Max kinetic energy: [2022]
 (A) $mgL(1 - \cos \theta)$
 (B) $mgL \sin \theta$
 (C) mgL
 (D) $mgL \cos \theta$

- Q19.** Internal energy of 1 mol ideal gas depends on: [2024]
 (A) Pressure alone
 (B) Volume alone
 (C) Temperature alone
 (D) None of these

- Q20.** Metal rod 1 m, angular velocity 5 rad/s, $B = 0.2$ T. Induced emf: [2025]
 (A) 0.5 V
 (B) 1.0 V
 (C) 0.2 V
 (D) 0.1 V

Section B — Numerical Value Questions

- Q21.** Light bulb 100 W, 220 V. Resistance $X \Omega$: [2024]
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- Q22.** Mass 1 kg, spring constant 100 N/m, time period $X\pi/5$ s. Find X : [2023]
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- Q23.** Photoelectric experiment, $f = 8 \times 10^{14}$ Hz, work function 2.0 eV. Max kinetic energy $X \times 10^{-19}$ J: [2025]
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- Q24.** Radius of second Bohr orbit, $X \times 10^{-10}$ m. $r_1 = 0.53 \text{ \AA}$. Find X : [2022]
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- Q25.** Force $\vec{F} = (2\hat{i} + 3\hat{j} + 4\hat{k})$ N, displacement (1, 1, 1) m. Work done X J: [2024]

Answer Key

Section A

1.(A)	2.(A)	3.(A)	4.(A)	5.(B)
6.(B)	7.(A)	8.(A)	9.(A)	10.(C)
11.(A)	12.(A)	13.(B)	14.(C)	15.(A)
16.(A)	17.(C)	18.(A)	19.(C)	20.(A)

Section B

21. 484	22. 1	23. 2.08	24. 2.12	25. 9
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