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 light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. If the frequency is halved and the intensity is doubled, the photoelectric current becomes: *[2024]*

(A) Doubled
(B) Quadrupled
(C) Halved
(D) Zero

Q2. Ratio of wavelengths of last line of Balmer and Lyman series: *[2023]*

(A) 1
(B) 4
(C) 0.5
(D) 2

Q3. Nucleus of mass 218 splits into 214 and 4. Potential energy of daughter nuclei is V. Q-value: *[2022]*

(A) V
(B) $1.02V$
(C) $0.98V$
(D) More data needed

Q4. Energy of electron in nth orbit $E_n = -13.6/n^2$ eV. Energy to excite from 1st excited to 3rd excited: *[2025]*

(A) 10.2 eV
(B) 2.55 eV
(C) 0.66 eV
(D) 1.89 eV

Q5. Hollow conducting sphere radius R has charge $+Q$. Electric field at $r < R$: *[2024]*

(A) kQ/r^2
(B) kQ/R^2
(C) Zero
(D) kQ/Rr

Q6. Capacitor 4 μF charged to 400 V, plates connected through 1 kΩ resistor. Heat produced: *[2021]*

(A) 0.16 J

(B) 0.32 J

(C) 0.64 J

(D) 1.28 J

Q7. Six charges at vertices of regular hexagon in alternating order. Electric potential at center: *[2023]*

(A) $3kq/a$

(B) $6kq/a$

(C) Zero

(D) $\sqrt{3}kq/a$

Q8. Carbon resistor marked Brown, Black, Green. Resistance: *[2022]*

(A) 1 kΩ

(B) 1 MΩ

(C) 10 kΩ

(D) 100 kΩ

Q9. Meter bridge null point at 20 cm from one end, $X < Y$. Ratio $X : Y$: *[2025]*

(A) 1:4

(B) 1:5

(C) 4:1

(D) 2:3

Q10. Current 2 A, area 2 mm^2, electron density 8×10^{28}/m^3. Drift velocity: *[2024]*

(A) 0.078 mm/s

(B) 0.156 mm/s

(C) 1.25 mm/s

(D) 0.5 mm/s

Q11. Long solenoid 1000 turns/m, current 1 A. Magnetic field at center: *[2021]*

(A) $4\pi \times 10^{-4}$ T

(B) $2\pi \times 10^{-4}$ T

(C) $4\pi \times 10^{-7}$ T

(D) 10^{-3} T

Q12. Circular loop radius r, angular velocity ω in uniform B. Maximum induced emf: *[2023]*

(A) $B\pi r^2\omega$

(B) $2B\pi r^2\omega$

(C) $B\pi r^2\omega/2$

(D) Zero

Q13. LCR series, phase difference $\pi/4$, R=100 . Reactance: *[2022]*

(A) 100

(B) 200

(C) 50

(D) 1002

Q14. Convex mirror, object 30 cm, focal length 30 cm. Image distance: *[2024]*

(A) 15 cm behind mirror

(B) 30 cm in front of mirror

(C) 60 cm behind mirror

(D) Infinity

Q15. Young's double slit, fringe width 0.4 mm, immersed in water n=4/3. New fringe width: *[2025]*

(A) 0.3 mm

(B) 0.4 mm

(C) 0.53 mm

(D) 0.2 mm

Q16. Unpolarized light, angle between polaroids 60°, transmitted intensity: *[2021]*

(A) $I_0/2$

(B) $I_0/4$

(C) $I_0/8$

(D) $3I_0/8$

Q17. Average translational kinetic energy of gas molecule at temperature T: *[2023]*

(A) kT

(B) $3/2kT$

(C) $1/2kT$

(D) $3kT$

Q18. Carnot engine between 27°C and 127°C, efficiency: *[2022]*

(A) 25

(B) 33

(C) 50

(D) 75

Q19. Particle in circle r=5 cm, time period 0.2 s. Acceleration: *[2024]*

(A) 5 m/s²

(B) 25 m/s²

(C) 36 m/s²

(D) 50 m/s²

Q20. Two bodies 1 kg, 4 kg dropped from same height. Ratio of momenta before impact: *[2025]*

(A) 1:2

(B) 1:4

(C) 1:16

(D) 4:1

Section B — Numerical Value Questions

Q21. Series LCR, $R = 10\ \Omega$, $L = 2$ H, $C = 32\ \mu$F. Resonant frequency X Hz. Take $\pi = 3.14$. *[2024]*

Q22. SHM, $y = 5\sin(20t + 0.5)$ cm. Maximum velocity X m/s. *[2023]*

Q23. Ball dropped from height h, rebounds to 0.64h. Coefficient of restitution $0.x$. Find x. *[2025]*

Q24. Two satellites S_1, S_2, same orbit. Mass $S_1 = 4\times$ mass S_2. Ratio T_1/T_2. *[2022]*

Q25. Wire length L, resistance R bent into circle. Resistance between two points on diameter R/x. Find x. *[2024]*

Answer Key

Section A

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

Section B

21. 20	22. 1	23. 8	24. 1	25. 4