Pattern aligns with current JEE Main Paper 1: 90 questions across Physics, Chemistry, Mathematics (Section A: 20 MCQs; Section B: 10 Numerical Value Questions with internal choice—attempt any 5), total 300 marks.

Marking scheme

Section A (MCQs): +4 correct, −1 incorrect, 0 unattempted.

Section B (Numerical): +4 correct, −1 incorrect, 0 unattempted. Enter integer/decimal as indicated. Attempt any 5 per subject.

Time: 3 hours. Use g=10m/s² unless stated. Take c=3×10^8m/s, h=6.63×10^−34J·s, e=1.6×10^−19C, NA=6.02×10^23, R=8.314J·mol^−1·K^−1.

PHYSICS (Section A: 20 MCQs)

A block of mass 2kg on a rough horizontal surface (μk=0.2) is pulled by a 10N horizontal force. Acceleration is

A) 1m/s² B) 2m/s² C) 3m/s² D) zero

A projectile is fired with speed u at angle 45°. Maximum range on level ground is

A) u²/g B) u²/2g C) u²/√2g D) 2u²/g

A uniform disc (M,R) rotates with ω; its rotational kinetic energy equals

A) ½MR²ω² B) ¼MR²ω² C) ⅓MR²ω² D) MR²ω²

A satellite in circular orbit of radius r around Earth has total energy

A) −GMm/r B) −GMm/2r C) GMm/2r D) zero

A gas undergoes isothermal reversible expansion from V to 3V at temperature T (n moles). Work done is

A) nRT ln3 B) −nRT ln3 C) 3nRT D) −3nRT

For SHM x=0.05cos(20t) (SI), maximum speed is

A) 0.05m/s B) 1m/s C) 0.5m/s D) 20m/s

A string fixed at both ends of length 1m supports a standing wave with 3 nodes (including ends). The frequency is 150Hz; wave speed is

A) 50m/s B) 75m/s C) 100m/s D) 150m/s

Inside a conducting shell in electrostatic equilibrium, the electric field is

A) kQ/R^2 B) kQ/r^2 C) 0 D) depends on charge outside

Two capacitors C and 2C in series across V: energy stored in equivalent combination is

A) $\frac{1}{2}CV^2$ B) $\frac{1}{3}CV^2$ C) $\frac{1}{4}CV^2$ D) $(2/3)CV^2$

A wire is stretched to double its length (volume constant). Its resistance becomes

A) 2R B) 4R C) 8R D) R/2

A charge q moves with speed v perpendicular to uniform B. Radius of circular path is

A) qB/v B) mv/qB C) qv/B D) Bq/mv

In a series LCR circuit at resonance, the impedance and power factor are

A) $Z=R, \cos\phi=1$ B) $Z=X_L, \cos\phi=0$ C) $Z=X_C, \cos\phi=1$ D) $Z=X_L-X_C, \cos\phi=0$

Displacement current concept was introduced to satisfy

A) Energy conservation B) Charge continuity C) Momentum conservation D) Faraday's law

For a convex lens f=20cm, object at 30cm on principal axis. Image position is

A) 60cm B) 30cm C) −60cm D) −30cm

In YDSE, fringe width $\beta=\lambda D/d$. If λ doubles and d halves, β becomes

A) same B) 2β C) 4β D) 8β