20. (a) Explain relativistic generalization of Newton's laws.

Or

(b) Explain Hamiltonian formulation of relativistic mechanics.

SECTION D — (2 × 10 = 20 marks)

Answer ALL questions, choosing either (a) or (b).

21. (a) Deduce Hamilton–Jacobi partial differential equation. Discuss harmonic oscillator problem by Hamilton – Jacobi method.

Or

(b) Discuss the motion of a symmetrical top with one point fixed.

22. (a) Obtain the relations connecting the partition function and the various thermodynamical quantities such as energy E, Helmholtz free energy F, entropy S and specific heat.

Or

(b) State and explain Fermi–Dirac distribution law. Discuss Pauli's theory of paramagnetism.

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