

13. (a) State and explain the law of equipartition of energy.

Or

(b) Explain the relation of thermodynamical variables to the partition functions.

14. (a) Briefly compare the three statistics.

Or

(b) Give an account of Bose-Einstein condensation.

15. (a) Explain the Riemann tensor and Ricci tensor.

Or

(b) Give an account of the covariant Lagrangian formulation.

SECTION C — (5 × 8 = 40 marks)

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

16. (a) Derive the equations of canonical transformations.

Or

(b) Discuss the harmonic oscillator problem by the Hamilton-Jacobi method.

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17. (a) Derive the Euler's equations of motion.

Or

(b) Discuss the three types of motion of a symmetrical top.

18. (a) Give a detailed account of Doppler broadening of the spectral lines.

Or

(b) Obtain the expressions for the vibrational and rotational partition functions.

19. (a) Apply B.E. statistics to explain law of blackbody radiation.

Or

(b) Arrive at an expression for the paramagnetic susceptibility of a free electron gas.

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

Or

(b) Explain the covariant Hamiltonian formulation.

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