

12. (a) Explain moments and products of inertia.

Or

(b) What are normal modes and normal coordinates of vibration?

13. (a) State and explain Maxwell-Boltzmann distribution law.

Or

(b) Write a note on Doppler broadening of spectral lines.

14. (a) Applying B.E. statistics, derive Planck's radiation formula.

Or

(b) Compare M.B., B.E. and F.D. statistics.

15. (a) Write a note on the Riemann tensor.

Or

(b) State and explain Lorentz transformation equations.

SECTION C — (5 × 8 = 40 marks)

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

16. (a) Derive the equations of motion in Poisson brackets notation.

Or

(b) What are action and angle variables? Explain briefly any one of its applications.

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

Or

(b) Discuss the free vibrations of a linear triatomic molecule.

18. (a) Applying the law of equipartition of energy, obtain an expression for the mean energy of harmonic oscillator.

Or

(b) Derive expressions for the most probable, average and root mean square speeds.

19. (a) Discuss briefly Bose-Einstein condensation.

Or

(b) Derive Richardson-Dushman equation of thermionic emission.