Match the following :

11. Hamilton's principal function (a) K

12. Moment of inertia tensor (b) ϕ

13. Boltzmann constant (c) I

14. Work function of the metal (d) T^*

15. Relativistic kinetic energy (e) S.

Answer in 1 or 2 sentences :

16. Write down Hamilton–Jacobi equation for Hamilton's principal function.

17. Define Euler's angles.

18. State classical Maxwell–Boltzmann distribution law.

19. What is meant by Fermi energy?

20. Write down the relativistic relation for the variation of mass with velocity.

At $T > 0$, $E = E_{F_0}$

Thus Fermi energy E_F at $T > 0$ is that energy level in which 50% of the quantum states are occupied & 50% are empty.

SECTION B — (5 × 6 = 30 marks)

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

21. (a) Show that the transformation

$$P = q \cot p$$

$$Q = \log\left(\frac{\sin p}{q}\right)$$

is canonical.

Or

(b) Write a note on Hamilton's principal function.

22. (a) Deduce Euler's equations of motion of a rigid body.

Or

(b) Explain the terms normal co–ordinates and normal modes of vibration.

23. (a) State and explain the principle of equipartition of energy.

Or

(b) Establish Maxwell's law of distribution of velocities.