Match the following :

11.	Canonical transformation	(a)	Maxwell-Boltzmann distribution law
12.	Nutation	(b)	Minkowski's space
13.	Molecules of a gas	(c)	Symmetric top
14.	Neutrons	(d)	Space inversion
15.	Four dimensional	(e)	Fermi-Dirac distribution law

Answer in 1 or 2 sentences :

16. What are canonical transformations?

17. What is a sleeping top?

18. Define partition function.

19. Write down Richardson-Dushman equation of thermionic emission.

20. Write down Doppler's relativistic formula for light waves in vacuum.

SECTION B — (5 × 6 = 30 marks)

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

21. (a) Prove any two properties of Poisson bracket.

Or

(b) Find the solution to harmonic oscillator problem by Hamilton-Jacobi method.

22. (a) Explain briefly Euler's angles.

Or

(b) Explain the terms normal coordinates and normal modes of vibration.

23. (a) Obtain expressions for most probable speed, mean speed and root mean square speed from Maxwell-Boltzmann distribution law.

Or

(b) State and explain the principle of equipartition of energy.