

25. (a) Evaluate the number of energy states lying in the energy range  $\epsilon_i$  to  $\epsilon_i + d\epsilon_i$  using BE statistics.

Or

(b) Compare the three statistics.

SECTION C — (5 × 10 = 50 marks)

Answer ALL questions.

26. (a) Obtain equations of motion in Poisson bracket form.

Or

(b) Discuss harmonic oscillator problem by HJ method.

27. (a) Deduce an expression for rotational kinetic energy of the rigid body.

Or

(b) Derive expressions for moments and products of inertia of a rigid body. Discuss principal axes of transformation and secular equations.

28. (a) Derive normal frequencies and normal modes of a parallel pendula and discuss.

Or

(b) Show that, the eigen frequencies  $\omega_i^2$  are all real for small oscillations and they complete oscillations about the position of equilibrium for a given  $\omega_i^2$ .

29. (a) Evaluate the multipliers 'α' and 'β'.

Or

(b) Show that, if the partition function is 'z', then mean energy  $\bar{E} = -\frac{\partial}{\partial \beta}(\log z)$  where  $\beta = \frac{1}{kT}$ .

30. (a) Derive Planck's law from BE statistics.

Or

(b) Derive Richardson–Dushman equation.