2. Precession is rotation about

(a) x-axis (b) z'-axis

(c) space z-axis (d) line of nodes.

3. Partition function is given by

(a) $z = \sum_r g_r e^{-\beta E_r}$ (b) $z = \sum_r g_r e^{\beta E_r}$

(c) $z = \sum_r \frac{e^{-\beta E_r}}{g_r}$ (d) $z = \sum_r \frac{e^{\beta E_r}}{g_r}$.

4. Examples for a Boson are

(a) Protons (b) Neutrons

(c) Electrons (d) Photons.

5. Relativistic kinetic energy is given by

(a) $T^2 = p^2c^2 + m^2c^2$ (b) $T^2 = p^2c^2 + m^2c^4$

(c) $T^2 = p^2c^2 + m^4c^2$ (d) $T^2 = p^2c^2 + m^2c^3$.

Answer the following questions in 1 or 2 sentences :

6. Define Lagrange brackets.

7. What are Euler's angles?

8. State the properties of partition function.

9. What are Bosons and Fermions?

10. Explain the metric tensor.

SECTION B — (5 × 4 = 20 marks)

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

11. (a) Show that Poisson's bracket is invariant under canonical transformation.

Or

(b) Define action and angle variables.

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

Or

(b) What are normal co-ordinates and normal modes of vibration?

13. (a) Explain mean, root mean square and most probable velocities.

Or

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

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

Or

(b) Write a note on Bose–Einstein condensation.

15. (a) What is meant by Riemannian space?

Or

(b) Write a note on the relativistic generalisation of Newton's laws.