

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2026**(Regular/Improvement/Supplementary)****PHYSICS****GPHY6B11T: STATISTICAL PHYSICS, SOLID STATE PHYSICS, SPECTROSCOPY & PHOTONICS****Time: 2 Hours****Maximum Marks: 60****SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 marks)**

1. Compare classical and quantum statistical mechanics.
2. What are density of states?
3. Give two applications of Fermi Dirac statistics.
4. Define a blackbody.
5. What is a primitive cell?
6. What are Miller indices?
7. Explain Bragg's law.
8. What is quantization of energy?
9. Define resolving power.
10. What is a spectrum?
11. What is rotation spectra?
12. Explain Morse curve.

**SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)**

13. For the case in which five particles share 6 units of energy, calculate the probability to observe a particle with 2 units of energy for (a) distinguishable classical particles and (b) indistinguishable quantum particles with integral spin.
14. Find the coordination number and atomic packing fraction of simple cubic, body-centered cubic and face-centered cubic crystal structures.
15. Find the equation for moment of inertia of a rigid diatomic rotator in terms of reduced mass.
16. Distinguish between simple and anharmonic oscillators.
17. Obtain equation for Einstein coefficients. What is their significance?
18. Explain metastable states and population inversion.
19. Explain quantum theory of Raman effect.

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. Obtain the Maxwell Boltzmann energy distribution equation.
21. Explain in detail the seven crystal systems.

(1 × 10 = 10 Marks)