

QP CODE: 25047332



Reg No :
Name :

M.Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2025

Third Semester

M Sc PHYSICS (MATERIAL SCIENCE)

Core Course - PH020301 - STATISTICAL PHYSICS AND ASTROPHYSICS

2019 ADMISSION ONWARDS

51DA9703

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. What are the conditions for statistical equilibrium?
2. Define partition function. Write its expression.
3. Discuss fermi energy in terms of fermi dirac distribution.
4. What do mean by critical exponents?
5. What do you mean by lattice gas? Explain.
6. Write a short note on Aurora Borealis and Aurora australis.
7. What is bolometric correction ? Explain.
8. Explain proton-proton cycle.
9. Explain the two important sequences in the HR diagram.
10. Explain Magnetars and Gamma ray bursts.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Show that the matrix ρ_{lk} in the double average plays a role analogous to that of probability density.
12. Bring out the theory of white dwarfs.
13. Discuss density and energy fluctuations.
14. What is lambda-transition ? Why is it called so?
15. Explain Trigonometric parallax.





16. Find the dissociation temperature using saha's equation of thermal ionisation.
17. Explain Virial theorem for a mono atomic gas in the absence of an external pressure.
18. Explain the electron degeneracy in white dwarfs.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Derive Energy and pressure of ideal Bose-Einstein gas.
20. Give a detailed analysis of the equilibrium between a system and heat reservoir and obtain the thermodynamical relation in canonical ensemble.
21. Explain the Ecliptic and Galactic co ordinate system.
22. Discuss the formation of black holes. Explain its parameters.

(2×5=10 weightage)

