M.Sc DEGREE (CSS) SPECIAL REAPPEARANCE EXAMINATION, APRIL 2025

Third Semester

M.Sc PHYSICS(MATERIAL SCIENCE)

CORE - PH020301 - STATISTICAL PHYSICS AND ASTROPHYSICS

2019 ADMISSION ONWARDS

45ABA012

Time: 3 Hours   Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What do you mean by a priori probablity?

2. What is fermi energy? Write it's expression.

3. Why gas degeneracy in molecular hydrogen is small ?

4. Obain the energy fluctuations in cannonical ensemble.

5. What are scaling relations?

6. Explain the energy production in Sun.

7. Explain equinoctial points.

8. What do you mean by luminosity of a star?

9. What are the contributions of Hertzsprung towards H R diagram ?

10. Explain the formation of a neutron star.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Explain density matrix and obtain its equation of motion.

12. Bring out the theory of white dwarfs.

13. Discuss the energy fluctuations.

14. Discuss the properties of liquid helium II.Explain the necessary theory its peculiar behaviour

15. 1st magnitude star is 100 times brighter than the 6th magnitude star. Prove that The ratio of brightness of two stars whose magnitudes differ by unity is 2.512

16. Explain ionization temperature and excitation temperature.

17. Write the application of the Virial theorem to an isothermal gas sphere.

18. Explain the singularity and event Horizon in a black hole.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Show that for a diatomic molecule the partition function $z=z_t z_r z_v$.

20. Discuss the one dimensional Ising model State the advantages also.

21. Explain the sources of Thermonuclear energy gereration in stars.

22. Explain the pre main sequence of Stellar evolution.

(2×5=10 weightage)