

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2019 – 2020)

SUBJECT CODE : 19PH/PE/AP15

M.Sc., DEGREE EXAMINATION NOVEMBER 2019

PHYSICS

FIRST SEMESTER

COURSE : ELECTIVE
PAPER : ASTROPHYSICS
TIME : 3 HOURS

MAX. MARKS : 100

SECTION - A

ANSWER ALL QUESTIONS:

(10x3=30)

1. What are the coordinates of the Altazimuth system and state its demerits?
2. Show with a diagram the coordinates of the galactic system on the celestial sphere.
3. What is the significance of an HR diagram?
4. Distinguish between effective temperature and colour temperature of stars.
5. What are the different causes of stellar opacity?
6. Bring out the differences between the upper main sequence stars and lower main sequence stars in Schwarzschild's model of real stars.
7. Explain with a neat diagram the depletion of hydrogen in stars with convective core.
8. What is nuclear time scale?
9. Write down the thermonuclear reactions of a CN cycle inside a star.
10. Outline the study of helioseismology.

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5x5=25)

11. Describe the local equatorial system of coordinates for a star. Give the merits of the system.
12. Obtain the relation between the spectrophotometric gradient and the colour temperature of two stars.
13. Derive the fundamental equations of stellar structure.
14. Obtain the Schoenberg-Chandrasekhar limit for the isothermal core.
15. Outline the comprehensive theory of nucleosynthesis with specific reference to first generation stars and second generation stars.
16. Discuss the neutrino problem.
17. Explain the following i) Russel-Vogt theorem ii) Modified Kramer's law of opacity.

SECTION – C

ANSWER ANY THREE QUESTIONS:

(3x15=45)

18. Explain the trigonometric parallax and cluster parallax of a star.
19. What is a binary star? Explain in detail its classification.
20. Obtain the Emden's equation for polytropic index n and discuss its solution for $n=0, 1$ and 5 .
21. State and prove the virial theorem and apply it to an isothermal gas sphere.
22. Obtain an expression for the rate of reaction in stellar structure with reference CN cycle.
