

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2023 – 2024)

M.Sc., DEGREE EXAMINATION NOVEMBER 2023
PHYSICS
FIRST SEMESTER

COURSE : ELECTIVE
PAPER : ASTROPHYSICS
SUBJECT CODE : 23PH/PE/AP15
TIME : 3 HOURS

MAX. MARKS : 100

| Q. No. | SECTION A Answer ALL the questions: (10 x 3 marks = 30 marks) | CO | KL |
|--------|--|-----|----|
| 1. | Define galactic coordinate system. | CO1 | K1 |
| 2. | What is apparent and absolute magnitude? | CO1 | K1 |
| 3. | Mention the significance of HR diagram. | CO1 | K1 |
| 4. | Distinguish color temperature and effective temperature of stars. | CO2 | K2 |
| 5. | What are the different causes of stellar opacity? | CO2 | K2 |
| 6. | What is Schwarzschild radius of star? | CO2 | K2 |
| 7. | Write a note on main sequence star. | CO2 | K2 |
| 8. | What is nuclear time scale? | CO3 | K3 |
| 9. | What is stellar nucleosynthesis? | CO3 | K3 |
| 10. | Mention the importance of helioseismology. | CO3 | K3 |
| Q. No. | SECTION B (30 marks) | CO | KL |
| | PART A Answer any TWO questions: (2 x 5 = 10 marks) | | |
| 11. | Describe the ecliptic system of coordinates for a star. | CO3 | K3 |
| 12. | Derive the fundamental equation of stellar structure. | CO3 | K3 |
| 13. | Write a brief note on the effect of hydrogen depletion in stars. | CO3 | K3 |
| | PART B Answer any FOUR questions: (4 x 5 marks = 20 marks) | CO | KL |
| 14. | Explain the trigonometric parallax of a star. | CO4 | K4 |
| 15. | Obtain the stellar temperature of star from Maxwell law of distribution of velocities. | CO4 | K4 |
| 16. | State and explain Russel – Vogt theorem. | CO4 | K4 |
| 17. | Obtain the Schoenberg- Chandrasekhar limit of an isothermal core. | CO4 | K4 |
| 18. | Elucidate the comprehensive theory of nucleosynthesis. | CO4 | K4 |
| Q. No. | SECTION C Answer the following: (2 x 20 marks = 40 marks) | CO | KL |
| 19. | a) Explain with neat diagrams the method of determining the coordinates of star in the local equatorial system and universal equatorial system. (12 Mark) b) Explain the method of determining the distance of stellar objects by cluster parallax method. (8 Mark) | CO5 | K5 |

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| | OR | | |
| | c) Explain binary stars and its classification in detail. (10 Mark) d) Discuss the Eddington's standard model for the main sequence stars and obtain mass luminosity relation. (10 Mark) | CO5 | K5 |
| 20. | a) State and prove virial theorem and explain its application to an isothermal gas sphere. (12 Mark) b) Obtain an expression of Jean criterion for star formation. (8 Mark) | CO5 | K5 |
| | OR | | |
| | c) Obtain an expression for the rate of reaction in stellar structure with specific reference to CN cycle. (10 Mark) d) Write and explain pp cycle of reactions in detail. (10 Mark) | CO5 | K5 |
