



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

## M.Sc. DEGREE EXAMINATION – PHYSICS

SECOND SEMESTER – APRIL 2017

### Ph 2955 - ASTROPHYSICS

Date: 28-04-2017  
01:00-04:00

Dept. No.

Max. : 100 Marks

#### PART A

Answer ALL questions

(10x2 = 20 marks)

1. What is zero hour circle and right ascension angle?
2. Find the distance in parsec for  $\alpha$  Canis Majoris, given  $\pi'' = 0.375$  and  $m = -1.44$ .
3. Give the significance of HR diagram.
4. How is the radius of Sirius A and Sirius B determined?
5. Give the relation connecting the bolometric magnitude and effective temperature of star.
6. Give the equation of continuity for the stellar structure.
7. Explain the process of hydrogen burning for stars with convective core.
8. What is nuclear time scale?
9. Define the term helioseismology.
10. What are second generation stars?

#### PART B

Answer any FOUR questions (4 x 7.5 = 30 marks)

11. a) Explain how the distance of a star is determined by its absolute luminosity.  
b) Given the apparent and absolute magnitude of Sirius B,  $m = +8.6$ ,  $M = +11.4$ , determine its distance in parsecs and light years.
12. From Planck's law obtain the relative spectrophotometric gradient of two stars of temperatures  $T_1$  and  $T_2$  respectively.
13. Obtain the Emden's equation for polytropic index  $n$  and discuss its solution for  $n=0, 1$  and  $5$ .
14. Explain the effect of hydrogen depletion in stars near the main sequence.
15. Explain in detail the neutron capture process in nucleosynthesis.
16. How is the distance of stars determined by cluster parallax?

#### PART C

Answer any FOUR questions (4 x 12.5 = 50 marks)

17. a) Explain in detail the trigonometric parallax to determine the distance of stars. [6.5+6]  
b) Draw a neat diagram and explain the ecliptic coordinate system to locate a star.

18. What is a binary star? Explain in detail its classification.
19. Discuss the Eddington's standard model for the main sequence stars and obtain the mass luminosity relation.
20. Obtain the Schoenberg Chandrasekhar limit of an isothermal core from virial theorem.
21. Obtain the ratio  $\frac{\epsilon_{CN}}{\epsilon_{PP}}$  from the rates of thermonuclear reactions for CN cycle and pp chain.
22. Explain the different methods of determining the apparent luminosity of star.

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