LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - PHYSICS

SECOND SEMESTER – **APRIL 2013**

PH 2955/2953 - ASTROPHYSICS

Date : 04/05/2013
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART A

Answer all questions (10×2 = 20)

01. Show with a diagram the coordinates of the galactic system on the celestial sphere?
02. The star Betelgeuse has $\pi = 0".017$. What is its distance in light years?
03. What is the significance of an HR diagram?
04. Show graphically the relationship of mass vs luminosity for the main sequence stars.
05. Define various surface temperatures for stars.
06. State Kramer's law of opacity.
07. What is the basic principle of the Homologous model?
08. Sketch the Schwarzchild's model for main sequence stars.
09. Express Jean' s criterion for star formation.
10. What are Hayashi and Henyey tracks in the pre-main sequence evolution.

PART B

Answer any four (4x7.5 = 30)

11. Describe the Universal equatorial system of coordinates for a star. Give the merits of the system.
12. How is the observed magnitude of a star corrected for atmospheric extinction?
13. For a binary system show that $\tan \upsilon/2 = [(1+e)/(1-e)]^{1/2} \tan E/2$ where υ is the true anomaly and E is the eccentric anomaly.
14. Discuss in detail the sources of energy in stellar interior of all stars.
15. Discuss the neutrino problem.

PART C

Answer any four (4x12.5 =50)

16 a. Describe the ecliptic system of coordinates for a star. (6)
    b. Give an account of Spectroscopic classification and MK classification of main sequence stars.
17 a. Explain the different types of binary systems. (7.5)
    b. Explain the method of estimating the radii of Sirius B a white dwarf of 10 magnitude fainter than Siruis A of radius 2R in a binary system. (5)
18 a. Prove the virial theorem for a system of particles. (7)
    b. Using the virial theorem, obtain expression for the maximum pressure for an isothermal gas sphere. (5.5)
19 a. Using fundamental equations, show that $L \propto M^5$ in Eddington's standard model for main sequence stars. (8.5)
    b. Discuss convection in the stellar interior. (4)
20. Write notes on any **Two** of the following.
    i) Cluster parallax and Secular parallax
    ii) Peculiar stellar spectra
    iii) Effect of hydrogen depletion in stars.

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