LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **PHYSICS**

SECOND SEMESTER – **APRIL 2014**

PH 2955/2953 - ASTROPHYSICS

Date : 05/04/2014 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

PART A

Answer **ALL** the questions (10 × 2 = 20)

1) Define the Fundamental Great Circle, the Fundamental Secondary Circle and the Poles of the Universal equatorial system.
2) State and explain the relation between the magnitudes of two stars with their brightness/luminosities.
3) State and explain Stefan-Boltzmann law of black body radiation.
4) Distinguish between the *effective temperature* (T_e) and *colour temperature* (T_c).
5) Explain briefly the different causes of stellar opacity.
6) What is homologous model of the main sequence stars?
7) An isothermal gas sphere of uniform density has both the upper and the lower limit of radii- Briefly explain
8) Explain briefly the Jean's criterion for self-gravitation of an isothermal cloud .
9) What are the approximate composition of H, He and heavier element in the main sequence stars both by numbers and by weights?
10) Write down the thermonuclear reactions of a CN cycle inside a star

PART – B

Answer any **FOUR** questions (4 × 7.5 = 30)

11) Explain the method of determining the astronomical unit (a.u) by the aberration of starlight.
12) Obtain the relation between the spectrophotometric gradient and the colour temperature of two stars.
13) Explain the Russel- Voigt theorem based on the equations of stellar structure.
14) Obtain the Jean's criterion for self gravitation of an isothermal gas cloud and discuss its importance
15) (a)Write down the CN cycle of reactions and explain which particular reaction decides the rate of reaction.
    (b) Outline the process of nuclear synthesis.

PART – C

Answer any **FOUR** questions (4 × 12.5 = 50)

16) Explain with neat diagrams the method of determining the coordinates of a star in (i) the Local equatorial system and
    (ii) the Universal equatorial system.
17) State and explain all the laws of the black body radiation and explain the terms the effective temperature, the colour temperature and the brightness temperature
18) Obtain the Emden's equation for polytropic index n and discuss its solution for n= 0,1 and 5.
19) State and prove virial theorem and explain its application to isothermal gas sphere.
20) Obtain an expression for the rate of reaction in stellar structure with specific reference CN cycle.