

1 (Sem-6/FYUGP) PHY 63 MJ

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PHYSICS

(Major)

Paper : PHY0600304

(Astronomy and Astrophysics)

Full Marks : 60

Time : 2½ hours

*The figures in the margin indicate full marks
for the questions.*

1. Answer the following : 1×8=8

- (a) What do you mean by Stellar parallex?
- (b) Write the Chandrasekhar limit for white dwarf mass.
- (c) Convert 1 parsec into light year.
- (d) How does the life time of a star on the main sequence vary with mass?
- (e) What is Aladin?
- (f) Place the following spectral types in order of decreasing temperatures :
A, B, F, K, G, M, O
- (g) What are Lenticular Galaxies?
- (h) List the terrestrial planets.

2. Answer any six of the following : $2 \times 6 = 12$

- (a) The distance of a star is 100 pc and its apparent magnitude is 6. Find its absolute magnitude.
- (b) Draw a schematic ray diagram of a Newtonian reflecting telescope.
- (c) Calculate the resolving power of a telescope having a diameter 2.34 m, when a radiation of wavelength 5500 Å is detected.
- (d) Write the differences between asteroids and meteoroids.
- (e) What is Kuiper belt? What is its shape?
- (f) Write two major differences between elliptical galaxies and spiral galaxies.
- (g) What are cosmic voids and how do they form?
- (h) State the cosmological principle and its significance in cosmology.
- (i) What is H-R diagram? Sketch H-R diagram showing all groups of stars.
- (j) What is neutron star? What is its mass?

3. Answer any four of the following : $5 \times 4 = 20$

- (a) Define apparent and absolute magnitudes of a star. Deduce the relation between them. $1 + 1 + 3 = 5$

- (b) What is light gathering power of a telescope? Compare the light gathering power of the 8 m telescope and 0.8 m telescope. $2 + 3 = 5$
- (c) Using Stefan-Boltzmann law of radiation, obtain the ratio of radii of two stars in terms of their surface temperatures and absolute magnitudes.
- (d) Explain the significance of Stellar mass in respect of evolution of stars. Estimate the life time of stars on the main sequence. $2 + 3 = 5$
- (e) Explain how the objects in the solar system are classified.
- (f) What is Milky way? Mention its different components. Draw a schematic diagram of the Milky way showing all the components. $1 + 2 + 2 = 5$
- (g) State Hubble's law and explain how Hubble's constant indicates the age of the universe. $2 + 3 = 5$
- (h) What are Cepheid Variable Stars? Explain how the Cepheid Variable Stars can be used to find distances of nearby stars. $1 + 4 = 5$

4. Answer any two of the following : $10 \times 2 = 20$

- (a) (i) Explain how the distance of a nearby star can be determined using trigonometric parallax method. 5

- (ii) Distinguish between reflecting and refracting telescope. What are the advantages of reflecting telescope over the refracting telescope? $3+2=5$
- (b) (i) What do you understand by hydrostatic equilibrium in a star? Derive the equation of hydrostatic equilibrium for a star. $2+4=6$
- (ii) Calculate the ratio of fluxes received from two stars whose apparent magnitudes differ by 2.5. 4
- (c) (i) What are the three principal layers of Sun's atmosphere? Explain the layers briefly. $2+6=8$
- (ii) What is Asteroid Belt? Where is it located? $1+1=2$
- (d) (i) Draw the Hubble's tuning fork diagram and describe the classification scheme of the galaxies. $3+4=7$
- (ii) Describe the Kant-Laplace nebular hypothesis for the formation of solar system. 3
- (e) Write short notes on any *two* of the following : $5 \times 2 = 10$
- (i) Oort cloud
- (ii) Cosmic Microwave Background Radiation (CMBR)
- (iii) PP and CNO cycle
- (iv) Star clusters
- (v) Virial theorem

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