

(b) What is an asteroid? 1+4=5

10. (a) Discuss different hypothesis that describe the origin and formation of the sun and other member of the solar system. 10

(b) What is a comet? How comets are classified? 4

PG (CBCS) ODD SEMESTER EXAMINATION, 2022

PHYSICS

3rd Semester

Course No. : PHYCC - 304A

(Astrophysics - I)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. (a) What is parsec? How is it related to light year and kilometre? 2
- (b) What are apparent and absolute magnitudes of a star? Derive the relation between them. 2+2+3=7
- (c) Define color index. 2
- (d) The absolute magnitude of Antares is -5.28 and its distance is 554 light years. Calculate the apparent magnitude. 3
2. (a) Discuss in brief Equatorial co-ordinate system. 5

(2)

- (b) What is the Horizontal co-ordinate system? Why this co-ordinate system was rejected by Astronomers? 3+2=5
- (c) The RA and DEC of a star are +12h : 15 m : 30s and -08d : 30m : 30s. Determine the hour angle of the star on December 08, 2023 at midnight. Also, calculate the rising and setting time of the star on that day. The longitude of the place is 105 degree East. 4

UNIT - II

3. (a) What are different optical configuration of a reflecting astronomical telescope? Discuss with full diagram showing how rays from a star at infinity are forming image on the focal plane. 6+5=11
- (b) What are the angular resolutions and plate scales of an astronomical telescope? 3
4. (a) Discuss the working principle of a Charge Coupled Detector (CCD). 10
- (b) Calculate the diffraction limit of resolution of Devasthal Telescope of Nainital of 3.6 metre diameter for $\lambda = 0.55 \text{ um}$. 4

UNIT - III

5. (a) Discuss in brief Jeans criterion for the formation of stars and obtain an expression for Jeans mass and Jeans length. 10

(3)

- (b) How is energy generated in stars? 4
6. (a) What is binary star? Discuss the classification scheme for binary stars with example. 9
- (b) Explain how-mass-luminosity relation can be used to compute the mass of stars. 3
- (c) What is a variable star? What are different classes of variable stars? 1+1=2

UNIT - IV

7. (a) Explain the evolutionary stages of the following compact objects :
(i) Black hole 4+4+4=12
(ii) White dwarf and (iii) Neutron star
- (b) What is pulsar? 2
8. (a) Explain Hertzsprung-Russell (HR) diagram. Draw a neat diagram showing the positions of (i) Sun, (ii) Polaris, and (iii) Sirius B 8+2=10
- (b) Write down Saha's ionization equation and discuss it. 4

UNIT - V

9. (a) What are sunspots? Discuss Babcock's model of the Sun's magnetic cycle. 2+7=9

(Turn Over)