PG/IIIS/PHS/304/23
(CBCS)

M. Sc. 3rd Semester Examination, 2023

PHYSICS

(INTRODUCTORY ASTROPHYSICS)

PAPER –PHS-304 (CBCS)

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP–A

Answer any **four** of the following questions : 2×4

1. What do you mean by geocentric latitude and geographic latitude ? 2

2. Why can you see a corona during total solar eclipses? 2

3. What is a coronal mass ejection (CME)? 2

4. What do you mean by "fuel" of a star? 2

5. Red giant is a dying star. Do you support it? Justify. 2

6. Calculate the peak wavelength of Sun radiation considering the temperature of the Sun is 5600K. 2

GROUP–B

Answer any **four** of the following questions : 4×4

7. Calculate the velocity of a standing person on our earth. 4

8. Write a short note on the summer and winter constellations in the night sky. 4

9. If the sun is located at the centre of an imaginary sphere of radius $1.5 \times 10^{11}\ m$, calculate the energy received per second by the inner surface of the sphere. Given, the solar constant = $1.36\ kW/m^2$. 4

10. Describe the H-R diagram of with all four axes and show the position of Sun like star, Dwarf star and Giant star. 4

11. What do you mean by star cataloguing? Explain with one example. 4

12. If a star has same mass, same temperatur but double diameter of SUN and another star has same mass, same diameter but double temperature of Sun then which one will be more luminous than Sun? What will be the ratio of luminosity of those two stars? 4

GROUP–C

Answer any **two** of the following questions : 8×2

13. (*a*) Write a short note on the total solar eclipse and give representative figure.

(*b*) Describe how the stars appear to change their positions from night to night and from month to month. 3 + 5

14. (*a*) What are fast and slow solar-winds?

(*b*) Write briefly the nuclear fusion process in our sun.

(*c*) Calculate the energy released in the fusion reaction : ${}_1^2H + {}_1^3H \rightarrow {}_2^4He + {}_0^1n$. Given, mass of ${}_1^2H, {}_1^3H, {}_2^4He$ and ${}_0^1n$ are respectively 2.014102 *u*, 3.016050 *u*, 4.002603 *u* and 1.008665 *u*. 2+3+3

15. (*a*) Explain the evolution of Sun-like star.

(*b*) If the star at the beginning was fifty times higher than the solar mass then what will be the changes in the evolution of that star? 5 + 3

16. Write short note on *any two* : 4 + 4

(*i*) Black hole

(*ii*) Binary Star

(*iii*) Optical and X-ray Astronomy

(*iv*) Big Bang.

[Internal Assessment – 10 Marks]