D 140217 **(Pages : 2)** **Name.....**

Reg. No.....

SIXTH SEMESTER (CBCSS—U.G.) DEGREE EXAMINATION
APRIL 2026

Physics/Applied Physics

PHY6B13/APH6B13—RELATIVISTIC MECHANICS AND ASTROPHYSICS

(2020 Admission onwards)

Time : Two Hours Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

Answer **all** *questions in two* **or** *three sentences, each correct answer carries a maximum of* 2 *marks.*

1. State the postulates of special theory of relativity.
2. Distinguish between inertial and non-inertial frame of reference.
3. Distinguish between time like and space like intervals.
4. Discuss the outcome of Michelson-Morley experiment.
5. State the principle of equivalence in general theory of relativity.
6. What are neutron stars ?
7. State the Cosmological principle.
8. What is the significance of Chandrasekhar limit ?
9. Describe gravitational lensing.
10. State Hubble's law.
11. Define gravitational redshift.
12. What are galactic clusters ?

(Ceiling - 20)

Turn over

Section B (Paragraph/Problem Type)

Answer **all** *questions in a paragraph of about* **half a page** *to* **one page**, *each correct answer carries a maximum of* 5 *marks.*

13. A rod of length L_0 moves with speed v along the horizontal direction. The rod makes an angle θ_0 with respect to the x-axis.

    (a) Determine the length of the rod as measured by a stationary observer.

    (b) Determine the angle θ the rod makes with the x-axis.

14. Derive the law of addition of velocities using Lorentz transformation equation.

15. Write a short note about Big Bang theory of the universe.

16. Sirius is at a distance of 2.63pc and has an apparent magnitude of-1.44. Calculate its absolute magnitude.

17. Canis Majoris has a temperature of 9200K. What is the peak wavelength of light emitted by it ? Which region of spectrum it belongs ?

18. Discuss stellar parallax. What is its limitation ? Write is the relationship between the distance of a star and its parallax

19. Briefly describe : (a) Globular clusters ; and (b) Planetary nebulae.

(Ceiling - 30)

Section C (Essay Type)

Essays - Answer in about ***two pages****, any* ***one*** *question.*
The question carries 10 *marks.*

20. Describe Michelson-Morley experiment and explain the results

21. Describe the various mechanisms possible in the death of a star.

(1 × 10 = 10 marks)