19U609

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Name: ....

Reg.No: ....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022
(CBCSS - UG)
CC19U PHY6 B13 - RELATIVISTIC MECHANICS AND ASTROPHYSICS
(Physics - Core Course)
(2019 Admission - Regular)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. What was the aim of Michelson-Morley experiment?

2. What is meant by time-like interval? Explain with an example.

3. Give two practical examples of time dilation.

4. Give the expressions for relativistic energy and momentum. How is the energy and momentum is related in relativistic physics?

5. What is weak equivalence principle?

6. Define a black hole.

7. Explain what is meant by magnitude of stars.

8. What is the trend in the stellar diameters vs. temperature for main sequence stars?

9. Name the three origins of triggering star formation.

10. Describe the Core of the Sun.

11. What are cephied variable stars?

12. What is photo-disintegration process?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. Obtain the Galilean transformation equations for position, velocity and acceleration.

14. Derive an expression for the length of an object moving with a velocity v (in a direction parallel to its length) wr.t. in the lab frame.

15. Using relativistic velocity transformation law, show that the photon's velocity in vacuum is c in all inertial frames of reference.

16. How is radiation from pulsars used to find an upper limit for photon's mass?

17. Write a note on anti-matter.

18. The parallax of our nearest star Proxima Centauri is 0.785 ′ . Find its distance in parsecs, light years, astronomical units and kilometres.

19. Explain how Chandrasekhar limit affect end stages of different stars.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Explain how red giant stars are formed. Describe the post main sequence evolutionary track of stars with different masses, with the help of an H-R diagram.

21. Describe active galactic nuclei and Quasars. Explain gravitational lensing with examples.

(1 × 10 = 10 Marks)

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