

21U609

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Name:

Reg.No:

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U PHY6 B13 / CC20U PHY6 B13 - RELATIVISTIC MECHANICS AND ASTROPHYSICS

(Physics - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Give the equations of Lorentz transformation.
2. What is meant by simultaneity? How does the status of simultaneity change in relativistic and non-relativistic physics?
3. What is Lorentz length contraction?
4. What is Doppler effect? Explain with an example.
5. Write Einstein's field equation.
6. Define a black hole.
7. Is it correct to say that a big star is always luminous than smaller star? Explain why or why not.
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. Distinguish between galactic and globular clusters.
11. Name different types of variable stars.
12. What is an AGB star?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. What are the main postulates of special relativity?
14. What is muon decay? Explain how the muon decay is relevant as an illustration for time dilation.
15. What is the energy of a photon whose momentum is the same as that of an electron whose kinetic energy is 12 MeV?

16. Calculate the energy and momentum of a photon with a frequency of (5×10^{14}) Hz.
17. How did we come to know that the Universe is expanding?
18. Two stars, α Canis Majoris and α Ceti, have a temperature of 9200 K and 1900 K, respectively. What are their peak wavelengths?
19. Describe binary star systems and their features. Explain how masses of stars can be determined?

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Discuss the internal structure of the Sun and describe how energy is transported from core to the surface.
21. What are galaxies? Classify different type of galaxies. Describe the "structure of spiral galaxy. Discuss the factors, which affect the observation of galaxies.

(1 × 10 = 10 Marks)
