Galaxies and Particle Astrophysics

Course Outcome:
1. Understand the collapse of stars and the formation of black holes, including the concepts of singularities, trapped surfaces, and event horizons.
2. Analyze the characteristics and properties of different types of black holes such as Schwarzschild and Kerr black holes, including their metrics and unique features.
3. Examine the structure and classification of white dwarfs, including the Chandrasekhar mass and relativistic instability, as well as the equation of state below the neutron drip density.
4. Evaluate the equations of state for neutron stars, including the nuclear EoS for dense neutron matter, and analyze the structure of massive neutron stars.
5. Explain the concepts of dark energy stars, black hole accretion, and accretion disk properties.
6. Discuss the interstellar medium and its role in star formation, including the formation of protostars, pre-main sequence evolution, and the initial mass function.
7. Demonstrate an understanding of the Periastron shift and Shapiro time delay in a binary system involving neutron stars.
8. Interpret the Conformal Structure of Infinity through the Penrose Diagram in the context of black holes and compact objects.
9. Enhance problem-solving skills through the application of concepts related to galaxies and particle astrophysics, specifically focusing on black holes, white dwarfs, neutron stars, and interstellar medium.
10. Evaluate and analyze observational data and theoretical models related to compact X-ray sources, radio pulsars, supermassive black holes, and gamma-ray bursters in the context of galaxies and particle astrophysics.