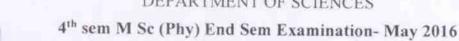
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Manipal University, Manipal DEPARTMENT OF SCIENCES





PHY 704 - Relativity and Astrophysics

Time: 3hour Max. Marks: 50

Answer any FIVE full questions

- A) Obtain an expression for the relativistic kinetic energy of a particle. Show that it reduces to classical expression for low speeds.

 B) Obtain an expression for the relativistic Doppler effect. How it is different from classical Doppler effect for sound waves?

 Smarks
- A) Two motor cyclists are racing at relativistic speeds along perpendicular directions with velocities of 0.75c and 0.90c with respect to a stationary observer. Calculate their relative velocity.
 - B) Write a note on Tensors.

5 marks

- A) Describe Ötvos experiment and explain the experimental outcome.
 5 marks
 - B) Explain gravitational red shift.

5 marks

- A) Deduce an expression for Schwarzschild line element and hence arrive at its solution.

 5 marks
 - B) What is a geodesic? Deduce the equation for the same.

5 marks

5. A) Explain the statistical parallax method of determining the distance of group of stars.

6 marks

- B) What is a parsec? Obtain its value in terms of meter and light year. Given: Mean Sun-Earth distance=1.49597871 x 10¹¹ m. 4 marks
- A) Give an account of (mathematical details are not necessary) pre-main sequence evolution of stars.

 6 marks
 - B) Calculate the time taken by the light to travel to Earth from the nearest star Proxima Centauri which subtends a parallax angle of 0.785". Given: Mean Sun-Earth distance = 1.496 x 10¹¹ m. 4 marks.
