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Manipal University, Manipal DEPARTMENT OF SCIENCES

4th sem M Sc (Phy) Make up Examination- 28 June 2016

PHY 704 - Relativity and Astrophysics



Time: 3hour

Max. Marks: 50

Answer any FIVE full questions

- A) Deduce Lorentz velocity transformation equations S' → S, and hence prove thati) for small speeds the transformation reduces to Galilean transformation equation and ii) Velocity of light is same for both the observers.
 - B) What is length contraction? Obtain an expression for the same. 4 marks
- A) An Astronaut takes a trip to Sirius, which is at a distance of 8 ly from the earth. The astronaut measures the time of the one way journey to be 6 years. If the space ship moves at a constant speed of 0.8c, how can the 8 ly distance be reconciled with the 6 year trip time measured by the astronaut? What is the time interval observed by the ground based observer?

B) What are covariant and	contra-variant vectors?	4 marks
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- 3. A) Show that $ds^2 = dx^2 + dy^2 + dz^2 c^2 dt^2$ is an invariant quantity. 4 marks
 - B) Estimate the precession of Planet Mercury's orbit. 6 marks
- 4. A) Assuming Schwarzschild solution discuss the apparent singularity at r=2m. 4 marks
 - B) Explain Pound and Rebka experiment and discuss its outcome. 6 marks
- 5. Give a brief account of post main sequence stellar evolution. **10 marks**
- 6. A) Write a note on bolometric magnitude and color index of a star. **5 marks**
 - B) Write a note on spectral classification of stars. 5 marks
