Dr. TM

Reg. No.									

प्रज्ञानं ब्रह्म

Manipal
INSPIRED BY LIFE

MANIPAL UNIVERSITY
Manipal Institute of Technology, Manipal
2 nd sem M Tech end sem Examination- May 2016
Relativity and Astro Physics- PHY 510 (open elective)

Time : 3 hours **Max. Marks : 50**

Answer any **FIVE** full questions

1. A) Deduce Lorentz velocity transformation equations $S' \rightarrow S$, and hence prove that-
   i) for small speeds the transformation reduces to Galilean transformation equation and
   ii) Velocity of light is same for both the observers. **5 marks**

   B) Obtain an expression for the relativistic kinetic energy of the particle. Show that it reduces to classical expression for low speeds. **5 marks**

2. 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? **5 marks**

   B) Write a note on tensors. **5 marks**

3. A) Describe Ötvos experiment and explain the experimental outcome. **5 marks**

   B) Deduce an expression for Schwarzschild line element and hence arrive at its solution. **5 marks**

4. A) Estimate the precession of Planet Mercury's orbit. **6 marks**

   B) Write a note on HR diagram. **4 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) What is a geodesic? Deduce an equation for the same. **5 marks**

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