Rounding (I) Section - D. BSc (I) Test → 3.

Special- theory of Relativity →.

Q1 Establish the Relation $E^2 = p^2c^2 + m_0^2c^4$, whose the symbols have their usual meanings.

Q2. Prove the law of Relativistic addition of velocities in inertial frames, Hence Prove that no Particle can move with a velocity greater than that of light.

Q3. Calculate the velocity of an electron accelerated to a Potential of 1ev.

Q4. A Particle in a Stationary frame 'S' lies in the x-y Plane and has a velocity 0.8C inclined at 60° to the x-axis, what will be the velocity of the Particle as observed by a Person in a frame 'S' moving Relative to 'S' with a velocity '0.8C'.

Q5. A Rod is moving Parallel to its length with a velocity of 0.6C Relative to the laboratory, the length measure in Laboratory is '1 mt', what is the Proper length?.

Q6. write three explanations were given to account for limitation of Michelson- Morley Experiment.

Q7. Prove that $\left(p^2 - \frac{E^2}{c^2}\right)$ is invariant in Lorentz Transformation

HOME ASSIGNMENT

SECTION - D [CHAPTER - 3]

SPECIAL - THEORY OF RELATIVITY

- Q1 :- If u and u' are velocities of particle in frames S and S', prove that

$$1 - \frac{u^2}{c^2} = \frac{\left(1 - \frac{v^2}{c^2}\right)\left(1 - \frac{u^2}{c^2}\right)^2}{\left(1 - \frac{v}{c^2}u_x\right)}$$

- Q2. Prove that rest mass of a particle is given by

$$m_0 = \frac{p^2c^2 - T^2}{2Tc^2}$$

- Q3 Calculate the percentage contraction in a rod moving with velocity $0.9c$ in a direction inclined at $45°$ to its own length.
- Q4 At what speed is particle moving, if its mass is equal to four times its rest mass?
- Q5. A physicist observes a radioactive atom moving with a speed of $0.5c$. The atom then emits a β-particle which has a velocity $0.9c$ relative to the atom in direction of its motion. Calculate the velocity of β-particle as observed by physicist.
- Q6. Briefly state the significance of Michelson - Morley experiment.
- Q7 A rectangular lamina of sides 10cm and 20cm moves with a velocity $0.5c$ relative to an inertial observer along the longer side. What will be its dimensions when measured by a fixed observer?