(ii) Questions   : 9   Sub. Code : | 3 | 7 | 1 | 9 |

                               Exam. Code : | 0 | 4 | 7 | 4 |

M.Sc. Physics 3rd Semester

(2122)

CLASSICAL ELECTRODYNAMICS–II

Paper : PHY–8034

Time Allowed : Three Hours]   **[Maximum Marks : 60**

Note :— Answer **five** questions in all, selecting **one** question each from Units I-IV and the compulsory question from Unit V.

UNIT—I

1. (a) Obtain the expression for threshold energy required for the reaction $m_1 + m_2 \rightarrow m_3 + m_4 + m_5$, using energy-momentum relation, to go through.   6

   (b) What is time dilation ? What is length contraction ?   6

2. (a) Write a short note on Lorentz transformations.   6

   (b) Obtain the expression for minimum kinetic energy of m_2 in the decay $M \rightarrow m_1 + m_2$, using energy-momentum relation, for the decay to occur.   6

UNIT—II

3. (a) Describe the non-relativistic motion of a charged particle in an uniform constant electric field.   6

   (b) Explain the terms :
      (i) Gradient Drift
      (ii) Curvature Drift.   6

4. (a) Describe the relativistic motion of a charged particle in constant magnetic field.   6

   (b) What is a magnetic mirror ? State its application.   6

UNIT—III

5. (a) Starting from four Maxwell equations, obtain the wave equation for $\vec{A}$. 6

   (b) Write a note on covariant formulation of vacuum electrodynamics. 6

6. (a) Express electromagnetic field tensor $F_{\mu v}$ in tabular form, in terms of electric and magnetic field components. 6

   (b) Show that a field that a purely electric field in one frame appears both as an electric and a magnetic field to an observer moving with respect to the first. 6

UNIT—IV

7. (a) Describe radiation from a charged particle in a cyclotron. 6

   (b) Explain Thomson scattering. 6

8. (a) What are Lienard-Wiechert potentials ? Obtain the expression for retarded scalar potential. 6

   (b) Explain Rayleigh scattering. 6

UNIT—V

9. (a) State the two postulates of STR. 2

   (b) Show that four velocity vector is perpendicular to four acceleration vector. 2

   (c) Can a charged particle moving with uniform velocity radiate ? Yes or no ? Explain. 2

   (d) Explain the term Bremsstrahlung. 2

   (e) What are the two invariants that can be constructed out of $F_{\mu v}$? 2

   (f) What is radiation reaction ? 2