Syllabus for Quantum Field Theory
Under CBCS framework for M.Sc (Physics) students

1. Introduction :
(a) Relativistic Wave equations
(b) Lagrangian formulation of Particle Mechanics
(c) Noether's theorem for relativistic fields

2. Field Quantization :
(a) Scalar Field
(b) Dirac field
(c) Electromagnetic field

3. Perturbation Theory :
(a) Scattering Matrix – In and Out states
(b) Reduction Formalism
(c) Wick's theorem
(d) Feynman Diagrams in Momentum space,
Cross sections and application to scattering

4. Quantum Electrodynamics (QED):
(a) gauge theories, gauge invariance and $U(1)$ symmetry, Covariant derivatives,
(b) elementary processes in QED.

5. Concepts of renormalisation in QED:
(a) divergences in Feynman Diagrams and power counting,
(b) basic one-loop calculations.

Few suggested Books:

1) Quantum Field Theory by Lewis H. Ryder (Author),
Cambridge University Press
2) An Introduction to Quantum Field Theory by M. E. Peskin and D. V. Schroeder,
(Authors) CRC Press, Taylor & Francis Group
3) A First Book of Quantum Field Theory by Amitabha Lahiri and Palash B. Pal (Authors),
Alpha Science International Ltd. Oxford