Course 23: Particle Physics
Course code: MSCPH 558 Credit: 3

Unit-1: Elementary Particles
History of elementary particles, Classification of elementary particles, Fundamental interactions, Resonances, Lepton and Baryon number; Isospin, Strangeness, Hypercharge, Gell-Mann Nishijima relations, Symmetries and conservation laws, Parity, Time reversal and charge conjugation, Parity violation

Unit-2: Quark models
CP violation in mesons, CPT invariance, Quantum numbers, mesons and Yukawa's hypothesis, pions, Quark model, coloured quarks and gluons.

Unit 3: Unitary Symmetries and Application in the Physics of Elementary Particles
Basics of unitary groups, fundamental representation of SU(2), SU(3) diagonal generators and weights, generators of SU(2) and U(2), weight diagram of fundamental representation of SU(2), generators of SU(3) and U(3), Weight of first fundamental representation of SU(3), shift operators, I, U, V spins, complete weight diagram for the (1 0), (0 1), (3, 0), (1 1) and (2 1) representations of SU(3), Gell Mann Okubo Mass formula.

Unit 4: Method of Young Tableaux and its Applications
Young Tableaux and unitary symmetry, standard arrangements of young tableaux, Dimensionality of the representations of SU(N), Multiplets of SU(N-1), subgroup of SU(N), Baryon multiplets in different representations, general rule and its application for reducing kronecker product of two representations, kronecker product of three particle state vectors.

Unit – 5: Nuclear and Particle Detectors
Basic principle of particle detectors, Ionization chamber, Proportional detector, Geiger-Muller detector, Scintillation detector and gamma-ray spectrometer, Semiconductor detector, Nuclear emulsion technique, Cloud chamber, Bubble chamber.

Book Recommended:
D. H. Perkins: Introduction to High Energy Physics
S. N. Ghoshal: Atomic and Nuclear Physics
D. Griffiths : Introduction of Elementary Particles
DB Lichtenberg : Unitary Symmetry and Elementary Particles
Hughes: Elementary Particles
Blatt and Weiskopff : Theoretical Nuclear Physics
FE Close: Quarks and Patrons
T.P.Cheng and G.LF Li : Gauge Field Theory: