MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Odd Semester/Even Semester)
Session: (2024-2025)

Name of the Teacher/s: Dr. Swati Khatta
Department: Physics
Class: B.Sc. III (NM &Voc)
Subject: NUCLEAR AND PARTICLE PHYSICS (Paper C)
Section (s) Non-Medical and Computer Applications

S.No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
Odd semester				
1.	15/07/2024	31/08/2024	General properties of Nuclei : Constituents of nucleus and their intrinsic properties, Quantitative facts about nuclear size, mass, density, binding energy and its variation with mass number, Wave mechanical properties of nucleus, angular momentum, parity; magnetic moment and electric moments of the nucleus.	i) Lecture method. ii) Group discussion. iii) Notes. iv) Numerical Problems. v) Class test. vi) Assignments.
2.	01/09/2024	30/09/2024	Properties of nuclear forces and saturation, meson theory of nuclear forces Nuclear Models: Liquid drop model, semi-empirical mass formula, most stable isobar. Evidence for nuclear shell structure, Nuclear shell model, concept of mean field. Nuclear Reactions: Types, Concept of compound and direct (pickup and stripping) reactions, Reaction differential and integral cross section, units, Conservation laws and kinematics, Q-value equation.	
3.	01/10/2024	31/10/20 24	Coulomb (Rutherford) scattering cross section and distance of nearest approach. Energy classification of neutrons, Nuclear fission in reactors, Reactor facilities available in India, Nuclear fusion in stars, Radioactive decay, Units of radioactivity (Ci and Bq), Successive disintegration, Natural radioactivity, Radioactive series, Carbon dating. Alpha decay, energetic, alpha spectrum, Gamow's theory of alpha decay, Geiger-Nuttal rule.	
4.	01/11/2024	13/11/2024	Beta decay, Qualitative discussion of beta spectrum, Evidence of existence of Neutrino, Conservation of nuclear energy in Beta minus, Beta plus and Electron capture decays. Gamma-ray emission, selection rules, Internal conversion.	

Even Semester				
1.	10/01/2025	28/02/2025	Interaction of nuclear radiation with matter: Energy loss due to ionization (Bethe Bloch formula), Range and energy straggling, Energy loss of electrons and positrons, radiation loss by fast electrons, Bremsstrahlung, electron-positron annihilation, production of Cerenkov radiation, Gamma-ray interaction with matter, photoelectric effect, Compton scattering, pair production (qualitative description).	i) Lecture method. ii) Group discussion. iii) Notes. iv) Numerical Problems. v) Class test. vi) Assignments.
2.	01/03/2025	31/03/2025	Detectors for nuclear radiation: Gas-filled detectors, Ionization chamber, proportional counter, G.M. counter, Scintillation detector and Photomultiplier tube, Brief account of Semiconductor detectors, Particle Physics : Particle interactions : basic features and their exchange particles, Classification of elementary particles, properties, decay modes of leptons and mesons, Antiparticles, charge conjugation Symmetries and Conservation principles, Lepton number, baryon number, Isospin, Hypercharge, Strangeness and charm, Gell-mann Nishijima formula	
3.	01/04/2025	26/04/2025	Concept of the quark model, color quantum number and gluons. Origin and composition of Cosmic rays, Secondary cosmic rays, Effect of magnetic field of earth, Van Allen belts, Particle accelerators: Cockcroft-Walton accelerator, Van-de Graaff generator, Tandem accelerator Linear accelerator, Cyclotron. Brief account of Syncrhrotron, Accelerator facilities available in India.	