Lesson Plan

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Class and Section: M.Sc. Physics 2nd Sem.

Subject: Nuclear Physics Paper code: 18PHY22HC2

Week	Date	Topics
1	1st March-7th March	**Unit I**
		Basic characteristics of Nucleus Size,
		Density, Nuclear mass, Packing fraction
		Binding energy, spin, parity, Angular momentum
		Magnetic dipole moment, Electric quadrupole moment
		isospin, and Statistical properties of nucleus
		Two nucleon problem: Common potentials need for calculation of nuclear forces viz. Wigner, Majorana
2		Bartlett and Heisenberg potentials
		The ground state of deuteron
		Excited states of the deuteron
		Qualitative features of Nucleon- nucleon scattering
	7th March-14th March	Neutron proton (n-p) scattering at low energies
		Scattering length, Significance of sign of scattering length
3		Coherent and incoherent
		Spin dependence of n-p scattering
		Singlet stare in n-p scattering, and Effective range theory in n-p scattering
		Meson theory of nuclear force (Qualitative discussion)
	15th March-21th March	Types of nuclear reaction, compound and direct nuclear reactions
		Reaction cross-section
4		Reaction cross-section in terms of partial wave treatment
		Balance of mass and energy in nuclear reactions
		equation and its solution
		Fermi gas model of nucleus
	29th March-4th April	Liquid drop model, Similarities between liquid drop and nucleus

5		impirical mass formula
		Bohr-Wheeler theory of fission
		Merits and limitations of Liquid drop model
	5th April-11th April	Shell model Experiment evidence for shell effect
6		Magic numbers
		Main assumptions of single particle shell model
		Spin-orbit coupling in single particle shall model
		Estimation of spin, parities and magnetic moment of nuclei by single particle shell model
	12th April-18th April	nuclear Decay Alpha decay ,alpha disintegration energy,
7		Range of alpha-particles
		Range-energy relationship and Geiger - Nuttall law, Beta decay
		Paulis neutrino hypothesis. Fermi theory of beta decay
		Kurie plot, selection rules for beta decay
	19th April-25th April	Fermi and Gamow-Teller Transitions, Parity non-conservation in beta decay
8		Detection and properties of neutrino; gamma decay, Multipole transitions in nucleus
		Angular momentum and parity selection rules ,internal conversion,nuclear isomerism
		Elementary Particle Physics: Classifications of elementary particles Fermions and bosons, particles and antiparticles
		Fundamental interactions in nature, Type of interaction between elementery particle
		Symmetry and conservation laws; Classification of hadron , Strangeness Hypercharge, Gelleman Nishijima formula
	26th April-2nd May	Elementary idea of CP and CPT invariance
9		Quark model, Baryon Octet, Meson Octet, Baryon Decuplet
		Gell-Mann-Okubo formula for octet and decuplet, necessity of introducing colour quantum number
		SU (2) and SU (3) multiples qualitative only
		Test and Assignments
	3rd May-9th May	

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	10th May - 16th May	