

**Third year of Five Years integrated M.Sc (Physics)
M.Sc. - III, Semester –V**

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| MP 303 : | 3 | 0 | 0 | 3 |

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- **INTRODUCTION TO ATOMIC STRUCTURE AND MODELS** (04 Hours)
The nuclear atom, Electron orbits, Atomic spectra, The Bohr atom, Energy levels and spectra, Correspondance principle, Nuclear motion, Atomic excitations.
 - **ONE-ELECTRON ATOMIC SYSTEMS** (05 Hours)
Stark and Zeeman effect, Introduction to time-dependent perturbation theory.
 - **HYDROGEN ATOM** (04 Hours)
Limitations of classical mechanics, Schrodinger's time independent wave equation, Orbital angular momentum, parity of eigen functions.
 - **HELIUM ATOM** (04 Hours)
Spectrum of Helium, Quantum mechanical explanation of splitting of He terms, Ground state energy of He atom.
 - **HARTREE THEORY AND IDEA OF SELF-CONSISTENCY** (03 Hours)
Hartree's self-consistent field, Results of Hartree theory, Atomic orbitals and Hund's rule, The periodic table.
 - **GENERAL PROPERTIES OF NUCLEI, NUCLEAR DECAYS** (05 Hours)
Nuclear compositions, Nuclear properties, Stable nuclei, Binding energy, Meson theory of nuclear forces, Radioactive decay, Half-life, Radioactive series, α , β , γ decay.
 - **NUCLEAR FORCE, CHARGE INDEPENDENCE** (04 Hours)
 - **NUCLEAR MODELS** (04 Hours)
Shell model , Liquid drop model.
 - **NUCLEAR REACTIONS AND CLASSIFICATION , HEAVY ION REACTIONS** (05 Hours)
Nuclear reactions and crossection, Resonance, Compound nucleus
 - **NUCLEAR FISSION AND FUSION** (04 Hours)
- (Total Contact Time (Theory) : 42 Hours)**
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BOOKS RECOMMENDED :

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|----|--|--|-------------------|------|
| 1. | Woodgate G.K. | <i>Elementary Atomic Structure -</i> | Oxford Uni. Press | 1983 |
| 2. | Gillespie R.J. | <i>Atoms, Molecules, and Reactions: An Introduction to Chemistry</i> | Prentice Hall | 1994 |
| 3. | Bransden B.H. and Joachaim C.J. | <i>Physics of Atoms and Molecules -</i> | Benjamin Cummings | 2003 |
| 4. | Roy R R and Nigam B.P. | <i>Nuclear Physics: Theory and Experiment –</i> | John Wiley | 1967 |
| 5. | Preston M A and Bhaduri R K | <i>Structure of Nucleus –</i> | Addison-Wesley | 1975 |