

Programme: M. Sc.	Year: II	Semester: IX
Subject: Physics		
Course Code: B010902T	Course Title: Nuclear and Particle Physics	
Course Outcomes (COs)		
After the completion of the course, students will be/able to		
<ol style="list-style-type: none"> 1. have understanding of n-n, n-p and p-p scattering and charge symmetry of nuclear forces. 2. explain reasons behind ground state properties of nucleus such as spin-parity assignment, angular moment and magnetic moment with the help of shell model. 3. analyze kinematics formulation associated with different nuclear reactions including relativistic heavy ion reactions. 4. predict if an elementary particle reaction is allowed and to recognize the type of the interaction associated with it. 5. have fundamental understanding of nuclear decays and associated selection rules. 		
Credit: 4		Core Compulsory
Max. Marks: 25+75		Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical-Research (in hours per week): L-T-P-R: 3-1-0-0		
Unit	Topics	No. of Lectures
I	Deuteron, n-n scattering, n-p scattering, p-p scattering, charge symmetry of nuclear forces.	9
II	Shell Model, Extreme Single particle picture and angular momentum, magnetic moment, quadrupole moment of nuclei, Nuclear Isomerism, Collective model (qualitative discussion)	9
III	Compound Nucleus, Breit-Wigner Formula, Direct Interaction, Heavy Ion Reactions, Relativistic Kinematics	9
IV	Fundamental types of Interactions, General Classifications of Elementary Particles, Isospin, Strangeness, Conservation Laws, Symmetries (C, CP, CPT), SU(3) and quark model	9
V	Alpha, beta and gamma decay	9
Suggested Readings		
<ol style="list-style-type: none"> 1. Introduction to Solid State Physics C. Kittel, 8th Edition, John Wiley & Sons, Inc. New Jersey, USA (2012). 2. Solid State Physics, A. J. Dekker, McMillan India, (2000) 3. Solid State Physics, Neil. W. Ashcroft & N. David Mermin, Holt, Rinehart and Winston, (1976). 4. The Oxford Solid State Basics, Steven H. Simon 1st Edition, Oxford University Press, Oxford, UK, (2013). 		
Suggested Digital Platforms/Web Links		
<ol style="list-style-type: none"> 1. Swayam – Government of India, https://swayam.gov.in/explorer?category=Physics 2. National Programme on Technology Enhanced Learning (NPTEL), https://nptel.ac.in/course.html 3. Uttar Pradesh Higher Education Digital Library, https://heecontent.upsdc.gov.in/SearchContent.aspx 4. MIT Open Learning – Massachusetts Institute of Technology, https://openlearning.mit.edu/ 5. edX, https://www.edx.org/course/subject/physics 		
Course Prerequisites		
Physics in M. Sc. I Year.		