# SARASWATI MAHILA MAHAVIDHYALAYA, PALWAL

**LESSON-PLAN**

**Class: M.sc (Physics)** **Semester: 2nd sem**

**Subject: Nuclear and particle physics**

**Session: 2021-22**

| Lecture Number | Topic |
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| Lect.1 | UNIT – 1<br>Two nucleon and nuclear force: deuteron basic concept. |
| Lect.2 | Deuteron binding energy. |
| Lect.3 | Deuteron excited state –range and depth of potential. |
| Lect.4 | Deuteron radius. |
| Lect.5 | Electric quadrupole moment of deuteron. |
| Lect.6 | Magnetic moment of deuteron. |
| Lect.7 | the evidence of non-central (Tensor) force |
| Lect.8 | spin dependence of nuclear force. |
| Lect.9 | Nucleon-nucleon scattering; |
| Lect.10 | P-P Scattering (phase shift and scattering length). |
| Lect.11 | N-P And N – N Scattering (phase shift and scattering length). |
| Lect.12 | S- Wave Range Theory. |
| Lect.13 | Charge Independent and charge symmetry. |
| Lect.14 | Iso-spin Formalism. |
| Lect.15 | Ortho and Para hydrogen scattering. |
| Lect.16 | Difference between p-p, n-n and n-p nuclear force |
| Lect.17 | Numerical problem |

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| **Lect.18** | **UNIT- 2nd**<br>**Nuclear model- basic concept.** |
| **Lect.19** | **Liquid drop model assumption, dissimilarities, similarities .** |
| **Lect.20** | **Bethe weizsacker semi empirical formula.** |
| **Lect.21** | **Shell model.** |
| **Lect.22** | **Shell model evidence.** |
| **Lect.23** | **Extreme single particle.** |
| **Lect.24** | **Nuclear magnetic moment.** |
| **Lect.25** | **Stability of nuclei.** |
| **Lect.26** | **Prediction of the shell model.** |
| **Lect.27** | **Collective nuclear model.** |
| **Lect.28** | **Vibrational state of collective model.** |
| **Lect.29** | **Rotational state.** |
| **Lect.30** | **Comparison of liquid drop model ,shell model and collective model** |
| **Lect.31** | **Numerical of nuclear magnetic moment** |
| **Lect.32** | **Assignment given** |
| **Lect.33** | **Test 1** |
| **Lect.34** | **UNIT- 3RD**<br>**Nuclear decay and nuclear reaction basic introduction** |
| **Lect.35** | **Alpha particle .** |
| **Lect.36** | **Decay of alpha particle.** |
| **Lect.37** | **Geiger nuttal law** |
| **Lect.38** | **Introduction of beta decay.** |

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| **Lect.39** | **Fermi theory of beta decay.** |
| **Lect.40** | **Classification of beta transition.** |
| **Lect.41** | **Conservation in beta decay.** |
| **Lect.42** | **Selection rule, comparative half life.** |
| **Lect.43** | **Kurie plot** |
| **Lect.44** | **Gamow- teller transition.** |
| **Lect.45** | **Parity non conservation in beta decay.** |
| **Lect.46** | **Gamma decay.** |
| **Lect.47** | **Selection rules , transition , life time** |
| **Lect.48** | **Transition probality.** |
| **Lect.49** | **Nuclear reaction , types of nuclear reaction.** |
| **Lect.50** | **Compound nucleus reaction.** |
| **Lect.51** | **Direct reaction.** |
| **Lect.52** | **Optical model.** |
| **Lect.53** | **Continuum theory of nuclear reaction** |
| **Lect.54** | **Breit -Weigner formula.** |
| **Lect.55** | **Numericals** |
| **Lect.56** | **Assignment.** |
| **Lect.57** | **UNIT -4$^{TH}$**<br>**Elementary particle introduction.** |
| **Lect.58** | **Basic interaction of elementary particle.** |
| **Lect.60** | **Classification of elementary particle.** |

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| **Lect.61** | **Hadrons in detail** |
| **Lect.62** | **Muons.** |
| **Lect.63** | **Leptons.** |
| **Lect.64** | **Baryons.** |
| **Lect.65** | **Conservation laws for elementary particle- introduction** |
| **Lect.66** | **Lepton no. ,muon no. , baryon no.** |
| **Lect.67** | **Gell mann nishijima formula hypercharge, stangeness** |
| **Lect.68** | **Iso-spin, hyprones** |
| **Lect.69** | **Time reversal, CP,CPT Inversion** |
| **Lect.70** | **Charge conjugation** |
| **Lect.71** | **Space inversion.** |
| **Lect.72** | **Elementary symmetry.** |
| **Lect.73** | **SU(2)** |
| **Lect.74** | **SU(3)** |
| **Lect.75** | **Quark model.** |
| **Lect.76** | **Types of quark and colour** |
| **Lect.77** | **Assignment** |
| **Lect.78** | **Test** |
| **Lect.79** | **Revision** |
| **Lect.80** | **Revision** |