**LESSON PLAN**

Dr. Sandhaya

B.Sc. Non-medical 6th semester – Physics, Nuclear Physics (PAPER II)

**Section B: (1-3) & Section A :(4-6)**  **Session: 2023-24**

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| **Week** | **Topic covered** |
| **JANUARY** | |
| Week 1 | ***SECTION A***  **Unit I :** Introduction , Nuclear mass and binding energy, systematics nuclear binding energy ,nuclear stability. Nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept).  ***SECTION B***  **Unit I :** Introduction , Nuclear mass and binding energy, systematics nuclear binding energy ,nuclear stability. Nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept). |
| Week 2 | ***SECTION A***  Determination of mass by Bain-Bridge, Bain-Bride and Jordan mass spectrograph, Determination of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering.  ***SECTION B***  Determination of mass by Bain-Bridge, Bain-Bride and Jordan mass spectrograph, Determination of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering. |
| Week 3 | ***SECTION A***  ***Revision , problems ,group discussion & TEST UNIT 1.***  **Unit-II** : Interaction of heavy charged particles (Alpha particles).  ***SECTION B***  ***Revision , problems ,group discussion & TEST UNIT 1.***  **Unit-II** : Interaction of heavy charged particles (Alpha particles). |
| Week 4 | ***SECTION A***  Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha – decay. Range and straggling of alpha particles, Geiger- Nuttal law.  ***SECTION B***  Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha – decay. Range and straggling of alpha particles, Geiger- Nuttal law. |
| **FEBRUARY** | |
| Week 1 | ***SECTION A***  Introduction of light charged particle (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of beta- particles (ionization). Range of electrons, absorption of beta-particles.  ***SECTION B***  Introduction of light charged particle (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of beta- particles (ionization). Range of electrons, absorption of beta-particles. |
| Week 2 | ***SECTION A***  Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma radiations through matter (photoelectric, Compton and pair production effect) electron position annihilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application.  ***SECTION B***  Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma radiations through matter (photoelectric, Compton and pair production effect) electron position annihilation . Absorption of Gamma rays (Mass attenuation coefficient) and its application. |
| Week 3 | ***SECTION A***  **REVISION , GROUP DISCUSSION AND TEST UNIT – 2**  Introduction of UNIT III. Nuclear reactions, Elastic scattering, Inelastic scatting.  ***SECTION B***  **REVISION , GROUP DISCUSSION AND TEST UNIT – 2**  Introduction of UNIT III. Nuclear reactions, Elastic scattering, Inelastic scatting. |
| Week 4 | ***SECTION A***  Nuclear disintegration, photo-nuclear reaction, Radiative capture, Direct reaction, heavy ion reactions and spallation Reactions.  ***SECTION B***  Nuclear disintegration, photo-nuclear reaction, Radiative capture, Direct reaction, heavy ion reactions and spallation Reactions. |
| **MARCH** | |
| Week 1 | ***SECTION A***  Conservation laws. Q-value and reaction threshold, Nuclear Reactors General aspects of Reactor design.  ***SECTION B***  Conservation laws. Q-value and reaction threshold, Nuclear Reactors General aspects of Reactor design. |
| Week 2 | ***SECTION A***  Nuclear fission and fusion reactors (Principles, construction, working and use) Linear accelerator, Tendem accelerator.  ***SECTION B***  Nuclear fission and fusion reactors (Principles, construction, working and use) Linear accelerator, Tendem accelerator |
| Week 3 | ***SECTION A***  Cyclotron and Betatron accelerators. Ionization chamber.  ***SECTION B***  Cyclotron and Betatron accelerators. Ionization chamber. |
| Week 4 | **HOLI BREAK** |
| **APRIL** | |
| Week 1 | ***SECTION A***  Proportional counter, G.M. counter detailed study, Revision, problem discussion and UNIT TEST (III) .  ***SECTION B***  Proportional counter, G.M. counter detailed study, Revision, problem discussion and UNIT TEST (III) . |
| Week 2 | ***SECTION A***  Scintillation counter and semiconductor detector and problem discussion.  ***SECTION B***  Scintillation counter and semiconductor detector and problem discussion. |
| Week 3 | ***SECTION A***  Assignment and Revision of UNIT I and II  ***SECTION B***  Assignment and Revision of UNIT I and II |
| Week 4 | ***SECTION A***  Revision of UNIT III  ***SECTION B***  Revision of UNIT III |

**SIGNATURE OF TEACHER**