PPH211 PHYSICS LAB III

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Course Objectives: To expose the students to various detectors in nuclear and particle physics so that they can investigate various relevant aspects and be confident to handle sophisticated instruments and analyze the data.

List of Experiments:

1. Dead time of a Geiger Muller (GM) Counter (Two source method)
2. Dead time of a Geiger Muller (GM) Counter (Absorber method)
3. To determine the operating voltage of a PMT and to find the photo peak efficiency of a NaI (Tl) crystal of given dimension for ϒ rays of different energies.
4. To calibrate a ϒ ray spectrometer and to determine the energy of a given gamma ray source
5. Pulse height ϒ ray spectrum with multi-channel analyzer.
6. Energy resolution of a NaI (Tl) detector.
7. To verify the inverse square law with ^{137}Cs source.
8. To study the Compton scattering using ϒ rays of suitable energy.
9. To study the time resolution of a coincidence setup.
10. To determine ϒ ray attenuation coefficient for different metals.
11. To study the relationship between thickness of absorber and backscattering using GM counter.
12. To study the shielding effect of radiation penetrability.
13. To study anisotropy of ϒ ray cascade emission in ^{60}Co source.
14. To determine the half-life of a radioactive sample.
15. Simple simulations in FOARTRAN90 for nuclear physics.
16. Studies on the Electric Spin Resonance spectrum of the given DPPH sample and determination of Lande*g* factor.
17. Studies on the NMR spectrum of ethylbenzenein $CDCl_3$and obtain the ^1H NMR spectrum and obtain the chemical shift and mutiplicity.

Course learning outcomes: Students will have achieved the ability to:

1. operate a GM counter and Scintillation counter with MCA.
2. determination of mass abs coeff for the given material, variation of resolution with energy and activity of the given gamma source.
3. determine $1/r^2$ law and the decay statistics for the given beta and gamma sources.
4. design and run simulations for nuclear physics problems in FORTRAN90.

5. handle nuclear materials and nuclear safely management.
6. analyze and interpret experimental data using graphs

Evaluation Scheme:

Sr. No.	Evaluation Elements	Weightage (%)
1	Lab Evaluation	100