Roll No. | | | | | | | | | | | | | **Total No. of Pages: 02**

Total No. of Questions: 11

M.Sc. (Physics) (Sem. – 4)

EXPERIMENTAL TECHNIQUES IN NUCLEAR AND PARTICLE PHYSICS

Subject Code: MSPH542-18

M Code: 77848

Date of Examination: 15-12-2022

Time: 3 Hrs. **Max. Marks: 70**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SEVEN questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly:

   a) Why Li is doped in Si(Li) solid state detector?

   b) Discuss energy resolution and detection efficiency of a detector.

   c) What is meant by Range-energy relationship?

   d) Can photoelectric effect take place with a free electron? Explain.

   e) What do you mean by minor interaction processes?

   f) What are Cherenkov radiation and their threshold velocity?

   g) Distinguish between XRF and PIXE.

   h) What do you mean by Breamsstrahlung? Explain its energy and Z dependence.

   i) What is the minimum energy required for pair production?

   j) Calculate the energy of gamma ray after scattering through 70^{o}.

SECTION-B

2. What do you understand by gas filled counters? Where do we use them?

3. Advocate the relevance of scintillation detectors in context of radiation detection process.

4. Discuss the working of Multiwire proportional chamber.

5. What do you mean by Compton scattering? How it is different from photoelectric absorption?

6. Write a short note on Time projection chamber.

7. Discuss the concept and importance of Diagnostic nuclear medicines.

8. What are neutron counters? Write different detection methods used to count neutrons and to measure their kinetic energies.

SECTION C

9. Discuss the neutron activation and charged particle analyses. Compare the two techniques.

10. Explain the principle of XRF. Discuss the instrumentation and spectrum analysis of EDXRF.

11. Describe the working principle, construction and working of HPGe detector.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.