K24P 0332

Reg. No.: .....

Name : .....

IV Semester M.Sc. Degree (C.B.S.S .– Reg./Supple.-(One Time Mercy Chance)/Imp.) Examination, April 2024
(2014 Admission Onwards)
PHYSICS
PHY 4E12 : Experimental Techniques

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **both** the questions (Either **a** or **b**).

1. a) What are vacuum gauges ? With the help of neat diagrams, explain Pirani gauge and ionization gauge.

   OR

   b) What is the need of liquefaction of gases ? Explain internal work method for the liquefaction of gas in detail.

2. a) What is ion implantation ? Explain the process and technique of ion implantation.

   OR

   b) Explain the theory behind Rutherford back scattering and obtain an expression for scattering cross section using classical theory. **(2×12=24)**

SECTION – B

Answer **any four** questions (**One** mark for Part **a**, **3** marks for Part **b**, **5** marks for Part **c**).

3. a) Give two methods of thermal evaporation technique.

   b) What are the parameters that affect the sputtering yield ?

   c) Write a brief note on quartz crystal monitor used for the measurement of thickness of thin films.

P.T.O.

4. a) Why electrons cannot be accelerated using a cyclotron ?

   b) Explain thermionic emission and spark discharge process for the production of ions.

   c) Explain the working of a sector focussed cyclotron.

5. a) What is Q value of a nuclear reaction ?

   b) What are the factors which are to be considered in choosing a nuclear reaction for analysis of one particular element ?

   c) What should be the minimum energy of a photon for it to split an alpha particle at rest into a tritium and proton ?

6. a) What is Joule-Thomson Effect ?

   b) What are the differences between external and internal work method of cooling ?

   c) A mono atomic ideal gas at 170° is adiabatically compressed to 1/8th of its initial volume. Find the temperature after compression.

7. a) Name two nuclear techniques of elemental analysis.

   b) What is the role of depth profiling in resonance nuclear reactions ? Explain.

   c) Briefly explain the principle of nuclear reaction analysis.

8. a) Name any two vacuum valves.

   b) Briefly explain air inlet valves.

   c) Explain the working of an oil-sealed rotary-vane pump. **(4×9=36)**
