DAF-003-0498001 Seat No. _____

B. Sc. / M. Sc. (Applied Physics) (Sem. VIII) (CBCS) Examination

April - 2022

Vacuum Technology & Thin Film : Paper - V

(Core - 5) (New Course)

Faculty Code : 003
Subject Code : 0498001

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Numbers in the right margin indicate marks.

1 Attempt any SEVEN short questions (Two marks each) **14**

(1) What is rough vacuum and high vacuum?
(2) What is Diffusion and Permeation?
(3) Mention different stages of rotary pump operation.
(4) What is vacuum gauge?
(5) Explain how the Residual Gas Analyser works.
(6) Define homogeneous and heterogeneous nucleation.
(7) Draw a schematic diagram and name the basic thin film deposition stages.
(8) What are the advantages and disadvantages of spin coating technique?
(9) What is electrochemical deposition?
(10) Why PECVD can be operated at lower temperature than CVD?

2 Write the answer of any two questions. **14**

(1) Explain the atomistic concept of pressure, mean free path and impingement rate.
(2) Draw a schematic diagram for Diffusion pump and explain it's working.
(3) Explain the mechanism and operation of Turbo molecular pump.
(4) How condensation category pump is different from Physical removal category? Explain the working of cryo pump.

3 Write the answer of any two questions. **14**

(1) Explain the Pirani gauge in details.

(2) Describe: Principle and Use of Helium Leak Detector.

(3) Prepare a diagram of the setup of a High vacuum pumping system and explain it.

(4) Describe the Cold cathode Ionization gauge (Penning gauge) in detail.

4 Write the answer of any two questions. **14**

(1) Explain the classical Capillarity model for thin film nucleation.

(2) Explain the role of various deposition parameters for epitaxial growth of thin film.

(3) Describe the processes involved in grain structure of polycrystalline film.

(4) Discuss atomistic or statistical model for nucleation.

5 Write the answer of any two questions. **14**

(1) Explain design and operation of different types of sublimation sources.

(2) What is sputtering? Explain RF sputtering technique of thin film deposition.

(3) Explain pulsed laser deposition technique.

(4) Mention different techniques for thin film thickness measurement and explain optical interference method.
