



Seat No. _____

H-003-0498001

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

April - 2023

**Vacuum Technology and Thin Film : Paper-V (Core-5)
(New Course)**

Faculty Code : 003

Subject Code : 0498001

Time : $2\frac{1}{2}$ / 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) Describe the concept of mean free path and monolayer formation time.
- (2) Classify the vacuum according to different ranges ?
- (3) What is Vacuum gauge ?
- (4) Describe pump down.
- (5) Explain how the residual gas analyzer works.
- (6) Define thin film. Write the name of different techniques for thin film fabrication.
- (7) Give the difference between homogeneous and heterogeneous nucleation.
- (8) What do you mean by rate of nucleation ?
- (9) Define epitaxy.
- (10) Write the name of different techniques for measurement of thin films.

2 Write the answer of any two questions: 14

- (1) Explain gas flow, throughout and conduction in detail.
- (2) Discuss rotary pump and diaphragm pump in detail.
- (3) How condensation category pump is different from physical removal category ? Explain the working of cryo pump.
- (4) Draw a schematic diagram for Diffusion pump and explain its working.

- 3** Write the answer of any two questions : **14**
- (1) Discuss the principle and use of helium leak detector.
 - (2) Construct a diagram of the setup of a High vacuum pumping system and explain it.
 - (3) Explain Cold cathode Ionization gauge (Penning gauge) in detail.
 - (4) Write a note on pirani gauge.
- 4** Write answer of any two questions : **14**
- (1) Write an equation of number of vapour atom coverage on substrate (n_i) and derive the equation for the re-evaporation (N_{ev}).
 - (2) Explain the role of various deposition parameters for epitaxial growth of thin film.
 - (3) Discuss the basic stages thin film deposition with schematic diagram.
 - (4) Explain atomistic or statistical model for nucleation in detail.
- 5** Write the answer of any Two questions : **14**
- (1) Discuss spin coating technique for thin film with advantages and disadvantages.
 - (2) Explain electrodeposition in detail.
 - (3) Write a note on thermal evaporation mechanism for thin film in detail.
 - (4) Explain interferometry method for thickness measurement in detail.
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