

2012  
B.A./B.Sc. (Hons.) Third Semester  
Physics  
Paper – I: Physics of Vacuum and Low Temperature

Time allowed: 3 Hours

Max. Marks: 44

**NOTE:** Attempt five questions in all, including Question No. VII (Unit-III) which is compulsory and selecting two questions each from Unit I - II.

x-x-x

**UNIT - I**

- I. a) Explain the Sputter-ion pump in detail?  
b) What is ultimate pressure and pump throughput?  
c) What is conductance? (6,2,1)
- II. a) Explain Diffusion pump with diagram ?  
b) What is gettering? Give details about different types of getters? (6,3)
- III. a) What is McLeod gauge?  
b) Explain the principle of Pirani gauge? (6,3)

**UNIT - II**

- IV. a) What is refrigeration and explain various methods of refrigeration?  
b) What is coefficient of performance? (5,4)
- V. a) What is low temperature thermometry and explain different techniques?  
b) Explain thermodynamics of  $\lambda$ -transition? (5,4)
- VI. a) Explain adiabatic-demagnetization in detail?  
b) Explain regenerative cooling? (6,3)

**UNIT - III**

- VII. Attempt any eight of the following
- What is sputtering?
  - What is speed of exhaust?
  - Which type of magnetic material is used in adiabatic demagnetization?
  - Explain principle of Ion-pumps?
  - What is viscous flow and molecular flow?
  - What is critical temperature?
  - Explain Joule Thomson effect in brief?
  - Give example of any working substance used in refrigeration process?
  - What do you mean by liquefaction of gases?
  - Give two uses of liquid gases? (8 X 1)

x-x-x