

AMI27 VACUUM AND CRYOGENIC INSTRUMENTATION

UNIT-1 VACUUM

- 1.1 Basic ideas- vapors and saturated vapor pressure- gas mixtures partial pressures
- 1.2 Mean free path- volume flow rate- vacuum pumps- diffusion pumps accessories
- 1.3 Turbo molecular pumps-cry pumps.

UNIT-2 VACUUM MEASUREMENT

- 2.1 Vacuum scale- mechanical phenomena gauges transport phenomena gauges
- 2.2 Ionization phenomena gauges- mounting gauge heads calibration – accuracy.

UNIT-3 DESIGN CONSIDERATIONS

- 3.1 Conductance- gas flow regions- gas and vapor load ultra-high vacuum systems
- 3.2 UHV measurements- vacuum leak detection- identification of gases present.

UNIT-4 LOW TEMPERATURE

- 4.1 Basic ideas- production of low temperature- liquid nitrogen and liquid helium plants-
- 4.2 Measurement of low temperatures- storage and transfer of liquefied gases
- 4.3 Cooling with helium-3 – the dilution refrigerator- adiabatic demagnetization.

UNIT-5 DESIGN OF CRYOSTATS

- 5.1 General considerations- cryostats for specific heat,
- 5.2 Thermal conductivity and electrical resistivity measurements
- 5.3 Cryostats for optical and x-ray studies, magnetic susceptibility measurements
- 5.4 Closed cycle nitrogen and helium refrigerators.

Reference Books:

1. N. Harris – Modern Vacuum Practice – McGraw Hill.
2. G.K.White – Experimental Techniques in low Temperature Physics – Clarendon Press
3. A.Roth – Vacuum Techniques – North Holland