

CRYOGENIC ASPECTS OF HYDROGEN ENERGY (UG Elective) for Spring Semester

Course Name: <b>Cryogenic Aspects of Hydrogen Energy</b>	Credit: 3-0-0 = 3
Course Teacher: Prof. Indranil Ghosh	Cryogenic Engineering Centre

- 1 Overview of Hydrogen Technology
- 2 Hydrogen Technology: Applications, Advantages and Challenges
- 3 Properties of Gaseous Hydrogen, Liquid Hydrogen, Slush (Liquid & Solid Mixture) Production
- 4 Isotopes of Hydrogen and their uses
- 5 Deuterium and Tritium Separation
- 6 Production of Synthesis Gas (Steam Reforming, Partial Oxidation, Auto-thermal Reactor)
- 7 Processing of Syngas (Linde-Bronn Process and l' Air Liquide System)
- 8 H<sub>2</sub> Production: Electrolysis of Water, Tank Type & Filter Press Type Electrolyser
- 9 H<sub>2</sub> Production: Thermo-chemical and Hybrid Process
- 10 Hydrogen Production: Use of non-conventional energy
- 11 Different Means of Storing Hydrogen – An Overview
- 12 Compressed Gaseous Hydrogen Storage
- 13 Design of Pressure Vessel; Materials; Problems
- 14 Overview of Cryogenic Liquefaction Cycles; Maximum Inversion Temperature
- 15 Overview of Cryogenic Liquefaction Cycles; Problems
- 16 Liquefaction of Hydrogen
- 17 Liquefaction of Hydrogen; Problems
- 18 Ortho-Para Conversion of Hydrogen
- 19 Ortho-Para Conversion of Hydrogen
- 20 Problems
- 21 CLASS TEST
- 22 CLASS TEST
- MID SEMESTER EXAMINATION**
- 23 Storage and Transfer of Liquid Hydrogen, Super-insulated Vessels
- 24 Metal Hydride Storage of Hydrogen
- 25 Metal Hydride Storage of Hydrogen
- 26 Adsorption Storage of Hydrogen in Carbonaceous Materials
- 27 Different Models to Predict Adsorption Isotherms
- 28 Langmuir Model, DA Model,
- 29 Cryo-Sorption Storage of Hydrogen
- 30 Problems
- 31 Equilibrium Adsorption Capacity Measurement
- 32 Volumetric and Gravimetric Method
- 33 Hydrogen Sorption Cooling for Space Application
- 34 Metal Hydride-Hydrogen Air Conditioning System
- 35 Hydrogen as Fuel (for Space Application)
- 36 Hydrogen as Fuel
- 37 Fuel Cells and its Applications
- 38 Fuel Cell in Automobile
- 39 Safety Issues on Hydrogen
- 40 Safety Issues on Hydrogen
- 41 CLASS TEST
- 42 CLASS TEST