

20PE009 - ENERGY STORAGE TECHNOLOGIES

UNIT - I

ENERGY STORAGE: Necessity of energy storage, Energy storage systems, Components of energy storage system, Pros and cons of energy storage systems, Types of energy storage systems.

MECHANICAL ENERGY STORAGE SYSTEMS: Pumped Hydro Storage System, Components, Working, Advantages and drawbacks, Flywheel energy storage system, Components, Working, Advantages and drawbacks, Compressed air energy storage system, Components, Working, Advantages and drawbacks.

UNIT - II

THERMAL ENERGY STORAGE : Thermal energy storage systems, Sensible heat storage, Working, Advantages and drawbacks, Latent heat storage, Working, Advantages and drawbacks, Thermo-chemical energy storage, Working, Advantages and drawbacks, Solar pond storage system, Working, Advantages and drawbacks.

UNIT - III

BATTERY ENERGY STORAGE : Fundamental concept of batteries, Measurement of battery performance, Charging and discharging of a battery, Types of batteries, Lead acid, Nickel – Cadmium, Lithium ion batteries, Terminology, Battery capacity (Ah), Discharge/Charge rate or C-rating, Depth of Discharge (DOD), State of Charge (SOC), Terminal voltage, Open circuit voltage, Internal resistance, Self-discharge, Energy density, Specific energy, Power density, Specific power, Battery life, Comparison of batteries.

UNIT - IV

HYDROGEN STORAGE: Hydrogen storage options, Compressed gas, Liquid hydrogen, Hydride, Chemical storage, Comparisons. Safety and management of hydrogen.

UNIT – V

OTHER STORAGE TECHNOLOGIES : Superconducting magnetic energy storage, Components, Working, Advantages and drawbacks, Super capacitor energy storage, Components, Working, Advantages and drawbacks. Comparison of different energy storage technologies.

TEXT BOOKS:

1. Archie.W.Culp, “Principles of Energy Conversion”, Mc Graw-Hill Inc., 1991.
2. G.D. Rai, “Non Conventional Energy Sources”, 4th edition, Khanna Publishers, 2011.

REFERENCE BOOKS:

1. S.P. Sukhatme and J.K.Nayak., “Solar Energy”, 3rd edition, Tata Mc-Graw Hill Education Private Limited, 2010.
2. Kettari M.A., “Direct Energy Conversion”, Addison-Wesley Publication Co., 1997.