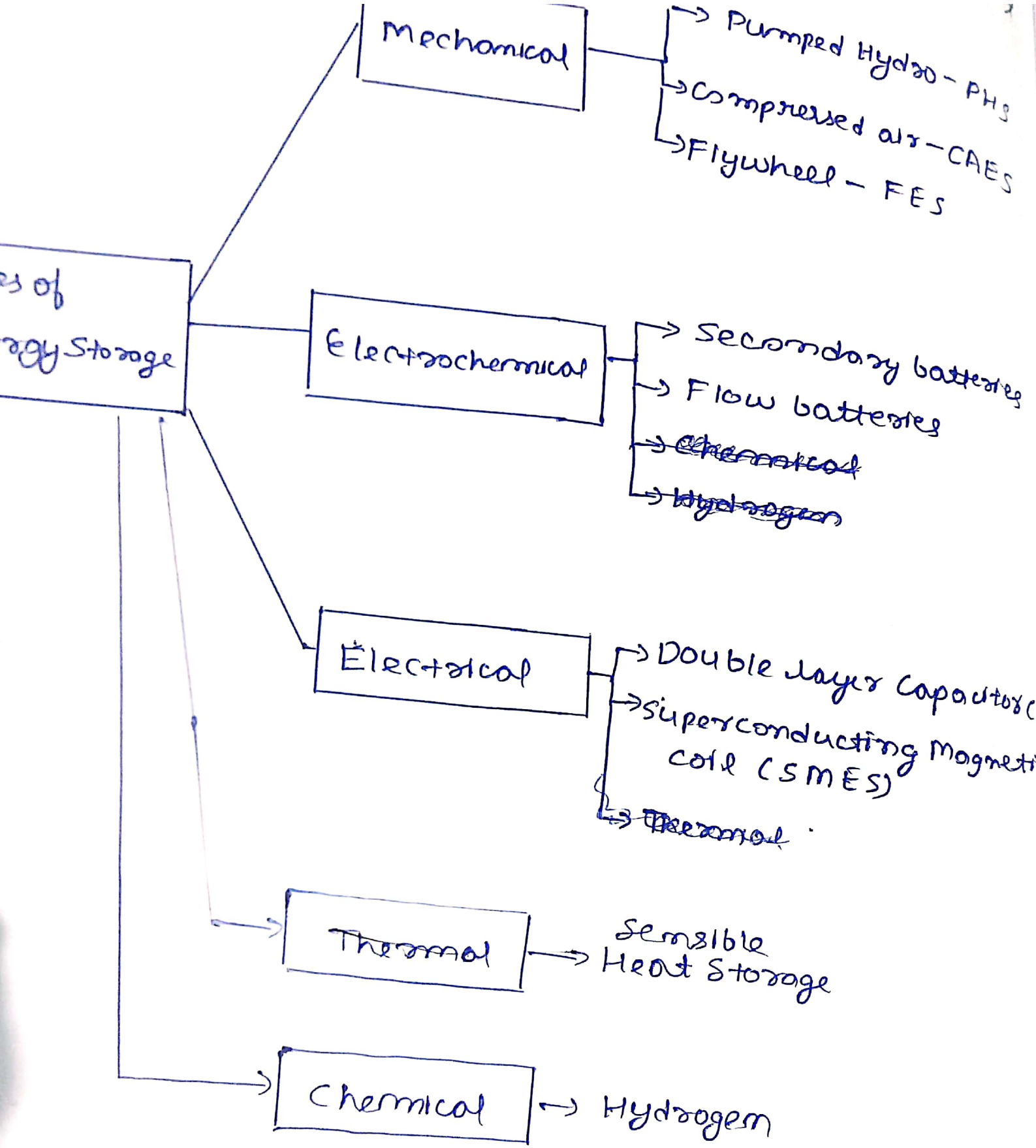


Scanned with CamScanner

(1) Mechanical Storage Systems :- The most common mechanical storage systems are pumped hydroelectric power plants (pumped Hydrostorage, PHS), compressed air energy storage. CCAES) and flywheel energy storage (FES).

(a) Pumped hydro storage (PHS):-

→ Pumped Hydro storage System is a type of energy storage system that uses two reservoir at different elevation.

→ water circulates from upper reservoir to lower reservoir and it flow back to the upper reservoir by the help of pump that's why it is called as pumped hydro storage system.

(b) Compressed Air Energy Storage (CAES):-

→ Compressed Air Energy storage system is a type of technology by which we store energy as a compressed air for its later use when demand of energy increase.

→ Compressed air energy storage system almost similar to the pumped hydroenergy storage but in this system instead of water we use compressed air that underground in metallic container.

→ When demand of electricity increase then compressed air expand in expansion turbine by which generator remain coupled then generate the electricity and fulfill the demand.

Scanned with CamScanner

(C) Flywheel Energy Storage (FES) :-

→ Flywheel energy storage is a type of energy storage system in which we store the energy in the form of rotation or mechanical energy

→ Stored energy in the form of rotation recovered in the form of electrical energy and it utilize to fulfill the demand of electricity.

2) Electrochemical Storage Systems :- The electrochemical storage system include ~~secondary batteries, flow batteries~~, various battery technologies that use different electrochemical reactions to store electricity namely lead acid batteries, Lithium ion (Li-ion) batteries, sodium-sulfur batteries (NAS), flow batteries.

(a) Secondary batteries :-

(i) Lead acid battery :- It is a battery whose electrodes are mainly made of lead and its oxides, and the electrolyte is sulfuric acid solution.

→ Lead acid batteries are the world's most widely used battery type and have been commercially deployed since about 1890 attack movie download.

Scanned with CamScanner

(ii) Lithium-Ion battery:- It is a type of battery energy storage system that uses lithium metal as the negative electrode-material and uses a non-aqueous electrolyte solution.

(iii) Sodium Sulphur battery (NAS):- The sodium sulphur batteries consist of liquid (molten) sulphur at the positive electrode and liquid (molten) sodium at the negative electrode; the active materials are separated by a solid beta alumina ceramic electrolyte

(b) Flow batteries:-

→ In conventional secondary batteries, the energy is ~~stored~~ charged and discharged in the active masses of the electrodes.

→ A flow battery is also a rechargeable battery but the energy is stored in one or more electroactive species which are dissolved in liquid electrolyte.

(3) Electrical Storage Systems:-

(a) Double layer capacitors (DLC):-

→ Electrochemical double layer capacitors (DLC) also known as supercapacitors.

→ A DLC consist of three basic layers; the electrolyte, the separator, and the positive and negative electrodes.

→ It exploits the double layer of charge formed when a voltage is applied to an electrode immersed in an electrolyte.

Scanned with CamScanner

(b) Superconducting magnetic Energy storage System (SMES):-

→ Superconducting magnetic energy storage (SMES) system work according to an electrodynamic principle. The energy is stored in the magnetic field created by the flow of direct current in a superconducting coil, which is kept below its superconducting critical temperature

## (4) Thermal Storage Systems :-

→ Thermal storage system, thermal energy is stored in the medium of an insulated container and converted back to electrical energy when needed or can be directly used without being converted back to electrical energy.

→ Thermal energy storage is divided into sensible head energy storage and Latent heat energy storage

## (5) Chemical energy storage :-

(a) The main purpose of such a chemical energy storage system is to use excess electricity to produce hydrogen via water electrolysis.

(b) Once hydrogen is produced different ways are available for using it as energy carrier either as pure hydrogen or as SNG.

(c) Chemical energy storage focuses on hydrogen and SNG as secondary energy carriers, since they could have a significant impact on the storage of electrical energy in large quantities.

Scanned with CamScanner