## Assignment No.1

Reference Book: G.D. Rai, Non-Conventional Sources of Energy, Khanna Publications

Lecture 23 to 27: Chapter 10

### UNIT -4

Q-1: Draw the sketch of molten Carbonate fuel cell. Write down the reactions at different electrodes.

Q-2: Draw the sketch of ion exchange membrane cell. Write down the reactions at different electrodes.

Q-3: Discuss the types of electrodes used for fuel cells.

Q-4: Draw typical I-V characteristics and voltage time characteristics of batteries.

Q-5: Write down the chemical reactions at (i) Lead Acid battery (ii) Nickel Iron cell

Q-6: Explain any two methods of Hydrogen storage.

### UNIT -5

Q-1: Give the classification of small hydro power stations based on (i) power capacity (ii) head available.

Q-2: Write down the advantages and disadvantages of tidal wave.

Q-3: Draw the sketches of (i) Bulb turbine (ii) Tube turbine (iii) Dolphin type wave power machine.

Q-4 : Draw the sketch of a small hydro power station. Explain briefly the functions of following components (i) Desliting tank (ii) Penstock and (iii) Spillway

Q-5: Prove that work done during filling of the simple single basin is directly proportional to square of the tidal range. (Section 9.3.5)

### UNIT -6

(Note: - Reader of renewable energy must be aware of energy storage methods.)

Q-1: Draw the sketches of (i) vapor dominated geothermal power plant (ii) flashed steam system.

Q-2: Explain the working of Binary fluid geothermal power system.

Q-3: Write down a short note on material selection for geothermal power plant.

Q-4: Draw the sketch showing compressed air-energy storage system. (Chapter 16)

Q-5: What is difference between sensible heat storage and latent heat storage? Define (i) Specific heat (ii) Latent heat. (Chapter 16)

Q-6: List down the criteria for selection of material suitable for phase change energy storage.

Q-7: Explain the construction and working of heat pipe. (Chapter 16)

Q-8: Draw the Sankey diagram for energy audit.

Q-9: What is the difference between preliminary and detailed energy audit.

**NUMERICALS**

1) http://large.stanford.edu/courses/2010/ph240/harting2/
   See the above webpage.
   This gravitational potential energy is simply equal to the product of mass, height, and gravitational constant (9.81 $m/s^2$). For example, the potential energy of a cubic meter of water (1000kg) in a stratus cloud at 2000 m of elevation is about 20 MJ, or 5.5 kWh. This means that in a region where the average amount of rain is about 0.40 m, the total amount of rain potential energy lost over a 1 $km^2$ plot of land is about 7.8 x $10^{12}$ J, 2.18 x $10^6$ kWh, or enough energy for about 220 homes in US. Unfortunately, the vast majority of this energy is lost via friction with the air during the rain fall. The next section looks at the total amount of kinetic energy that is still present when the rain hits the ground.

   Understand the calculations and try to apply to your area.

2) Calculate energy released by complete mass-energy conversion of 10 gm of nuclear fuel. Calculate the rise in air temperature packed in cube of 1 km height. Assume air density to be 1 kg/m3 and Cp= 1005 J/kg-K.
3) Examples 10.2.8.1 to 10.2.8.5. (Fuel cell )
4) Examples 9.3.5.1, 9.3.6.1 (Energy from ocean waves)