

(18)

SARDAR PATEL UNIVERSITY

M.Sc. Renewable Energy Examination (Semester –II)

Saturday, 18-04-2015, Time: 10.30 to 01.30P.M

PS02CREN01: Renewable Energy: Conversion, Storage and Environmental Aspects

Total Marks: 70

Q-1 Select most appropriate answer

(8x1 =8)

1. An electro-mechanical energy conversion device is one which converts _____
 - a) Electrical energy to mechanical energy only
 - b) Mechanical energy to electrical energy only
 - c) All of the mentioned
 - d) None of the mentioned
2. What is the coupling field used between the electrical and mechanical systems in an energy conversion devices?
 - a) Magnetic field
 - b) Electrical field
 - c) Magnetic or electrical field
 - d) None of the above
3. Which of the following statement about compressed air storage is true?
 - a) It is not useful in countries with nuclear power stations.
 - b) Storage in large pressure vessel is uneconomic
 - c) It is useful for peak lopping
 - d) It is not suited for salt caverns because they are not gas-tight when under pressure.
4. The units of specific energy density are
 - a) $W\ kg^{-1}$
 - b) $J\ kg$
 - c) $Wh\ kg^{-1}$
 - d) Wh
5. In lead acid cell $PbSO_4$ is formed during
 - a) Charging only
 - b) Discharging only
 - c) Both during charging as well as discharging
 - d) Neither during charging nor discharging
6. Any substance for change of its state at constant temperature absorbs/release heat is called---
 - a) Latent heat
 - b) Sensible heat charging only
 - c) Enthalpy
 - d) Entropy
7. All are particulate pollutants except
 - a) Dust
 - b) Ozone
 - c) Soot
 - d) smoke
8. Combustion of coal in power plant produces mainly which is a major pollutant of air.
 - a) Sulpher Dioxide
 - b) Nitrogen Dioxide
 - c) Methan
 - d) H_2O

Q-2 Answer **any seven** questions

(7x2=14)

1. Define the following terms:
 - a. Base load
 - b. Intermediate load
 - c. Peak load
 - d. Load factor
2. Calculate the load factor for the following usage. The demand and usage of power is 436kW & 57200 kWh, for the billing cycle is 32 days.
3. What are flue gases? Give the examples.
4. What is energy storage? Write the classification of energy storage.
5. Determine the maximum available energy if we compress 1450 kg air from 100kPa to 1200 kPa at 300K at isothermal conditions with a heat loss of 24,000kJ
6. What is the difference between sensible and latent heat energy storage.
7. What is metal hydride? How hydrogen stored in metal hydride
8. Define air pollutant and give the examples
9. What are the emissions, pollutants, contaminants from energy conversion processes?

Q-3 A) Describe coal fired steam power plant & Integrated Coal Gasification Combined Cycle plant (ICGCC) **(06)**

Q-3 B) Describe magneto-hydro dynamics power plant technology. Write its advantages and disadvantages. **(06)**

OR

Q-3 B) Discuss the various difficulties in electrical energy route **(06)**

Q-4A) Describe pumped hydro energy storage plant. State its operating modes with respect to peak load and off-peak hours. **(06)**

Q-4B) Describe in detailed mechanical energy storage with neat diagram. **(06)**

OR

Q-4B) A underground cavern will be used to store the energy of compressed air. If the cavern has a volume of 29,000m³ determine the value of stored energy by the compression of air from 100 to 1,500 kPa at 300K at isothermal conditions with a heat loss of 55, 000kJ **(06)**

Q-5 A) Explain the principle of chemical energy storage. **(06)**

Q-5 B) Describe lead acid battery energy storage. **(06)**

OR

Q-5 B) Write in detailed metal hydride hydrogen storage and write the advantages of hydrogen energy storage **(06)**

Q-6 A) State the principle of emissions from coal fired power plants and its harmful effects. Enlist the equipments installed in coal fired thermal power plants for controlling emission of a) fly ash b)SOx and c)NOx. **(06)**

Q-6B) Describe various controlling methods of particulate matter from thermal power plant **(06)**

OR

Q-6B) Explain the criteria of permitting emission up to certain limits as a basis of formulating air quality standards. **(06)**