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## SARDAR PATEL UNIVERSITY

M.Sc. Renewable Energy Examination (Semester -II) April -2016

Tuesday, 05-04-2016, Time: 10.30 to 01.30P.M

## PS02CREN01: Renewable Energy: Conversion, Storage and Environmental

Total Marks: 70

## Q-1 Select most appropriate answer

(8x1=8)

1. The conversion efficiency of Integrated Coal gasification combined cycle (ICGC) is \_\_\_\_
  - a) 35-41%
  - b) 45-50%
  - c) 27-38%
  - d) 45-80%
2. Equipment used for pulverizing the coal is known as
  - a) Ball mill
  - b) Hopper
  - c) Burner
  - d) Stoker.
3. Which of the following statements about compressed air storage are true?  
Please select all that apply.
  - a) It is not useful in countries with nuclear power stations.
  - b) Storage in large pressure vessels 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. Which of the following statements about flywheels are true?  
Please select all that apply.
  - a) They are not useful for peak-lopping.
  - b) They take many hours to restore to full speed.
  - c) It is more effective to make flywheels faster than heavier.
  - d) The maximum tensile stress of the material is a limiting factor.
5. Super conducting magnetic energy storage
  - a) Store electricity from the grid within a magnetic field
  - b) It is used for short duration storage
  - c) It is used for grid balancing
  - d) All the above
6. Which 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. Hydrogen storage methods are ----
  - a) Liquid hydrogen
  - b) Compressed hydrogen
  - c) Boron hydrides
  - d) All the above
8. All are particulate pollutants except
  - a) Dust
  - b) Ozone
  - c) Soot
  - d) Smoke

Q-2 Answer any seven questions

(7x2=14)

1. Write energy conversion efficiency of different power plant and write their commercial applications.
2. Write a short note on Indian coal fired power plant
3. 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
4. Classify thermal energy storage. Write thermal properties of some common
5. A steel torsion bar is to be used for the storage of energy. The cylindrical bar is having radius of 5cm and a length of 1.2 m. What is the energy stored in the bar when it is rotated by 15°?
6. What is the difference between sensible and latent heat energy storage.
7. What is metal hydride? How hydrogen stored in metal hydride
8. What is chemical energy storage? Write merit of chemical energy storage.
9. Define air pollutant and give the examples

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 in detailed mechanical energy storage with neat diagram. (06)

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

OR

Q-4B) A underground cavern will be used to store the energy of compressed air. If the cavern has a volume of 29,000m<sup>3</sup> 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 thermal energy storage and calculate thermal energy lost from an insulated tank filled with 1000liter olive oil for a temperature drop of 100°C from boiling point. (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 equipment's installed in coal fired thermal power plants for controlling emission of a) fly ash b)SO<sub>x</sub> and c)NO<sub>x</sub>. (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)

X-X-X

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