

( A-99)

SARDAR PATEL UNIVERSITY

M.Sc. Renewable Energy Examination (Semester -IV)

Wednesday, 22-04-2015, Time: 14.30- to - 17.30

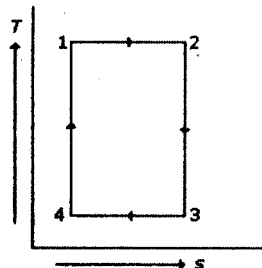
PS04ESYT02: Solar Power Plant Technology

Total Marks: 70

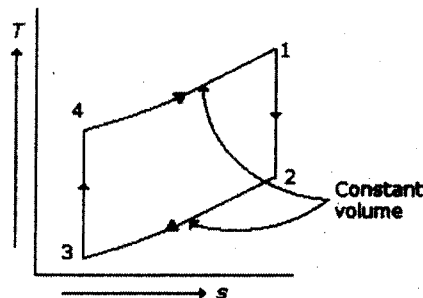
Q-1 Select the most appropriate options

(8x1= 08)

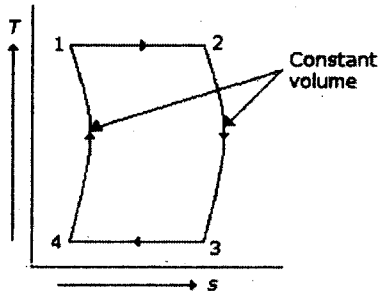
- 1. An adiabatic process is one in which \_\_\_\_
  - a) No heat enters or leaves the gas
  - b) Temperature of gas changes
  - c) the change in internal energy is equal to the mechanical workdone
  - d) all the above
- 2. Which of the following represents Otto cycle on temperature - entropy ( $T - s$ ) diagram?



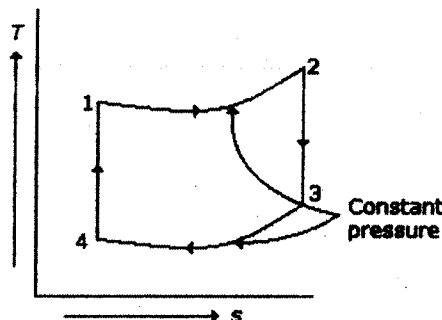
a)



b)



c)



d)

- 3. Rankine cycle comprises of \_\_\_\_
  - a) two isentropic processes and two constant volume processes
  - b) two isentropic processes and two constant pressure processes
  - c) two isothermal processes and two constant pressure processes
  - d) none of the above.

4. Thermal power plant works on
- a) Carnot cycle
  - b) Bryton cycle
  - c) Rankine cycle
  - d) Otto cycle
5. Which of the following statements about concentrated solar thermal power (CSTP) are correct?. Please select all that apply.
- a) It can provide electricity at night-time.
  - b) The output from a solar chimney is proportional to its height.
  - c) The technology does not depend on any rare element.
  - d) CSTP plants are often best located within 15 degrees of the equator.
  - e) The output in ocean thermal conversion plants depends on the cube of the temperature difference between the surface and water below 1000 m.
  - f) Stirling engines are external heat engines capable of high efficiency
6. In solar thermal conversion systems the solar heat is transferred to
- a) water-steam
  - b) liquid metals
  - c) molten salts
  - d) any of the above.
7. Which of the following area is preferred for solar thermal electric plants?
- a) mountain tops
  - b) hot arid zones
  - c) coastal areas
  - d) high rainfall zones.
8. Which of the following enters the super heater of a boiler?
- a. Cold water
  - b. Hot water
  - c. Wet steam
  - d. Super-heated steam.

Q-2 Answer **any seven** questions

**(7x2= 14)**

1. List the methods of improving the performance of a rankine cycle
2. Why Carnot cycle not practical for a steam power plant? Explain shortly.
3. Give the advantages of feed water heating system.
4. Write short notes on steam turbine
5. Define the condenser & write the need for condenser in steam power plant
6. Write the need for solar tracking system in solar thermal power generation.
7. What is solar field?
8. What is receiver?
9. Explain Fresnel steam generation technology.

Q3 A) Compare the Otto and Diesel cycles on the basis of same compression ratio and same heat inputs, with help of T-S and P-V diagrams. **(06)**

Q3 B) Discuss the effect of i) Boiler pressure and ii) Condenser pressure on the performance of a Rankine cycle. **(06)**

**OR**

Q3B) With a neat diagram explain construction and working of steam turbine. **(06)**

Q4 A) Explain different types of thermal power generation technologies with diagram **(06)**

Q4 B) Discuss the structure, reflecting mirrors, receiver of parabolic dish power plants. **(06)**

**OR**

Q4 B) Describe the working principle, main elements and characteristic parameters of a Stirling engine (06)

Q 5A) Explain the parabolic dish power plants and write possibility of power generation for the Indian context. (06)

Q 5B) Describe central receiver power plant (CRPP) with neat sketch diagram (06)

**OR**

Q5B) B) Describe any conventional power plant and how the CRPP integrated conventional power plants. (06)

Q6 A) Describe Integrated Solar Combined Cycle (ISCC) and how to integrate water/steam cycle in Parabolic Trough, Central Tower, and Linear Fresnel Concentrated solar power plants and hybrid plants. (06)

Q6 B) Describe the mechanism and need of solar tracking system in solar power plant technology with neat sketch diagram. (06)

**OR**

Q6 B) Discuss the rough unit cost rating of different types of solar thermal power generation technology. (06)

~~-X-~~