

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-V EXAMINATION – WINTER 2015**

**Subject Code: 151906****Date:14/12/2015****Subject Name: Conventional Power Engineering****Time: 10:30am to 1:00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

**Q.1 (a)** On which cycle thermal power plant works? Explain the cycle with line diagram. Also plot (T-s) and (h-s) diagram. **07**

**(b)** In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar. Assume flow rate of 9.5 kg/s. Determine :  
(i) The pump work, (ii) The turbine work, (iii) The Rankine efficiency, (iv) The condenser heat flow, (v) The dryness at the end of expansion, (vi) Represent the same cycle on T-s diagram. **07**

**From steam table :**At 35 bar :  $h_{g1} = 2802 \text{ kJ/kg}$ ,  $sg_1 = 6.1228 \text{ kJ/kg K}$ At 0.2 bar :  $h_f = 251.5 \text{ kJ/kg}$ ,  $h_{fg} = 2358.4 \text{ kJ/kg}$ ,  $v_f = 0.001017 \text{ m}^3/\text{kg}$ ,  
 $s_f = 0.8321 \text{ kJ/kg K}$ ,  $s_{fg} = 7.0773 \text{ kJ/kg K}$ .

**Q.2 (a)** In a gas turbine plant working on Brayton cycle, the air at inlet is 27°C, 0.1 MPa. The pressure ratio is 6.25 and the maximum temperature is 800°C. The turbine and compressor efficiencies are each 80%. Find compressor work, turbine work, heat supplied, cycle efficiency and turbine exhaust temperature. Mass of air may be considered as 1 kg. Draw T-s diagram. Assume  $C_{p_{air}} = C_{p_{gas}} = 1 \text{ kJ/kg K}$ . **07**

**(b)** Describe working of diesel power plant with suitable diagram. Write merits and demerits of diesel power plant over other types. **07**

**OR**

**(b)** Explain the following systems for diesel power plant with a neat sketch :  
(i) Air intake system and (ii) Engine exhaust system. **07**

**Q.3 (a)** Why is compounding required in steam turbine? Explain with neat sketch any one method of compounding in steam turbine. **07**

**(b)** Explain the ideal and actual Brayton cycles with T-S diagrams. Derive expressions for air standard efficiency for ideal Brayton cycle. **07**

**OR**

**Q.3 (a)** State the various methods of governing of a steam turbine and Explain any one of them in detail. **07**

**(b)** State the various methods of improving the efficiency and work output of a gas turbine plant. With schematic and T-S diagram explain the regeneration process. **07**

**Q.4 (a)** What are the criteria for selection of sites for hydro electric power plant? Differentiate between Impulse and reaction water turbines. **07**

**(b)** What is the difference between fission and fusion process? Explain Nuclear fission chain reaction. **07**

**OR**

- Q.4 (a)** Define the followings; (1) Load factor, (2) utility factor, (3) plant operating factor, (4) capacity factor, (5) Demand factor, (6) Base load, (7) peak load. **07**
- (b)** Write a note on nuclear waste and its disposal. **07**
- Q.5 (a)** What are the principal parts of a nuclear reactor? Explain in brief. **07**
- (b)** Classify all hydraulic turbines and briefly explain Pelton wheel with neat diagram. **07**
- OR**
- Q.5 (a)** Describe CANDU type reactor with neat sketch and give its advantage and disadvantages over the other type of nuclear reactor. **07**
- (b)** What are the advantages and limitation of hydro power plant over other power plant? **07**

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