Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 151802

Subject Name: Thermodynamics-I

Date: 15 /12 /2010 **Time: 03.00 pm - 05.30 pm**

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)**	Explain Single Stage reciprocating Air compressorwith all arrangement and indicator diagram.	**07**
	(b)	Explain. (i) specific humidity. (ii) Relative humidity.(iii)Dew point. (iv)Unsaturated and saturated air.	**07**
Q.2	**(a)**	Explain P-T diagram for a pure substance	**07**
	(b)	Compare Rankine and Carnot cycle Briefly.	**07**
		OR	
	(b)	A cyclic heat engine operates between a source temperature of 800^0 C and a sink temperature of 30^0 C. What is te least rate of heat rejection per KW net output of the engine?	**07**
Q.3	**(a)**	Explain Reheat cycle with the effect of Thermal efficiency & Steam rate.	**07**
	(b)	Discuss different Losses in Actual vapour cycle processes.	**07**
		OR	
Q.3	**(a)**	Compare Otto ,Diesel & Dual cycles for (1) Same compression ratio.(2)Same maximum pressure & temperature .	**07**
	(b)	Explain Indicated power,Brake power ,Friction Power & Mechanical Efficiency.	**07**
Q.4	**(a)**	Write Kelvin-Plank's and Clausius's statement of second law of Thermodynamics & explain its equivalence of them briefly.	**07**
	(b)	Explain Carnot Cycle with all four successive processes.	**07**
		OR	
Q.4	**(a)**	Explain Advantagesof Multi Stage Compressors.	**07**
	(b)	A two –stage air compressor with perfect intercooling takes in air at 1 bar pressure and 27^0 C. The law of compression in both the stages is $pv^{1.3}$ =constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver.Calculate ,per Kg of air , (1) the minimum work done and(2)The heat rejected to the intercooler.	**07**
Q.5	**(a)**	A coal fired boiler plant consumes 400 Kg of coal per hour. The boiler evaporates 3200 kg of water at 44.5^0 C in to superheated steam at a pressure of 12 bar and 274.5^0 C.If the calorific value of the fuel is 32600 KJ/Kg of coal, determine (i)Equvalent evaporation (ii)Thermal Efficiency of the Boiler. Assume Specific heat of superheated steam is 2.1KJ/Kg.K	**07**
	(b)	What is evaporative capacity of the boiler ?explain Equivalent Evaporation in standard and actual operating conditions.	**07**
		OR	
Q.5	**(a)**	Discuss Tandem and in-line arrangement in compressors.	**07**
	(b)	Discuss air leakage problems in surface condensers.	**07**

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