Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-IV Remedial Examination Nov/ Dec. 2010

Subject code: 142501 **Subject Name: Heat Power Engineering**

Date: 01 /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)**	[1]Define: (i) System (ii) Surrounding (iii) Thermal equilibrium	**03**
		[2] Explain flow and non flow processes.	**04**
	(b)	What are the limitations of first law of thermodynamics? Give different statements of second law of thermodynamics.	**07**
Q.2	**(a)**	What is entropy? Derive the general expression for change of entropy in terms of temperature and volume.	**07**
	(b)	Explain Clausius inequality and give third law of thermodynamics.	**07**
		OR	
	(b)	List various power producing thermodynamic cycles and explain Carnot cycle.	**07**
Q.3	**(a)**	Explain Otto cycle and derive equation for its air standard efficiency.	**07**
	(b)	An engine having 25 cm bore and 192 mm stroke works on otto cycle. The clearance volume is 1600 cu cm. Taking γ = 1.4, determine air standard efficiency of cycle.	**07**
		OR	
Q.3	**(a)**	What is steam nozzle? Explain the effects of friction on the flow through a steam nozzle.	**07**
	(b)	Explain super saturation phenomena in steam nozzle.	**07**
Q.4	**(a)**	Explain principle of operation of steam turbine and compare the steam turbine with steam engine.	**07**
	(b)	What is compounding? Explain compounding of impulse turbine.	**07**
		OR	
Q.4	**(a)**	Describe the working of simple constant pressure open cycle gas turbine with sketches.	**07**
	(b)	List methods of improving thermal efficiency of gas turbine and explain any one.	**07**
Q.5	**(a)**	Explain construction and working of single acting, single stage reciprocating air compressor.	**07**
	(b)	A single acting, single stage air compressor is belt driven from an electric motor at 300 rpm. The cylinder diameter is 24 cm and stroke is 30 cm. The air is compressed from 20 Pa to 160 Pa and law of compression is $pv^{1.25}$ = constant. If the transmission efficiency is 95%, find the power required by the motor. Neglect clearance effect.	**07**
		OR	
Q.5	**(a)**	Explain vapour compression refrigeration cycle with diagram.	**07**
	(b)	[1] Explain various modes of heat transfer with suitable examples	**04**
		[2].Explain concept of black body.	**03**

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