Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-II Remedial Examination December 2010

Subject code: 722102 Subject Name: Thermal Power Plant Engineering

Date: 20 /12 /2010 **Time: 02.30 pm – 05.00 pm**

Total Marks: 60

Instructions:

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

Q.1	**(a)**	What are the design considerations for modern boilers?	**06**
	(b)	Describe the various energy management techniques.	**06**
Q.2	**(a)**	What are the advantages and disadvantages of Pump Storage System?	**06**
	(b)	Explain in detail load division for economic design of generating plants.	**06**
		OR	
	(b)	An open cycle gas turbine power plant works on Brayton cycle. The maximum pressure and temperature of the cycle are limited to 5 bar and 900K. the pressure and temperature of the gas entering into the compressor are 1 bar and 27^0C. Reheating is used at pressure of 2.5 bar where the temperature of the gases is increased to its original turbine inlet temperature. The air flow per second through the plant is 10 kg/sec. Determine the thermal efficiency and plant capacity in MW. The exhaust pressure of the turbine is also 1 bar. Assume the compression and expansion as isentropic. Take γ = 1.4 for air and gases, Cp = 1 kJ/kg for air and gases. And C.V. for fuel = 40000 kJ/kg. Neglect the pressure losses in the system. Do not neglect the fuel quantity.	**06**
Q.3	**(a)**	Explain the gas disposal system of nuclear reactor.	**06**
	(b)	Explain factors affecting the performance of combined cycle power plants	**06**
		OR	
Q.3	**(a)**	Explain the Supercharging in diesel engines.	**06**
	(b)	The input-output curve of a 25 MW capacity generating power plant is given by $I = 5 \times 10^6 (7 + 0.2 L + 0.1 L^2)$ where I is in kJ/hr and L is in Mw. Find the average rate of heat supplied (heat supplied per MW-hr) when the plant is operating at 25 MW load for 10 hours in a day and it was kept hot at zero load for the remaining period of 14 hours. Also find the saving in the heat rate if same energy is produced for the whole day at constant load	**06**
Q.4	**(a)**	Explain the different arrangements of gas turbine plant components.	**06**
	(b)	Compare open cycle gas turbine plants and closed cycle gas turbine plants	**06**
		OR	
Q.4	**(a)**	Explain the principle of fluidized be combustion system.	**06**
	(b)	Explain design and selection for economizers.	**06**
Q.5	**(a)**	Define: average load, load factor, use factor, capacity factor, demand factor, diversity factor.	**06**
	(b)	A power plant has the following annual factors. The load factor = 70%, capacity factor = 50%, use factor = 60%. The maximum demand is 20 MW. Find: a) Annual energy production, b) Reserve capacity over and above peak load, c) Hours during which the plant is not in service per year.	**06**
		OR	
Q.5	**(a)**	Describe the methods of improving the thermal efficiency and power output of gas turbine plants.	**06**
	(b)	Describe the general design factors for the power plant layout.	**06**

****