GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2171910   **Date:02/02/2021**

Subject Name:Power Plant Engineering

Time:10:30 AM TO 12:30 PM   **Total Marks: 56**

Instructions:
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of steam table is permitted.

			MARKS
Q.1	**(a)**	Draw general layout of thermal power plant and label various components and name various circuits.	**03**
	(b)	Describe unique features of La-mont and Loeffler boilers.	**04**
	(c)	Describe compounding of steam turbine and explain pressure-velocity compounded impulse turbine with neat sketch.	**07**
Q.2	**(a)**	What are the difficulties encountered in ash handling.	**03**
	(b)	Develop an expression for chimney height in terms of mm of water column.	**04**
	(c)	In a constant pressure open cycle gas turbine air enters at 1 bar and 20°C and leaves the compressor at 5 bar. Using following data : Temperature of gases entering the turbine-680°C Pressure losses in the combustion chamber- 0.1 bar Compressor efficiency – 85% Turbine efficiency – 80% ; combustion efficiency-85% γ = 1.4 and Cp= 1.024 kJ/kg K for air and gas. Find (i) The quantity of air circulation if the plant develops 1065 kW (ii) Heat supplied/kg of air (iii) Thermal efficiency of the cycle.	**07**
Q.3	**(a)**	What are the effects of air leakage on performance of condenser?	**03**
	(b)	Make comparison of pulverized coal firing and stoker firing.	**04**
	(c)	A Parsons reaction turbine develops 6 MW at speed of 500 rpm using 7 kg/kWh of steam. The exit angle of the blades are 20° and the velocity of steam is 1.3 times the blade velocity and pressure at exit is 1.3 bar and dryness fraction is 0.92. Calculate : (i) a suitable blade height, assuming the ratio of drum diameter to blade height is 8, and (ii) diagram power.	**07**
Q.4	**(a)**	Define thrust, thrust power and propulsive power.	**03**
	(b)	Why closed cycle is preferred over open cycle gas turbine?	**04**
	(c)	Explain construction and working of cyclone burner.	**07**
Q.5	**(a)**	Define super saturation, degree of under cooling and degree of super saturation	**03**
	(b)	Explain effect of load on super heater temperature.	**04**

(c) A surface condenser deals with 13600 kg of steam per hour at 0.09 bar pressure. **07** The steam is 0.85 dry at condensate temperature. The air extraction pipe is at 36 °C. The air leakage is 7.26 kg/hr. Determine (i) The surface required if heat transmission rate is 3.97kJ/cm^2 per second (ii) cylinder diameter of pump for dry air,if it is to be single acting at 60 rpm with stroke to bore ratio of 1.25 and volumetric efficiency of 0.85.

Q.6	**(a)**	Explain base and peak load power plants	**03**
	(b)	Explain principle of reverse osmosis process.	**04**
	(c)	Write short note nuclear waste and its disposal.	**07**
Q.7	**(a)**	What is sub critical and super critical boiler?	**03**
	(b)	Discuss boiling water reactor with neat sketch.	**04**
	(c)	Explain Ion exchange process with neat diagram.	**07**
Q.8	**(a)**	What is the necessity of feed water treatment?	**03**
	(b)	Explain pneumatic ash handling system.	**04**
	(c)	Explain liquid metal cooled reactor with neat diagram.	**07**

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