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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2171910 **Date:21/05/2019**

Subject Name:Power Plant Engineering

Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

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

			MARKS
Q.1	**(a)**	Draw general layout of modern thermal power plant and labelled its components.	**03**
	(b)	List the different methods used to control the superheat temperature of steam and explain any one method in details.	**04**
	(c)	What is compounding? Explain working principle of pressure compounding with neat sketch.	**07**
Q.2	**(a)**	State the advantages and disadvantages of pressurized fluidized bed combustion boiler.	**03**
	(b)	List down the requirements of good ash handling system.	**04**
	(c)	Explain with neat sketch construction and working Benson boiler and state its advantages.	**07**
		OR	
	(c)	Air enters to compressor of gas turbine plant operating on Brayton cycle at 100 kPa and 300 K with a volumetric flow rate of 5 m^3 / sec. the compression pressure ratio is 10. The turbine inlet temperature is 1300 K. The turbine and compressor has an isentropic efficiency of 0.82 and 0.8 respectively. Calculate 1) Thermal efficiency of the cycle 2) Back work ratio 3) Net power developed in kW Assume C_p =1.005 kJ/kg and Υ=1.4 for air and gases.	**07**
Q.3	**(a)**	State the advantage of mechanical draught over natural draught.	**03**
	(b)	State the requirements of pulverized coal burners.	**04**
	(c)	Explain the working of electrostatic precipitator with neat sketch.	**07**
		OR	
Q.3	**(a)**	What is the necessity of cooling tower in a steam power plant?	**03**
	(b)	Differentiate between ramjet engine and pulsejet engine.	**04**
	(c)	A mean blade ring diameter of a single stage impulse turbine is 1.3 meter. It runs at 3200 R.P.M. The nozzle angle is 15^0 and blade speed ratio is 0.45. The blade friction factor is 0.9 and the discharge is axial. calculate blade inlet and outlet angles and power output per kg of steam.	**07**
Q.4	**(a)**	Explain the role of boiler feed water pH in corrosion of boiler tubes.	**03**
	(b)	Differentiate between throttle governing and nozzle control governing.	**04**
	(c)	Derive expression for mass flow rate of steam through nozzle.	**07**
		OR	

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Q.4	**(a)**	Define following term: 1) Vacuum efficiency 2) Condenser efficiency	**03**
	(b)	Draw the P-V and T-S diagram of ideal Brayton cycle.	**04**
	(c)	Write short note on sodium zeolite ion exchange process.	**07**
Q.5	**(a)**	Write down the function of following components of nuclear reactor :1) Moderator 2) Control rod	**03**
	(b)	Give detailed classification of steam turbines.	**04**
	(c)	Write short note on fast breeder reactor.	**07**

OR

Q.5	**(a)**	Define following terms as applied to jet propulsion: 1) Thrust 2) Propulsive power	**03**
	(b)	Define following terms: 1) Connected Load 2) diversity Factor	**04**
	(c)	Calculate the cost of generation per kWhr for a power station having following data: Installed capacity of plant = 200 MW Capital cost = Rs. 400 crores Rate of interest and depreciation = 12 % Annual cost of fuel, salaries and taxation = Rs. 5 crores Load factor = 50%	**07**

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