Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3171910 Date:24-05-2024

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Give the classification of gas turbine on three aspect.	**03**
	(b)	State the factors to be considered for site selection of Hydro Power Plant.	**04**
	(c)	Explain the Principle, Construction and Working of Liquid metal cooled Reactor with neat sketch	**07**
Q.2	**(a)**	Compare the gas turbine and steam turbine on any three aspects	**03**
	(b)	Derive the efficiency equation of Brayton cycle.	**04**
	(c)	Explain the Principle, Construction and Working of Pressurised Water Reactor with neat sketch.	**07**
		OR	
	(c)	Explain about the nuclear waste from nuclear power plant and its disposal methods	**07**
Q.3	**(a)**	Discuss the need of feed water treatment process in thermal power plant.	**03**
	(b)	State the function of cooling tower and give the classification of cooling tower on any three aspects.	**04**
	(c)	A gas turbine plant consists of two stage compressor with perfect intercooler and a single stage turbine. If the plant works between the temperature limits of 27^{o}C and 727^{o}C and 1 bar and 16 bar, find the net power of the plant per kg of air. Take specific heat at constant pressure as 1 kJ/kg K.	**07**
		OR	
Q.3	**(a)**	State and explain three types of Nozzle with neat sketch.	**03**
	(b)	Derive the equation of exit velocity from the steam nozzle	**04**
	(c)	In a gas turbine plant, the air is compressed in a single stage compressor from 1 bar to 9 bar and from an initial temperature of 27^{o}C. The same air is then heated to a temperature of 527^{o}C and then expanded in the turbine. The air is then reheated to a temperature of 527^{o}C and then expanded in the second turbine. Find the maximum power that can be obtained from the installation, if the mass of air circulated per second is 2kg. Take specific heat at constant pressure as 1 kJ/kg K.	**07**
Q.4	**(a)**	State the uses of gas turbine.	**03**
	(b)	Compare the induced draught and forced draught on any four aspects	**04**
	(c)	Draw the general layout of the modern thermal power plant. Explain the function of main component of modern thermal power plant.	**07**

OR

Q.4	**(a)**	Define: a) Steam condenser b) Condenser efficiency c) Vacuum efficiency	**03**
	(b)	Explain the principle, construction and working of a Reaction turbine.	**04**
	(c)	Explain the principle, construction and working Benson boiler with neat sketch	**07**
Q.5	**(a)**	Explain the terms: Load curves, Load duration curves, connected load	**03**
	(b)	What is the significance of two part tariff and three part tariff?	**04**
	(c)	List components of wind mill power system, show them with neat sketch. Compare horizontal axis wind turbine with vertical axis wind turbine on any four aspects.	**07**

OR

Q.5	**(a)**	Compare the open cycle gas turbine and closed cycle gas turbine on any three aspects.	**03**
	(b)	Explain the terms: Peak load, Load factor, Plant use factor, Demand factor	**04**
	(c)	What is concentrating solar-thermal power (CSP) technology and how does it work? Explain with line diagram.	**07**

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