Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3171910 Date:19-05-2025

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)**	Draw detailed layout of modern coal based thermal power plant	**03**
	(b)	State and explain unique features of High pressure. boilers.	**04**
	(c)	Explain working principle of solar photovoltaic cell and list merits and demerits of photovoltaic solar energy conversion.	**07**
Q.2	**(a)**	State necessity of feed water treatment in thermal power plants.	**03**
	(b)	State objective of condenser and its advantages in thermal power plant.	**04**
	(c)	An open cycle gas turbine plant uses heavy oil as fuel. The maximum pressure and temperature in the cycle are 5 bar & 650°C. The temperature and pressure of air entering into the compressor are 27°C and 1 bar. Assuming isentropic efficiencies of compressor and turbine to be 80% and 85% respectively, find the thermal efficiency of the cycle. The overall A:F ratio is 60:1. Take Cp for air and gas as 1 Kj/Kg °C and ɣ for air and gas as 1.4. if the plant consume 5 Kg of fule/sec then find the power generating capacity of the plant.	**07**
		OR	
	(c)	Calculate the efficiency and specific work output of a simple gas turbine plant operating on Brayton cycle. The maximum and minimum temperatures are 1000K and 288 K respectively. The pressure ratio is 6. The isentropic efficiencies of the compressor and turbine are 85% and 90% respectively. If unit consumes 2 tonnes of oil per hour and has CV 46500 KJ per Kg. Find the power generated. The mechanical efficiency is 90% and the generation efficiency is 85%.	**07**
Q.3	**(a)**	State safety measures required for nuclear power plants.	**03**
	(b)	Give comparison between forced and induce draught.	**04**
	(c)	Draw detailed layout and explain important components of hydro-electric power plant	**07**
		OR	
Q.3	**(a)**	Give classification of wind power plants.	**03**
	(b)	Give name of the components of a nuclear power plant and explain any three in brief.	**04**
	(c)	Explain need of cogeneration, list its type and explain any one in brief with neat sketch.	**07**

Q.4	**(a)**	Define impulse and reaction turbine.	**03**
	(b)	List operating variable effecting thermal efficiency of an actual open cycle gas turbine. Explain any one of them with supporting chart or sketches.	**04**
	(c)	Explain construction and working of BWR with neat sketch also list merit and demerit of it.	**07**

OR

Q.4	**(a)**	List characteristics of good coal handling plant & draw schematic of inplant handling of coal.	**03**
	(b)	Define compounding of steam turbine and explain why it is essential.	**04**
	(c)	Explain following terms. I) Average Load ii) Load factor iii) Demand iv) Diversity factor v) Plant capacity factor vi) Plant use factor vii) Maximum demand.	**07**

Q.5	**(a)**	State advantages of gas turbine over steam turbine.	**03**
	(b)	Compare horizontal and vertical axis wind turbine.	**04**
	(c)	With neat sketch explain construction and working of CANDU reactor.	**07**

OR

Q.5	**(a)**	Define load duration curves and how it is useful?	**03**
	(b)	List type of nuclear waste disposal method and discuss any one in brief.	**04**
	(c)	Prove that the pressure ratio for maximum work is function of limiting temperature ratio.	**07**

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