Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1722102 **Date: 10/12/2015**

Subject Name: Thermal Power Plant Engineering

Time:2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

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

Q1 A] Give the layout of modern thermal power station including major circuits/paths of flow of coal, air & flue gases, condensate & steam and cooling water. Label the major equipments. [7]

B] Explain the principle of Fluidized Bed Combustion systems with diagram. What are main problems with such system? How such problems are overcome? [7]

Q2 A] A gas turbine power plant works on constant pressure open cycle. It consists of compressor, generator, combustion chamber and turbine (the compressor, turbine and generator mounted on the same shaft). The following data is given for this plant: [7]

The pressure and temperature of air entering into the compressor	= 1 bar, 25^0C
The pressure of air leaving the compressor	= 4 bar
Isentropic efficiency of the compressor	= 82%
Isentropic efficiency of the turbine	= 86%
Effectiveness of the regenerator	= 72%
Pressure loss in regenerator along air side	= 0.08 bar
Pressure loss in regenerator along gas side	= 0.08 bar
Pressure loss in Combustion Chamber	= 0.04 bar
Combustion efficiency	= 92 %
Mechanical efficiency	= 92 %
Generator efficiency	= 92 %
Calorific value of fuel used	= 40000 KJ/kg
Flow of air	= 24 kg/s
Atmospheric pressure	= 1.03 bar
The maximum temperature of the cycle	= 690^0C

Determine the following:

(i) The power available at the generator terminals

(ii) The overall efficiency of the plant, and

(iii) The specific fuel consumption

Take ɔ = 1.4 for air and gases, C_{pa} =1 KJ/kgK ; C_{pg}= 1.1 KJ/kgK.

B] Which methods are used to improve the efficiency of a gas turbine power plant? Show them online-diagrams, p-V and T-s diagrams and explain any one. [7]

OR

	B]	Derive an expression for the optimum pressure ratio giving maximum specific output in simple cycle gas turbine.	[7]

Q3	A]	Explain with a neat sketch the combustion chamber of a gas turbine plant. What are dilution holes? How is flame stabilization secured by (a) a swirler (b) a bluff body?	[7]
	B]	Define: average load, peak load, load factor, use factor, capacity factor, demand factor, diversity factor.	[7]

OR

Q3	A]	Explain with neat sketch arrangement of a diesel power plant and also function of each system.	[7]
	B]	Explain the main features of supercharging with the help of P-V diagram. What do you mean by turbocharging? What is the effect of intercooling in turbocharging?	[7]
Q4	A]	What is HTGR? Explain with a sketch its main features.	[7]
	B]	Explain co-generation and combined cycle	[7]

OR

Q4	A]	Explain Nuclear waste and its disposal.	[7]
	B]	What is a CANDU ï type reactor? Explain with a sketch its main features	[7]
Q5	A]	How does the pumped hydro system operate? Show the main components in a neat sketch of the system.	[7]
	B]	What is meant by tariff? Explain straight line meter rate, two part tariff and three part tariff rates.	[7]

OR

Q5	A]	What is energy management? How it helps in solving problems of energy crisis?	[7]
	B]	Write short note on compressed air storage plant.	[7]

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