Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – IInd - Examination – June/July- 2011

Subject code: 1722102

Subject Name: Thermal Power Plant Engineering

Date:24/06/2011 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

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

Q.1 **(a)** Explain briefly fluidized bed combustion (FBC) system. **07**

(b) What are the advantages and disadvantages of direct and indirect methods of boiler efficiency? Following data are referred for calculating boiler efficiency and evaporation ratio by using direct method: **07**

Quantity of steam produced (Output):14 ton per hour(TPH) Quantity of coal consumed : 2 TPH

Gross calorific value of coal is : 17000 kj/kg

Steam pressure and temperature: 12 Bar(g)/188^{0}C

Enthalpy of steam (dry & sat. At 12 bar gag. Pr.):2782kj/kg

Feed water temperature is : 90 ^{0}C

Enthalpy of feed water temperature is : 370 kj/kg.

Q.2 **(a)** What are the methods use to improve the thermal efficiency of open cycle gas turbine plant? **07**

(b) Following case study of A gas turbine unit has pressure ratio of 6:1 and cover maximum cycle temperature of 625 ^{0}c. The isentropic efficiency of the compressor and turbine are 81 % & 83 % respectively. Calculate power output in kilowatts of an electric generator generated to the turbine when the air enters the compressor at 16 ^{0}C at the rate of 17 kg/s. Assume C_p is 1.005 kj/kg k and γ is 1.4 for the compression process and C_p is 1.11 kj/kg k and γ is 1.33 for the expansion process . **07**

OR

(b) Explain with line diagram of combined steam and gas turbine plants. **07**

Q.3 **(a)** What is the future of Modern nuclear power plant? **07**

(b) List the essential components of a diesel power plant and explain them briefly. **07**

OR

Q.3 **(a)** Discuss the various essential components of a nuclear reactor. **07**

(b) What factors should be consider while selecting a site for a diesel power plant? **07**

Q.4 **(a)** How to reduce power generation cost? **07**

(b) Why high pressure boiler is use in power plant? **07**

OR

Q.4 **(a)** What is the objective and requirements of tariff for electrical energy? **07**

(b) The following data related to steam power plant : **07**

Maximum demand : 30000 kw
Load factor : 0.42
Coal consumption : 1.1 kg/kwh
Boiler efficiency: 84%
Turbine efficiency: 88%
Price of coal: Rs.70/- per tonne.
Determine the following: (i) Thermal efficiency of the plant,(ii) Coal billow the plant for one year.

Q.5 **(a)** Write short note on pumped hydro storage plant. **07**

(b) What do you understand by energy conservation and its importance? **07**

OR

Q.5 **(a)** Write short note on compressed air storage plant. **07**

(b) What are the principles involved in energy management? **07**

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