

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –III Examination Dec. - 2011

Subject code: 732103

Date: 08/12/2011

Subject Name: Economics & Management of Thermal Systems

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) Discuss the importance of thermal power development in India. Also discuss in brief, the role of fuel in power plant economics. **07**
- (b) Discuss the method to construct load duration curve and state its advantages in the design of power plant. **07**

- Q.2** (a) Which resources are considered as future major power resources and why? **07**
- (b) What are non-conventional sources of power generation? Discuss its scope in India. **07**

OR

- (b) Define: connected load, demand factor, diversity factor. **07**
- A diesel power plant consists of two units of 500 kW capacity each and one unit of 200 kW capacity. The fuel used has calorific value 40000 kJ/kg and the fuel consumption is 0.3 kg/kWh. Determine the quantity of fuel required for a month of 30 days and its cost if the fuel cost is Rs. 5000 per tonne. Also find the overall efficiency of the plant. Assume plant capacity factor as 50% on monthly basis.

- Q.3** (a) Define: average load, load factor, use factor, capacity factor. **07**
- Find the number of hours of operation of plant during the year for the following data. The use factor is 0.6 and capacity factor is 0.5 considering the annual operation of plant.
- (b) Define peak load. What is peak load plant? What are the requirements of peak load plant? **07**

OR

- Q.3** (a) Explain with sketch the working of air-storage power plant as a peak load plant. **07**
- (b) Explain with diagram the pump storage plant and show that the energy developed by water turbine during peak requires nearly 1.4 kWh energy to that supplied to the pump during off-peak period. Take common values of efficiencies for pump and turbine. **07**

- Q.4** (a) What are the different types of Caverns used for air storage plants? State their relative advantages and disadvantages. **07**
- (b) Discuss in detail how the load between two generators of generating station can be divided for the best economy? **07**

OR

- Q.4 (a)** Discuss about the fixed cost and running cost of electrical energy generated in power plant. **07**
- (b)** The energy consumption of a consumer per month is 2300 kWh. The maximum demand is 12 kW. Using the Hopkinson demand rate as given below find **07**
- Monthly bill of the consumer and the unit energy cost,
 - Lowest possible bill for a month of 30 days and unit energy cost for the given energy consumption.

The Hopkinson charges are as follows:

Demand Rates:	0-5 kW	= Rs. 200/ kW
	6-10 kW	= Rs. 150/ kW
	11-15 kW	= Rs. 120/ kW

Energy Rates:

First	-	100 kWh = Rs. 2 kWh
Next	-	500 kWh = Rs. 1.5 kWh
Next	-	2000 kWh = Rs. 1 kWh
Excess over 2000 kWh		= Rs. 0.8 kWh

- Q.5 (a)** Discuss the methods of determining the depreciation of electrical power plant. **07**
- (b)** Discuss various tariff methods for electrical energy. **07**

OR

- Q.5 (a)** Mention the advantages and disadvantages of hydro-electric power plant compared to thermal power plant. Why combined operation of hydro and thermal plants is more economical than individual operation of the plant. **07**
- (b)** The annual load duration curve of a station varies uniformly from 64000 kW to zero. The load is supplied by two stations whose cost equations are given as: **07**
- $$C1 = \text{Rs. } (840000 + 840 \text{ kW} + 0.116 \text{ kWh})$$
- $$C2 = \text{Rs. } (500000 + 440 \text{ kW} + 0.2985 \text{ kWh})$$
- Find the minimum cost of generation in Rs./kWh for the system.
