

2063  
B.E. (Electrical and Electronics Engineering)  
Seventh Semester  
EE-709 (ii): Electrical Power Generation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- The maximum demand of a power plant is 40 MW. The capacity factors is 0.5 and the utilization factor is 0.8. Find (i) load factor (ii) plant capacity (iii) reserve capacity (iv) annual energy production
- What do you understand by the term 'load diversity'? What is its significance?
- Why do some power companies put a penalty for low power factor?
- What considerations govern the selection of plant size?
- Why is it economical to operate hydro steam plants in combination? (5x2)

**UNIT - I**

II. The load curve of an electrical system is liner with the following values at different times.

Time	12	2	5	8	5	6	9	12
Load MW	20	10	10	50	50	100	100	20

- Plot chronological load curve and load duration curve for the system.
  - Plot energy load curve mass current.
  - Find load factor of this system.
  - Find capacity factor and utilization factor if the station capacity is 125MW. (10)
- III. A 400 V, 3 Phase star connected induction motor draws a current of 25A at 0.8 lagging power factor under full load condition. It is desired to install a bank of capacitors to raise the full load overall power factor to 0.9 lagging. Find the kvar rating of the star connected capacitor bank and the value of each capacitor. (10)
- IV. a) Discuss the role of load factor on the cost of electrical energy.  
b) The annual fixed and operating costs of 300MW hydro station are Rs.1500 per KW of installed capacity per annum and Rs.0.35 per KW respectively. Plot the variation of unit cost of energy with load factor. (10)

**UNIT - II**

- V. a) Discuss the factors which tend to limit the size of units in steam plant.  
b) What considerations govern the selection of sites for stem plants? (10)

P.T.O.

(2)

- VI. A two-plant system having a steam plant near load centre and a hydro plant at a remote location is shown in Fig.(1). The load is 700MW for 14 hours a day and 500MW for 10 hours a day. The characteristics of units are:

$$C_1 = (24 + 0.02P_1)P_1 \text{ Rs/hours}$$

$$W_1 = (6 + 0.0025P_1)P_2 \text{ m}^3/\text{Sec}$$

$$\text{Loss coefficient } B_{22} = 0.0005$$

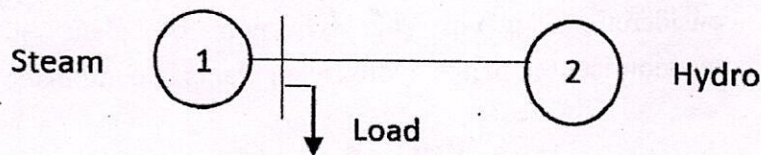


Fig. 1

Find the generation schedule, daily water used by hydro plant and daily operating cost of thermal plant for  $r_2 = 2.5$  Rs per hour/m<sup>3</sup> per sec. (10)

- VII. A large industrial undertaking has a maximum demand of 50MW at a load factor of 0.5. It has the option of getting supply from a utility or of installing its own steam plant. The cost are as under:

Public supply tariff = Rs. 400 per kW of maximum demand per year + Rs 0.3 per kWh

Private steam plant

Reserve capacity 20MW

Capital Investment Rs. 10,000 per kW

Interest and depreciation 10%

Fuel consumption 0.8 kg/kWh

Fuel cost Rs. 240 per 1000 kg

Wage, repair and other operating expenses =Rs 0.12 per kWh.

Find out the cheapest alternative. (10)