Exam.Code:0937
Sub. Code: 6995

2021
B.E. (Electrical and Electronics Engineering)
Seventh Semester
Elective – I
EE-709: Electrical Power Generation

Time allowed: 3 Hours Max. Marks: 50

***NOTE**: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Part.*

x-x-x

1. (i) What is the importance of mass curve in electrical power generation?
   (ii) What are the factors which play key role in deciding the tariff?
   (iii) How peak diversity and group diversity are influencing each other?
   (iv) Define run off river plant.
   (v) What are various scheduling methods for hydro-thermal coordination?

(5*2=10)

PART-. A

2. (i) Discuss organization of power sector in India and how it has changed in present power System.
   (ii) How base load and peak load plants are decided? What will be the problem if plants selection is ignored?

(5,5)

3. For a given power system, the load consumption in MW for 24 hours is as given below:

Time (sec)	12 AM	3AM	6 AM	8 AM	11:30 AM	12 PM	4 PM	5PM	8PM	9PM	11PM	12AM
Load (MW)	20	30	50	20	10	10	45	70	80	40	50	20

Draw chronological load curve, energy curve, mass curve and load factor. If there is load growth of 5%, what will be the change in load factor?

(10)

4. (i) Why is it not economical for consumers to raise power factor to unity? How can the most economical power factor be determined for a consumer installation?

   (ii) A 440V, 50 Hz star connected induction motor draws a line current of 40 A at 0.8 lagging power factor. It is desired to install a bank power factor to 0.95. Determine the KVAR rating of bank and the value of each capacitor bank.

(5,5)

PART- B

5. The maximum demand of power system is 2000 MW. This demand is proposed to be met by installing a hydrothermal system. The hydro system will meet the base load of 1200 MW and

P.T.O.

will operate at a load factor of 0.6. The steam station will meet the remaining demand and will operate at load factor 0.4. Installed capacity of each station will be 40% more than load. The capital costs are Rs 80000 per kW for hydro and Rs 35000 per kW for steam plant, the interest and depreciation charges being 11%. The operating costs for hydro and steam plants are Rs 0.40/kWh and Rs 0.96/kWh respectively. Find the overall generation cost per kWh.

(10)

6. Apply rate of return method to find the best plan out of given plans for given data:

	Plan A	Plan B	Plan C	Plan D
Cost of power plant building, equipment, installation and commissioning (Rs/kW)	9000	8000	10000	7000
Station heat rate (K-cal/kWh)	4000	5000	5500	4500
Heat value of fuel (K-cal/kg)	5000	6000	8000	4000
Fuel cost(Rs/ton)	225	223	220	115
Taxes on real estate	4%	4%	5%	5%
Insurance is 0.8% of capital investment for individual plan				
Interest Rate	6%	7%	5%	4%
Annual cost of supplies and maintenance (Rs)	1500000	200000	100000	300000

Calculate depreciation using sinking fund method. The plant need one chief operator (salary Rs 3000 per month) and 10 shifts operators (salary of each 4000 per month). Annual cost of supplies and maintenance of Rs 200000 for each plant. Plant of life is 25 years.

(10)

7. (i) Discuss the importance of short term hydro-thermal coordination.

(ii) In a two plant operation system, the hydro plant operates for 8 hours during each day and steam plant operates throughout day. The characteristics of the steam and hydro-plants are

$$C_T = .0025\ P_{GT}^2 + 14\ P_{GT} + 12 \text{ Rs/hr}$$

$$W_H = 0.002\ P_{GH}^2 + 28\ P_{GT} \text{ m}^3/\text{sec}$$

When both plants are running, the power flow from steam plant to the load is 190 MW and total quantity of water used for the hydro-plant operation during 8 hour is $220^* 10^6$ m^3. Determine the generation of a hydro plant and cost of water used. Neglect the transmission losses.

(10)

X-X-X