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Exam. Code: 0937
Sub. Code: 6995

1128

B. Engg. (Electrical & Electronics Engineering)

7th Semester

EE-709 (Elective-I): Electrical Power Generation

Time allowed: 3 Hours | Max. Marks: 50

Note: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part-A & B.*

x-x-x

1. (i) What are the factors which limit size of a unit in a plant?
   (ii) What is Electricity act 2003?
   (iii) Which type of tariff plan is used for agriculture sector?
   (iv) What is mass curve ? which type of information it gives?
   (v) What are techniques for long term load forecasting?

(5*2=10)

PART-A

2. (a) An electrical system experiences linear changes in load such that its load curve is defined as follows:

Time	12 PM	3 AM	7 AM	9AM	12 AM	12:30 PM	3 PM	5PM	9PM	12 PM
Load (MW)	40	30	45	60	75	80	60	45	65	40

Plot load duration, energy generated in 24 hours, mass curve and load factor, utilization factor of the plant serving this load if its capacity is 140 MW.

(b) Discuss the components of annual fixed of a plant.

(8,2)

3. (a) A feeder supplies 3 distribution transformers which feed the following connected loads
Transformer -1: Motor loads 300 kW, demand factor 0.6, commercial load 100 kW, demand factor 0.5
Transformer-2: Residential loads 500 kW, demand factor 0.4
Transformer-3: Residential loads 400 kW, demand factor 0.5
The diversity factors for the loads on three transformers may be taken as 2.3 , 2.4, 2.5. The diversity factors between transformers may be taken as 1.5. Determine peak load on each transformer and peak load on feeder.

(b) Derive an expression for most economic power factor when KVA demand is constant.

(5,5)

4. (a) An overexcited synchronous motor has an output of 380 h.p. at 0.9 efficiency. It takes 700 kVA from the mains. Find the overall power factor if this synchronous motor runs in parallel with 0.8 lagging power factor of 1 MVA.

(b) What are the factors which influence the tariff plan for any type of customer?

(c) How is group and peak diversity interlinked with each other?

(5,3,2)

P.T.O.

PART-B

5. The maximum demand on a thermal station is 200 MW at load factor of 80%. The diversity between consumers is 1.5. The cost and other data is as given below:

Installed capacity-250 MW
Reserve capacity- 50 MW
Capital cost of plant –Rs 30,000 per kW
Interest and depreciation- 10%
Fuel consumption- 0.8 kg per kWh
Fuel cost –Rs 760 per 1000 kg
Other operating cost 30% of fuel cost
Capital cost of transmission and distribution system –Rs $1200*10^6$
Energy consumed by auxiliaries- 6%
Energy loss in transmission and distribution system -10%
Profit on fixed and operating cost-$60*10^6$
Calculate overall generation cost per kWh.

(10)

6. (a) What is depreciation reserve? Why is it necessary to maintain it? Discuss the methods to calculate the depreciation charges.

(b) The annual electricity requirements of an industry are 40,000 MWh with a maximum demand of 30 MW. The requirements can be met from a utility charging Rs 600 per kW of maximum demand plus Rs 2/kWh. Alternatively the industry can be set up a private steam plant which will have a capacity of 70 MW. There are three options to set up. The various costs involved are as given below. Taxes on real estate is 3%, insurance 0.5 % of capital investment, interest rate 7% and depreciation rate using sinking fund method. Calculate the most suitable plan/utility supply to meet the required energy requirement using present worth method.

	Plan A	Plan B	Plan C
Total capital costs of plant (Rs/kW)	19000	15000	14000
Station heat rate (kcal/kWh)	4000	2500	4000
Heat value of coal (kcal/Kg)	5000		
Fuel consumption	0.7 kg/kWh	0.6 kg/kWh	0.8 kg/kWh
Fuel cost (Rs per 1000 kg)	1400	1200	1300

(2,8)

7. (a) Consider a two plant system without any transmission losses. One of plant is thermal and the other is hydro electric. The incremental fuel cost of the thermal unit is (22+0.025 P) Rs/MWh and water rate of the hydro unit is $(11P+0.0075\ P^2)\ m^3/sec$. The two units supply a peak load of 700 MW for 12 hours and off-peak load of 250 MW for remaining 12 hours in a day. Find out the economic scheduling of the plants both during peak-period and off-peak period, provided that $228*10^6\ m^3$ water is used during 24 hour period.

(b) Discuss the factors which are taken into account for short term hydro-thermal coordination.

(8,2)

x-x-x