

7E7132

Roll No.

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B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec. 2017

Electrical Engineering

7EE6.3A Economic Operation of Power Systems

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 26

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

UNIT-I

- Q.1 (a) What is depreciation reserve? Discuss the methods to calculate depreciation charges. [8]
- (b) Describe how the cost of unit energy generated by a generating unit is estimated. [8]

OR

- Q.1 (a) Explain the components which constitute the fixed and operating cost of power plant. [8]
- (b) Determine the generation cost per unit of energy from the following plant data-
- Installed capacity = 120 MW
Capital cost of plant = ₹ 40,000 per kW
Interest & depreciation = 15%
Fuel consumption = 0.64 kg/kWh
Peak load = 100 MW
Load factor = 60%
Salaries, wages, repairs & other operating costs per annum = ₹ 5,00,00,000 [8]

UNIT-II

- Q.2 (a) How is the sequence of adding units in thermal power plant decided? [8]
- (b) Discuss input – output curve, heat rate & incremental cost. [8]

OR

- Q.2 (a) Explain the “Economic Scheduling” Considering transmission losses. [8]
- (b) Two generating units of thermal station have cost characteristics as under-
- $$C_1 = 561 + 7.92 P_1 + 0.001562 P_1^2 \text{ ₹/hr}$$
- $$C_2 = 310 + 7.85 P_2 + 0.00194 P_2^2 \text{ ₹/hr}$$
- Obtain the cost characteristic of the composite unit for a total demand P_T . [8]

UNIT-III

- Q.3 (a) What are the advantages of pump storage plant as peak load plant in an interconnected system? [8]
- (b) Explain plant requirements for base load and peak load operation. [8]

OR

- Q.3 (a) Explain the advantages of operating a hydro and thermal plant in coordination. [8]
- (b) A two plant system is having a steam plant near load centre and a hydro plant at a remote location. The load is 700 MW for 14hrs a day and 500 MW for 10hrs a day. The characteristics of units are-

Loss coefficient, $B_{22} = .0005$

$$C_1 = (24 + 0.02P_1) P_1 \text{ ₹/hr}$$

$$W_2 = (6 + .0025 P_2) P_2 \text{ m}^3/\text{sec.}$$

Find the generation schedule, daily water used by hydro plant and daily operating cost of thermal plant for $Y_2 = 2.5 \text{ ₹/hour/m}^3/\text{sec.}$ [8]

UNIT-IV

- Q.4 (a) What is synchronizing power? How does it help in keeping the machines in step? [8]
- (b) Discuss the effect of change in excitation of one of the machines when two alternators are running in parallel. [8]

OR

- Q.4 (a) Describe briefly control of active and reactive power. [8]
- (b) Discuss the conditions necessary for parallel operation of alternators. [8]

UNIT-V

- Q.5 (a) Explain the different methods of minimum cost analysis and discuss about its applications, merits and demerits also. [8]
- (b) Explain the basic concepts of physical & financial efficiencies of electrical goods and services. [8]

OR

- Q.5 (a) Write short notes on the following- [10]
- (i) Linear & non – linear break even
- (ii) Break even and minimum cost analysis
- (b) Explain supply and demand relationship. [6]