

**7E7132**

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**B.Tech. VII Semester (Main/Back) Examination, Dec. - 2015**

**Electrical Engg.**

**7EE6.3A Economics operation of power systems**

**Time : 3 Hours**

**Maximum Marks : 80**

**Min. Passing Marks : 24**

**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) Graph papers (03 No.s)

**Unit - I**

1. a) Explain briefly the following: (8)
  - i) Capital cost
  - ii) Operational cost
- b) Enumerate and explain briefly various methods used to calculate the depreciation cost. (8)

**OR**

1. a) Discuss the selection of power plant equipments. What are the selection criterion for selection them. (8)
- b) Describe the economics of steam plant, I.C. engine plants, gas plants, hydro plants, diesel plant and hydro steam plants. (8)

Unit - II

2. a) Discuss the input, output, heat rate and incremental fuel rate characteristics of thermal power plants. (8)
- b) Explain the economic scheduling of thermal power plants considering effect of transmission losses. (8)

OR

2. The fuel input characteristics for two thermal plants are given by

$$F_1 = (8P_1 + 0.024 P_1^2 + 80) 10^6 \text{ K- cal/hr.}$$

$$F_2 = (6P_2 + 0.004 P_2^2 + 120) 10^6 \text{ K- cal/hr.}$$

Where  $P_1$  and  $P_2$  are in megawatts.

- i) Plot the input-output characteristics for each unit. (4)
- ii) Plot the heat rate characteristics for each unit. (4)
- iii) Assuming the cost of fuel as Rs. 100/ton calculate the incremental production cost characteristics in Rs/MWhr for each plant plot the same against power produced in MW. (8)

Unit - III

3. i) What are the advantages of Hydra thermal coordination. Explain the coordination of run off river and steam plant. (8)
- ii) Explain the long-term energy scheduling in hydro thermal system. (8)

OR

3. a) Describe the short-term hydro thermal scheduling. (8)
- b) For a hydro-thermal plant the total load is a constant of 90 MW for a month of 30 days. Find the running time of the thermal plant if the maximum hydro energy is 50, 000 MWhr. The cost function of thermal power plant is given by  $(F_c = 54 + 11 P_{th} + 0.02 P_{th}^2)$  Unit of cost /hr. (8)

Unit - IV

4. a) Explain synchronizing current and power for two alternators in parallel. (8)  
b) A 3 MVA, 6 pole alternator runs at 1000 r.p.m. in parallel with other machines on 3.3 kV bus bars. The synchronous reactance is 20% Calculate the synchronizing power per one mechanical degree of displacement and the corresponding torque. (8)

OR

4. a) Explain the effect of change in excitation on alternator in parallel. (8)  
b) Two alternators working in parallel supply a load of 3000 kW and a motor load aggregating to 5000 kW at a p.f. 0.72, one machine is loaded upto 5000 kW at 0.8 p.f. lagging. What is the load and power factor of the other machine? (8)

Unit - V

5. a) Explain financial efficiencies of electrical goods and services. (8)  
b) Describe break even cost analysis. (8)

OR

5. a) Explain supply and Demand. (8)  
b) Write short note on linear and nonlinear minimum cost analysis. (8)