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M. Tech. I - Sem. (Main) Exam., Dec. - 2018
Power System Engineering
1MPS4.2 Economic Operation of Power System

Time: 3 Hours

Maximum Marks: 100

Min. Passing Marks: 33

Instructions to Candidates:

Attempt any five questions, Marks of questions are indicated against each question. Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer. Assume missing data suitable if any and specify the same. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

Q.1 (a) Discuss the various methods of determining the depreciation of the equipments. [10]

(b) A steam station has two 110 MW Units. The cost data is as under- [10]

Unit-1	Unit-2
UC ₁ = ₹ 18,000/kw	UC ₂ = ₹ 30,000/kw
FCR ₁ = 10%	FCR ₂ = 10%
CF ₁ = 0.55	CF ₂ = 0.60
Fuel consumption = 0.7kg/kwh	Fuel consumption = 0.65kg/kwh
Fuel cost = ₹ 1500 per 1000kg	Fuel cost = ₹ 1500 per 1000kg
OM ₁ = 20% of annual fuel cost	OM ₂ = 15% of annual fuel cost
Utilization factor = 1	Utilization factor = 1

Calculate:

- Annual plant cost and generation cost of Unit 1.
- Annual plant cost and generation cost of Unit 2.
- Overall generation cost of the station.

Q.2 Two generating stations A and B have full load capacities of 200 MW and 75 MW respectively. The interconnector connecting the two stations has an induction motor/synchronous generator (plant C) of full load capacity 25 MW. Percentage changes of speeds of A, B and C are 5, 4 and 3 respectively. The loads on bus bars A and B are 75 MW and 30 MW respectively. Determine the load taken by the set C and indicate the direction in which the energy is flowing. [20]

Q.3 The fuel inputs per hour of two plants are given as- [20]

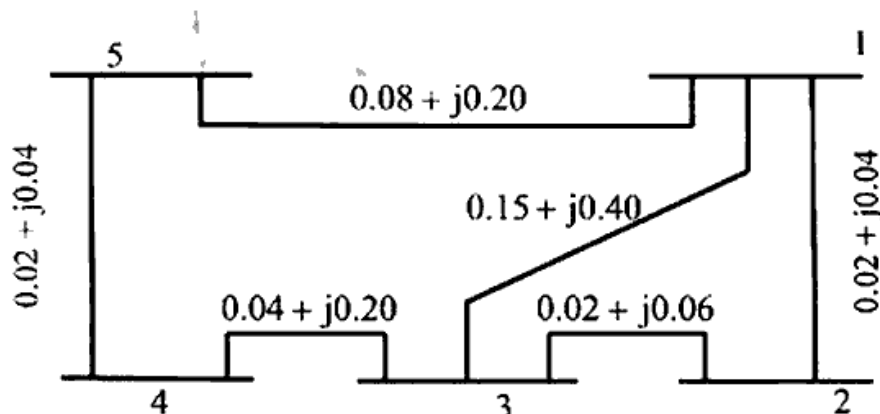
$$F_1 (PG_1) = (0.00889PG_1^2 + 10.333PG_1 + 200) \text{ ₹/h}$$

$$F_2 (PG_2) = (0.00741PG_2^2 + 10.833PG_2 + 240) \text{ ₹/h}$$

Using Newton Raphson method determine the economic schedule to meet the demand of 150 MW and the corresponding cost of generation. The transmission losses are given by-

$$P_L = 0.001 PG_1^2 + 0.002PG_2^2 - 2 \times 0.0002PG_1 PG_2$$

Q.4 Use the Y_{BUS} Method to determine the B-Coefficient for a 5 bus system shown below. Bus 5 is taken as the Slack Bus. [20]



Q.5 Define the Generalized Generation Shift Distribution. (GGSD) factor. Drive GGDF. http://www.mgsuonline.com [20]

Q.6 How are Hydro plants classified? What is long range and short range problems? [20]

Q.7 How is economic dispatch problems are solved for Active and Reactive Power Balance? [20]

Q.8 Write short notes (any 2): [20]

- (a) Interconnected System
- (b) Load sharing and Power transfer between stations
- (c) Merits and demerits of the system Interconnection.