

Roll No.

Total No. of Questions : 08]

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M.Tech.

POWER SYSTEMS OPERATION AND CONTROL

SUBJECT CODE : PEE - 501

Paper ID : [E0481]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 100

Instruction to Candidates:

- 1) Attempt any **Five** questions.
- 2) All questions carry equal marks.

Q1) (a) What is meant by cogeneration? What are the reasons for promoting cogeneration in decentralised environment - discuss.

(b) Discuss, in brief various technologies which are adopted in the world for cogeneration. Which of these are suitable for this in our country?

Q2) (a) Discuss characteristics of steam generation units and suggest methods for improving unit efficiency and reliability of the steam plant.

(b) Discuss advantages and disadvantages of steam power generation units as compared to hydroelectric units.

Q3) (a) Discuss factors influencing generation and operating costs of a thermal unit. Discuss formulation of Economic dispatch neglecting losses in the networks.

(b) The fuel costs - functions (in Rs/hour) for 3-thermal units are expressed as

$$C_1 = 350 + 7.20 P_1 + 0.0040P_1^2$$

$$C_2 = 500 + 7.30 P_2 + 0.0025P_2^2$$

$$C_3 = 600 + 6.75 P_3 + 0.0030P_3^2$$

where P_1 , P_2 and P_3 are in MW. Governor settings are such that all three generators share the load equally. Neglecting losses and generator limits, obtain the total cost (in Rs/hr) when the total load is (1) $P_D = 750$ MW.

- Q4)** (a) Introduce optimal power flow problem in an interconnected power system. How is Gradient method used to solve optimal power flow?
(b) A generation plant has two units with incremental fuel costs in Rs/MWh given by

$$\frac{dC_1}{dPg_1} = 0.20Pg_1 + 40$$

$$\frac{dC_2}{dPg_2} = 0.25Pg_2 + 30$$

Both units are required to operate all times and total load varies from 40 MW to 200 MW. The Maximum and Minimum loads on each unit are to be 120 MW & 20 MW respectively. How is load shared between the two units? Also give corresponding values of the plant incremental costs.

- Q5)** Discuss the short term Hydro-thermal scheduling problems and discuss how the problem is solved by Lamda(λ) – Gamma (γ) - iteration method.
- Q6)** What is Automatic Voltage Control (AVC) and Load Frequency Control (LFC) in an integrated power system? Show a schematic diagram of AVC and LFC of a synchronous generator. How AVC-dynamics does not affect LFC dynamics - explain.
- Q7)** What is Interchange of Power & Energy problem? Discuss economic interchange between two interconnected utilities in an integrated power system.
- Q8)** Write short notes on :
- (a) Emergency power interchange.
 - (b) Power Pools.

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