

Code No: 117GQ

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2017

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

- 1.a) List the various methods required for obtaining input output curves [2]
- b) List the assumptions made in deriving transmission loss coefficients? [3]
- c) What do you understand by scheduling problems? [2]
- d) What do you understand by optimal scheduling? [3]
- e) Explain the factors that decide the loading of generating stations [2]
- f) What does an excitation system consist of and why is it required [3]
- g) What is the main aim of Load frequency control [2]
- h) Explain the necessity of maintaining frequency constant [3]
- i) What is meant by shunt compensation? [2]
- j) Explain the need for reactive power compensation. [3]

Part-B (50 Marks)

- 2.a) Explain the different constraints that are considered for economic operation of power system
- b) A power System consists of two, 155 MW units whose input cost data are represented by the following equations:
 $C_1 = 0.042 P_1^2 + 28 P_1 + 900$ Rs/hr
 $C_2 = 0.048 P_2^2 + 22 P_2 + 1200$ Rs/hr
If the total received power is 220 MW. Determine the load sharing between the units for best economic operation. [4+6]

OR

- 3.a) Explain the significance of heat rate curve and cost curve for thermal power plants.
 - b) With an algorithm, explain the steps for optimal power generation in a thermal power plant by neglecting transmission losses. [4+6]
4. Explain the short term hydro thermal scheduling problem. [10]

OR

5. Discuss different hydro electric power plant models. [10]

- 6.a) Explain the different types of limiters and their role in speed governor system modeling.
- b) Explain the effects of increase in excitation on stability of the machine. [5+5]

OR

- 7.a) Draw the block diagram of steam turbine representation and explain each block along with its significance.
- b) Derive the small signal transfer function of a speed governor system. [5+5]

8.a) For a single area system show that the static error in frequency can be reduced to zero using frequency control.

- b) Explain in detail about the tie – line bias control. [5+5]

OR

9.a) With the help of neat block diagram, explain the two-area LFC with integral controller blocks.

- b) Explain how the optimum parameter adjustment for a two area system can be achieved? [5+5]

10.a) Explain in detail about the sub-synchronous resonance.

- b) Explain the effect of shunt compensation on the transmission line. [4+6]

OR

11.a) List the advantages and disadvantages of different types of compensating equipment used in a transmission system.

- b) A 3 phase, 500 HP, 50 Hz, 3.3 KV motor has the power factor of 0.75 lagging and the efficiency is 0.95. A bank of capacitors is connected in delta across the supply terminals and the power factor is raised to 0.98 lagging. Each of the capacitance units is built of five similar 300 V capacitors. Determine the capacitance of each capacitor. [5+5]

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