

R16

Code No: 137FX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, December - 2019

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 as sub questions.

PART – A

(25 Marks)

- 1.a) What is meant by Load frequency control. [2]
- b) Draw the block diagram of First order Turbine model. Write the typical values of time constants of Speed governor, Turbine and power system. [3]
- c) What is the function of Excitation Systems? [2]
- d) What are the sources of reactive power generation and absorbers of reactive power in a power system? [3]
- e) What are the parameters exists in cost of generation? [2]
- f) Two plants generate power as $PG_1=50MW$ and $PG_2=100MW$. If the loss coefficients of the two plants are $B_{11}=0.002$, $B_{22}=0.0015$, $B_{12}= -0.0011$. Find Transmission loss. [3]
- g) What are thermal unit constraints in Unit Commitment? [2]
- h) Illustrate the effect of spinning reserve on the Unit commitment. [3]
- i) What is the function of Load dispatch center? [2]
- j) Interpret the functions of EMS. [3]

PART – B

(50 Marks)

2. Explain Two-area load frequency control with its block diagram and also derive expressions for $ACE1(s)$, $ACE2(s)$. [10]
3. **OR**
Two interconnected areas 1 and 2 have the capacity of 1500 MW and 500 MW respectively. The incremental regulation and damping torque co-efficient for each area on its own base are 0.1 p.u. and 1.0 p.u. respectively. Find the steady state change in system frequency from a nominal frequency of 50Hz and change in tie line power following 50 MW load change in Area-1. [10]
4. Explain methods of voltage control; Describe the advantages and disadvantages of any four compensating equipment used for transmission systems. [10]
5. **OR**
 - a) Discuss the relation between voltage and reactive power at a node.
 - b) A generating unit has two 200 MW units whose input cost data is as follows. $F_1= 0.004P_1^2 + 2.0 P_1 + 80$ Rs/hr; $F_2= 0.006P_2^2 + 1.5 P_2 + 100$ Rs/hr; For a total load of 250MW, find the load dispatch between the two units for economic operation. [10]
- 6.a) Explain Optimum generation allocation including the effect of transmission line losses.

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- b) The Incremental fuel cost of a thermal power plant having two units are given by $dF_1/dP_1 = 0.02P_1 + 4$; $dF_2/dP_2 = 0.024P_2 + 3.2$
For load demand of 180MW. What is the total saving realized against equal distribution of power? [5+5]

AG 7. Interpret the solution of Economic Load Dispatch problem using Direct method and λ iteration method. [10]

8. State the Unit Commitment Problem (UCP). Explain priority list method of unit commitment problem in detail. [10]

OR

AG 9. With the help of a Flow chart, explain the forward Dynamic Programming Approach for the solution of UCP. [10]

- 10.a) Interpret the Need for computer control in power systems.

b) Illustrate the operation of Data acquisition and control. [4+6]

OR

- 11.a) Describe various functions of energy control centre.

b) What is Load forecasting? Illustrate any one method of load forecasting. [3+7]

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