

**R09**

**Code No: 09A70204**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech IV Year I Semester Examinations, May/June - 2013**

**Power System Operation and Control  
(Electrical and Electronics Engineering)**

**Time: 3 Hours**

**Max. Marks: 75**

**Answer any Five Questions  
All Questions Carry Equal Marks**

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- 1.a) Explain about (i)Generator constraints (ii)Voltage constraints (iii)Transmission line constraints and (iv)Transformer tap settings in view of the economical load dispatch problem.
- b) Incremental fuel costs in Rs/MWh for two units in a plant are given by:  
 $dF_1/dP_1=0.1 P_1+20$  and  $dF_2/dP_2=0.12 P_2+16$ . The minimum and maximum loads on each unit are to be 25 MW and 120 MW respectively. Determine the incremental fuel cost and the allocation of load for the minimum cost when loads are i) 90 MW and (ii) 140 MW. [7+8]
- 2.a) Develop an algorithm and draw the flow chart for the solution of coordination equations.
- b) The incremental fuel costs in Rs/MWh for two plants are given by:  
 $dF_1/dP_1=0.03 P_1+16$  and  $dF_2/dP_2=0.050 P_2+12$ . The loss coefficients of the system are given by  $B_{11}=0.005$  ,  $B_{12}=-0.0012$  and  $B_{22}=0.002$ . The load to be met is 190 MW. Determine the economic operating schedule and the corresponding cost generator if the transmission lines are included but not coordinated. [7+8]
3. Explain in detail about the optimal operation of hydro-thermal system. [15]
- 4.a) Obtain the small signal transfer function and thereby draw the block diagram of fly ball speed governing system used in thermal power plants.
- b) With the help of a neat schematic diagram, obtain the transfer function of IEEE type-1 excitation system. [7+8]
- 5.a) What is the effect of change in frequency on (i) impedance load and (ii)induction motor loads.
- b) Obtain the dynamic response (uncontrolled case) of an isolated power system.
- c) Two generators rated at 120 MW and 250 MW are operating in parallel.The generator settings on the machines are such that they have 4 percent and 3 percent drops. Determine (i) the load taken by each machine for a total load of 200 MW. [15]
6. From the fundamentals obtain the transfer function of a two-area controlled power system network and also draw the corresponding block diagram. [15]

- 7.a) Obtain the steady state response of a single area controlled power system network for the following situations (i) without proportional plus integral controller and (ii) with proportional integral controller.
- b) What is meant by load frequency control and economic dispatch control power system network? With the help of a neat block diagram, explain the operation of frequency controlled and economic dispatch controlled power system network. [8+7]
- 8.a) Why does the operating voltage level of a power system network changes? Write the effect of change in voltage level of a power system network on induction motors.
- b) Mention different types of reactive power compensation techniques used in power system.
- c) Distinguish between the shunt and series compensators used in the operation of a power system network.
- d) Write short notes on compensated transmission lines. [15]

