R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November - 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 the following terms with reference to hydro plants.
   i) Input-output curve
   ii) Incremental water rate curve
   iii) Incremental production cost curve.
   b) How is generation scheduled among various generators when transmission losses are neglected in a thermal system? Explain. [7+8]

2. A system consists of two generators with the following characteristics:

$$F1 = \left(7P_1 + 0.03P_1^2 + 70\right)10^6$$

$$F2 = \left(5P_2 + 0.05P_2^2 + 100\right)10^6$$

Where F and P are fuel input in K-cal/hr and unit output in MW respectively. The daily load cycle is given as follows:

Time	Load
12 midnight 6 am	50 MW
6 am to 6 pm	150MW
6 pm to 12 midnight	50 MW

Give the economic schedule for the three periods of the day. [15]

3.a) Explain heat rate curve and cost curve. Bring out the differences between them.
   b) Determine the economic operating point of three units supplying a load of 800 MW. The incremental fuel costs of the three units are:

$$dF_1/dP_1 = 6.48 + 0.00256P_1 \; Rs/MWh, \quad dF_2/dP_2 = 7.85 + 0.00388P_2 \; Rs/MWh$$

$$dF_3/dP_3 = 7.97 + 0.00964P_3 \; Rs/MWh$$ [7+8]

4.a) Explain how the incremental production cost of a thermal power station can be determined.
   b) Derive the model of a speed governing system and represent it by a block diagram. [7+8]

5.a) Distinguish between load frequency control and economic dispatch control.
   b) Two generators rated 300 MW and 600 MW are operating in parallel. Their governors have droop characteristics of 4% and 5% respectively from no load to full load. Assuming that the generators are operating at 50 Hz at no load,

determine how would a load of 750 MW be shared between them. What will be the system frequency at this load? Assume free governor action. [7+8]

6.a) With first order approximation explain the dynamic response of an isolated area for load frequency control.
  b) With a block diagram explain the load frequency control for a single area system.
[7+8]

7.a) Explain clearly what do you mean by compensation of line and discuss briefly different methods of compensation.
  b) With the help of Block diagram explain the load frequency control of two area system. [7+8]

8.a) Discuss in detail about the generation and absorption of reactive power in power system components.
  b) Discuss the advantages and disadvantages of different types of compensating equipment for transmission systems. [7+8]

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