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(2124)

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M. Tech 1st Semester Examination

Power System Operation and Control

EE1-511

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any Five Questions.

1. (a) Describe in detail, with suitable examples, the methods of optimum scheduling of generation of power from a thermal station. (10)

   (b) Explain the following terms with reference to power plants: heat input - power output curve, heat rate input, incremental input, generation cost and production cost. (10)

2. (a) Derive the generator load model and represent it by a block diagram. (5)

   (b) Draw the schematic diagram showing the speed changer setting, governor and steam admission valve and indicate how steam input is regulated with the change in load. Derive the Transfer Function of the above system. (10)

   (c) A 100 MVA, 50 Hz turbo-alternator operates at no load at 3000 r.p.m. A load of 25 MW is suddenly applied to the machine and the steam valves to the turbine commence to open after 0.6 secs due to time-lag in the governor system. Assuming inertia constant H of 4.5 kW-sec per KVA of generator capacity, calculate the frequency to which the generated voltage drops before the steam flow commences to increase to meet the new load. (5)

[P.T.O.]

3. (a) With a neat flow chart explain the dynamic programming algorithm for solving the economic dispatch equation of N-bus power system taking into account the effects of system losses. (15)

   (b) Explain the functional blocks of an automatic voltage regulator. (5)

4. (a) What is Interchange of Power & Energy problem? Discuss economic interchange between two interconnected ut.s in an integrated power system. (15)

   (b) What are the factors on which economic operation of combined hydro thermal system depends? (5)

5. (a) Explain economic dispatch of thermal plants using base point and participation method. (6)

   (b) Incremental cost of three units in a plant are:

   IC1 = 0.8P1 + 160Rs/MWh;

   IC2 = 0.9 P2+ 120 Rs / MWh; and

   IC3 = 1.25 P3+ 110Rs/MWh

   Where P1, P2 and P3 are power output in MW. Find the optimum load allocation when the total load is 242.5 MW. Using Participating Factors, determine the optimum scheduling when the load increases to 250 MW. (10)

   (c) Explain the necessity of maintaining a constant frequen in power system operation. (5)

6. Write short notes on:

   (a) Emergency power interchange.

   (b) With a neat block diagram explain the load frequency control with economic dispatch control. (20)

7. Discuss the short term Hydro-thermal scheduling problems and discuss how the problem is solved by Lambda (λ) - Gamma(γ) iteration method. (20)

8. Why unit commitment schedules are needed in power plant? State and explain constraints for plant unit commitment schedules. (20)