B.Tech III Year II Semester (R13) Supplementary Examinations December 2016
POWER SYSTEM OPERATION & CONTROL
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
   (a)   What are the two assumptions for deriving the loss coefficients?
   (b)   How the formula of transmission loss in terms of generation is divided?
   (c)   What is the need for short term hydrothermal scheduling problem?
   (d)   What are the parts of speed governing system?
   (e)   How the single area controlled system is protected?
   (f)   What is meant by a control area?
   (g)   Mention the purpose of series compensation.
   (h)   Write about static VAR compensator (SVC).
   (i)   What is restructured power system?
   (j)   What is meant by discriminatory pricing and non discriminatory pricing in electricity market?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2   Derive an iterative algorithm for solving the optimum dispatch equation of an 'n' bus power system taking into account the effects of system losses.

OR

3   (a)   For a simple two unit system the loss coefficients are:
            $B_{11} = 0.001$
            $B_{12} = -0.0005$
            $B_{22} = 0.0024$
            $dC_1/dP_1 = 0.08P_1+16$ Rs/MWhr.
            $dC_2/dP_2 = 0.08P_2+12$ Rs/MWhr.
         Find the generation P1 and P2 for λ = 50, also compute the transmission loss and total load.
   (b)   A system consists of two generators with the following characteristics:
            $F_1 = (7 P_1 + 0.03P_1^2 + 70) 10^6$
            $F_2 = (5 P_2 + 0.05 P_2^2 + 100) '106$
         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	150 MW
6 pm to 12 midnight	50 MW

         Give the economic schedule for the three periods of the day.

UNIT – II

4   Derive the model of a speed governing system and represent it by a block diagram.

OR

5   Explain about solution of pumped storage hydro scheduling with $\lambda - \gamma$ iteration method.

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UNIT – III

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6   Draw the block diagram representation of a single area system and deduce the expression for the static and dynamic response of the system under uncontrolled case?

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7   For the single area control system we have the following data:

       Time constant of power system, T_p = 10 sec

       Time constant of speed governor, T_g = 0

       Time constant of Turbine, T_t = 0

       Reciprocal of load damping factor, K_p = 100 Hz/p.u. MW

       Regulation, R = 3 Hz / p.u. MW

       Integral gain K_i = 0.1

     Compute the time error caused by a step disturbance of magnitude 0.1 p.u. MW. Prove in particular, that the error is reduced by increasing the given K, express the error in seconds and cycle if the system frequency is 50 Hz. Also find in what proportion the increase in load demand is met by the increase in generation and decrease in load due to drop in frequency.

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UNIT – IV

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8 (a) Discuss the advantages and disadvantages of different types of compensating equipment for transmission systems.

    (b) What does it mean by load compensation?

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9   Explain about shunt reactor and capacitor type compensation.

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UNIT – V

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10 (a) Explain the role of independent system operator (ISO).

    (b) Mention the reasons for restructuring / deregulation of power industry.

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OR

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11   Explain in detail the importance and features of congestion management.

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