M. Tech 1st Semester (Electrical Power System) Examination, May–2015

POWER SYSTEM OPERATION AND CONTROL

Paper–MTEPS–103

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions. Each question carries equal marks.*

1. (a) Why are thermal unit constraints considered in a UC table ? Describe the various thermal unit constraints considered in the UC problem. 10

(b) Describe in detail the Priority list scheme technique for getting the solution to the UC problem. 10

2. Prepare the unit commitment table with the application of DP approach for the system having three generating units, which have the following characteristic parameters. 20

Unit Number	Capacity (MW)		Cost – Curve parameters		
	Min.	Max.	a (Rs./MW^2)	B (Rs./MW)	d
1	1	14	0.74	22	0
2	1	14	1.5	25	0
3	1	14	1.8	28.5	0

3. Draw the schematic diagram of a speed-governing system and explain its components on the dynamic response of an uncontrolled system with necessary equations. Also, obtain the transfer function of a speed-governing system. 20

4. What are assumptions made in the simplified analysis of the integral action ? A single-area system has the following data : Speed regulation R= 4 Hz/p.u. MW. Damping co-efficient, B = 0.1 p.u. MW/Hz. Power system time constant, T_p = 10s, Power system gain, K_p = 75 Hz/p.u. MW. When a 2% load change occurs, determine the area frequency response characteristic and the static frequency error. What is the value of steady-state frequency error if the governor is blocked ? 20

5. Derive the mathematical modelling of the line power in an interconnected system and its block diagram. 20

6. (a) Explain about the optimal two-area LFC. 8

(b) Obtain the control law which minimizes the performance index $J = \int_0^\infty \left[x_1^2 + u^2\right] dt$ for the system

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$ 12

7. (a) Explain composite generation production cost function and its importance. 10

(b) Develop an algorithm for fuel scheduling by linear programming. 10

8. Write technical notes on :

(a) Economy Interchange Evaluation. 8

(b) Multiple Interchange Contracts. 7

(c) Power Pools. 5