Total No. of Questions : 10]

SEAT No. :

P1986

[Total No. of Pages : 3

[5059]-581

B.E. (Electrical Engineering) (Semester - I)

POWER SYSTEM OPERATION AND CONTROL

(2012 Pattern) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Draw and explain the loading capability curve of a synchronous generator. **[5]**

b) Explain the concepts of steady state, transient, dynamic stability? **[5]**

OR

Q2) a) Enlist the reasons for reactive power control. **[5]**

b) Explain TCSC in details with different operating modes. **[5]**

Q3) a) Explain the equal area criterion of transient stability studies for sudden rise in mechanical input. **[8]**

b) Explain the use of synchronous machine for reactive power generation. **[2]**

OR

Q4) Explain the working of any Two of FACTS devices **[10]**

a) SVC

b) STATCOM

c) UPFC

Q5) a) Explain the necessity of automatic generation control. Also explain the concept of control error in case of single area and two area case. **[6]**

b) Explain with block diagram and frequency response, proportional plus integral load frequency control of single area case for exact model. **[10]**

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OR

Q6) a) With neat block diagram and response, explain two area load frequency control. **[10]**

b) Explain the droop characteristic of speed governor system. **[6]**

Q7) a) Using priority list method, prepare unit commitment table for three thermal generating units, for load values such as 400 MW, 600MW and 900MW.**[6]**

The Incremental fuel cost of three thermal units and other details are as follows;

IC1= (0.0035*P1 + 6) * 10^3 k-cal/MW-hr

IC2= (0.0025*P2 + 6.5) *10^3 k-cal/MW-hr

1C3= (0.0045*P3 + 7)* 10^3 k-cal/MW-hr

The minimum and maximum generation limits are

50MW $\leq$ Pl $\leq$ 500MW

40 MW $\leq$ P2 $\leq$ 400MW

20MW $\leq$ P3 $\leq$ 300MW

Fuel costs are in Rs/ k-cal

CP1=1.2 Rs/k-cal

CP2=1 Rs/k-cal

CP3= 0.95 Rs/k-cal

b) Explain with mathematical formulation, Lagrange multiplier method of economic load dispatch with transmission loss and no constraint of generation limit, while meeting load. **[12]**

OR

Q8) a) Explain the recursive function of dynamic programming of Unit Commitment. **[8]**

b) Write short note on three following concepts; **[10]**

i) Cost curve of thermal unit.

ii) Equality and inequality constraints applied to economic load dispatch task.

iii) Constraints on unit commitment task

iv) Necessity of unit commitment and economic load dispatch

Q9) a) Explain the advantages of interchange of power among interconnected areas. Also explain the operational complexities. **[4]**

b) What is the Power Pool and Energy Banking? Explain the benefits of each. **[6]**

c) With Mathematical formula, explain any THREE reliability indices. **[6]**

i) SAIFI

ii) SAIDI

iii) CAIDI

iv) LO LP

v) LOLE

OR

Q10)a) Explain the situations when the Emergency power interchange is allowed between interconnected areas. **[6]**

b) What is reliability of power system? Explain following models required to evaluate the reliability indices of generation system; **[10]**

i) Generator Model

ii) Load Model

iii) Risk Model

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