Total No. of Questions : 12]

SEAT No. :

P1136

[Total No. of Pages : 3

[4264]-502

B.E. (Electrical)

POWER SYSTEM OPERATION & CONTROL

(2008 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain the equal area criterion for determination of transient stability. **[8]**

   b) What do you mean by a swing curve? What is its significance in stability studies? **[4]**

   c) Derive the swing equation. **[6]**

OR

Q2) a) Compare steady state, transient state and dynamic state stability in respect of loading of the power system, time duration of study, stability limit, definition. **[9]**

   b) A 60 Hz. synchronous generator having inertia constant H = 5 MJ/MVA and a direct axis transient reactance X'_d = 0.3 p.u is connected to an infinite bus through a purely reactive circuit as shown in fig. (2b). The induced emf of generator is $1.17\angle 26.38$ p.u. and is delivering real power p_e = 0.8 p.u. to infinite bus at V = 1∠0 p.u. A temporary three phase fault occurs at the sending end of the line at point F. When the fault is cleared both the lines are intact. Determine the critical clearing angle and fault clearing time. **[9]**
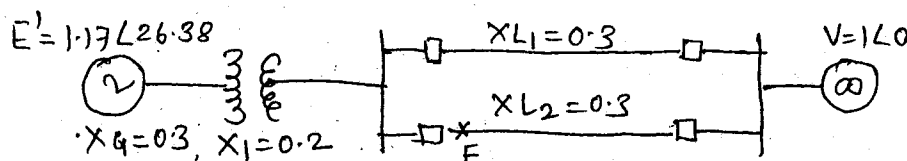
Q3) a) What is the necessity of reactive power control. **[8]**

   b) Explain the loading capability curve of synchronous generator. **[8]**

OR

P.T.O.

Q4) a) Explain the concept of subsynchronous resonance in detail. **[7]**

b) What are different types of compensations used in power system. **[9]**

Q5) a) What are problems of A.C. transmission system causes the thought of FACTS controllers. **[6]**

b) Write the short note on : **[10]**

   i) SVC

   ii) STATCOM

OR

Q6) Explain in detail principle of operation, draw circuit diagram, and give the applications of **[16]**

  a) TCSC

  b) UPFC

SECTION - II

Q7) a) Explain the concept of Area Control Error (ACE). With the help of neat block diagram, explain the proportional plus integral load frequency control of two area control case. **[10]**

b) Explain the concept of 'Generator rate constraint' and 'Speed governor dead - band' with reference to automatic generation control. **[8]**

OR

Q8) a) With mathematical formulation and complete block diagram representation explain load frequency control of an isolated power system. **[12]**

b) With schematic diagram, explain the working of turbine speed governing system. **[6]**

Q9) a) Define unit commitment. Explain the necessity of unit commitment task. **[4]**

b) Explain following terms related to unit commitment. **[12]**

   i) Minimum up time & minimum down time.

   ii) Spinning reserve.

   iii) Must run constraint.

   iv) Fuel constraint.

   v) Hydro constraint.

   vi) Constraints associated with renewable energy sources.

OR

Q10) a) With proper example, explain 'priority list method'. Also state other methods for unit commitment. **[8]**

b) Derive the objective of minimization of operating cost of thermal units for economic load dispatch without including transmission loss and considering constraint of meeting the load demand. **[8]**

Q11) Explain following concepts regarding exchange of power **[16]**

   a) Energy banking.

   b) Capacity interchange.

   c) Diversity interchange.

   d) Emergency power interchange.

OR

Q12) Write short notes on following **[16]**

   a) Multi - utility interchange transactions.

   b) Inter utility economy energy evaluation.

   c) Power pools.

   d) Inadvertent power exchange.