28/10/13

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**B.E. / B.Tech. (Full - Time) DEGREE END SEMESTER EXAMINATIONS, November 2013**

**ELECTRICAL & ELECTRONICS ENGINEERING BRANCH**

12

**SEVENTH SEMESTER**

**EE 9039 – ADVANCED POWER SYSTEM ANALYSIS**

**(REGULATIONS 2008)**

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

**Answer ALL Questions**

**PART-A (10 X 2 = 20 Marks)**

1. Give expressions for P and Q of polynomial loads.
2. How to obtain the critical clearing time by time-domain simulation?
3. What is the loadability limit of constant power loads?
4. What is the significance of VQ curves?
5. What is the need for voltage dependent current order limiter in HVDC link?
6. Compare the performance of SVC with STATCOM.
7. How many system and torsional modes of oscillation can occur in a turbine-generator with six rotating masses?
8. Discuss about the power system stability classification.
9. Compare the Newton-Raphson and Fast-Decoupled methods for solving the power flow problem.
10. What is the need for contingency analysis?

**PART-B (5 X 16 = 80 Marks)**

11. Fig.11 shows the one-line diagram of a simple three-bus power system with generators at buses 1 and 3. The line impedances are marked in per unit on a 100 MVA base. Find out the bus voltages after one iteration using Fast-Decoupled method. (16)

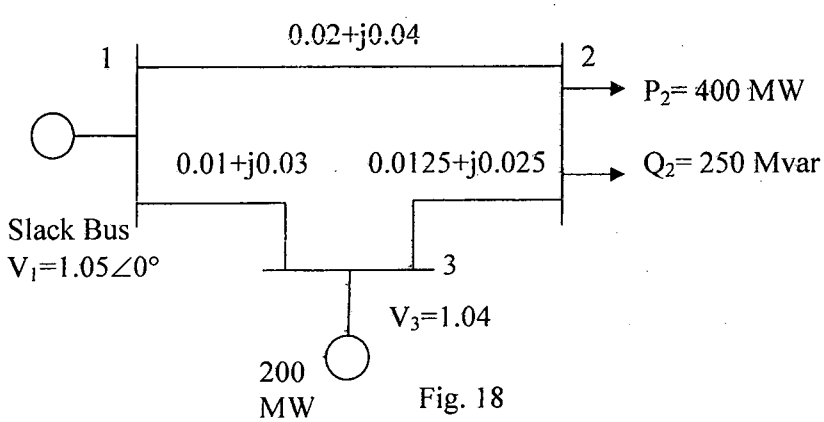


Fig. 18

Fig.11

12(a)(i)Consider a SMIB system obtain the small-signal model of the swing equation by assuming the synchronous machine represented by classical model.(6)

(ii)What is synchronizing power coefficient and describe its significance.(4)

(iii) Derive the expression for natural frequency of oscillation.(6)

**(Or)**

12(b).Describe stepwise computations involved in interfacing a classical model of a synchronous machine with the transient stability algorithm based on implicit integration method to advance simulation from time "t-$\Delta$t" to time "t.". (16)

13(a) Draw the block diagram of an OXL with integral control. Explain its functions with relevant sketches showing outputs of various blocks when there is a step increase in field current over the set point. (16)

**(Or)**

13(b).What is load restoration? Explain the load restoration of thermostatic loads. (16)

14(a) (i) Explain about the different subsynchronous resonance problems that arise whenever steam-turbine driven synchronous generator is connected to series compensated line. (10)

(ii) Discuss the various counter measures to SSR problems. (6)

**(Or)**

14(b) Explain about torsional interaction with the power system controls such as exciter, speed governor and HVDC control. (16)

15(a). Explain about the control of HVDC link with the necessary equations and diagrams. (16)

**(Or)**

15(b). (i) Explain the various operating modes of TCSC. (8)

(ii) Explain the operation of SVC in controlling the voltage of a HVAC bus voltage.(8)