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Code No. : 21702

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD

M.E. (EEE: CBCS) I-Semester Main Examinations, January-2018

(Power Systems & Power Electronics)

Power System Stability

Time: 3 hours

Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Define Dynamic Stability.
2. Explain the characteristics of generator for Voltage Stability.
3. List the indirect methods to evaluate Transient Stability.
4. Explain the purpose of calculating critical clearing angle and critical clearing time.
5. Draw the diagram of SVC.
6. Define energy function of SSSC.
7. Write the range of low frequency oscillations.
8. Classify the types of damping torques and write their significance.
9. Explain sub-synchronous resonance.
10. Explain torsional interaction with power system controls.

Part-B (5 × 8 = 40 Marks)

11. a) Define Steady State Stability and explain the stability criterion for single machine system. [5]
b) Explain the stability criterion for multi machine system. [3]
12. a) Obtain Swing equations for three machine system with relevant details. [3]
b) A 20 MVA, 50Hz generator delivers 18MW over a double circuit line to an infinite bus. The generator has kinetic energy of 2.52MJ/MVA at rated speed. The generator transient reactance $X_d' = 0.35\text{p.u.}$ each transmission circuit has a reactance of 0.2p.u on 20MVA base. A 3-ph short circuit occurs at the midpoint of one of the transmission lines. Obtain the rotor angle for a period of 0.15 seconds if fault is sustained. [5]
13. a) Derive Hydraulic Governor model equations from fundamentals. [4]
b) Sketch the relevant block diagram for Hydraulic Governor. [4]
14. a) Sketch the block diagram of single machine connected to infinite bus. [4]
b) Derive a transfer function and discuss the effect of exciter gain on low frequency oscillations. [4]
15. a) Explain sub-synchronous oscillations. Mention the reasons for the oscillation. [4]
b) How the network is represented in sub-synchronous oscillations analysis? Give the reasons for the representation. [4]
16. a) What is the difference between load angle stability and voltage stability? [3]
b) Explain equal area criterion method. [5]
17. Answer any *two* of the following:
a) Explain the energy functions for SSSC. [4]
b) Write the need for supplementary excitation control. [4]
c) Explain Sub Synchronous Resonance with series capacitor compensated transmission lines. [4]

