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M.TECH
EEPC202

2nd Semester Back Examination – 2016-17
Power System Dynamics
BRANCH(S): ELECTRIC & ELECTRONIC ENGG (POWER SYSTEM ENGG), ELECTRICAL POWER SYSTEM, POWER ELECTRO, POWER ELECTRONIC & DRIVES, POWER ELECTRONIC AND ELECTRICAL
Time: 3 Hours
Max Marks: 70
Q.CODE:Z1172
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   **Answer the following questions:**   (2 x 10)
- a) Define torsional stiffness (K). What is its significance?
- b) Compare Mid-Term and long-Term stability.
- c) Sketch the block diagram of a single-machine infinite bus system with classical generator model(block diagram only)
- d) Draw the V_R- P_R characteristics of a system with different load factors related to voltage stability.
- e) Draw the equal area criterion for SIMB case and show the prefault , faulted and post fault power angle curves P_e
- f) What is Lyapunov's method?
- g) Explain the procedure for determining t_{cr}
- h) What is the necessity of Power System Stabilizer?
- i) What is participation factor and how it is useful in stability studies?
- j) How do you classify different types of load based on voltage magnitude and load indices?

Q2   a) Define power system stability. Classify power system stability.   (5)
     b) Discuss different nature of small disturbance oscillation in power system. Interpret graphically nature of small disturbance response without and with Automatic Voltage Regulator(AVR)   (5)

Q3   What is sub synchronous resonance? Why it manly occurs in series capacitor – compensated transmission systems? Write the countermeasures to SSR problems.   (10)

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Q4   a) What are the sources contributing to the damping of torsional oscillations?   (5)
     b) Explain the torsional instability problems due to interaction with power system controls   (5)

Q5   a) With a suitable example explain clearly Hopf bifurcation   (5)
     b) Write the step by step algorithm to study the effect of loading on small signal stability   (5)

Q6   a) Explain how torsional oscillation in sub synchronous range could be due to Torsional fatigue duty due to network switching   (5)

b) Classify stability of a nonlinear system depending on region of state space in which the state vector ranges & explain briefly each (5)

Q7 Explain the design procedure of Power System Stabilizer using frequency domain method (10)

Q8 **Write Short Notes (Any Two)** (5 x 2)
a) Eigen properties of state matrix
b) Time domain simulations and direct stability analysis techniques
c) Multi machine PEBS
d) The energy function for single machine infinite bus system