

GANPAT UNIVERSITY
M. TECH SEM-II, (ELECTRICAL), REGULAR EXAMINATION – APRIL-JUNE 2015

Subject Code:3EE202

Subject Name: Power System Dynamics and Control

Time:3 Hours

Total Marks: 60

Instructions:

1. This Question paper has two sections. Attempt each section in separate answer book.
2. Figures on right indicate marks.
3. Be precise and to the point in answering the descriptive questions.

SECTION : I

- Q.1** Derive the equation of instantaneous electromagnetic torque (T_e), for a synchronous machine, in terms of 'd-q' variables in rotor reference frame. **10**
- OR**
- Q.1 (a)** Mention the basic assumptions and derive the equation of terminal voltage of a smooth cylindrical rotor alternator, in sinusoidal steady state condition. **05**
- Q.1 (b)** Derive the relation between the 'D-Q-0' parameters in synchronous reference frame and 'd-q-0' parameters in rotor reference frame for a synchronous machine. **05**
- Q.2 (a)** Draw the equivalent circuit of a synchronous machine and derive the equation of its instantaneous power output. **05**
- Q.2 (b)** Draw the phasor diagrams for smooth cylindrical and salient pole alternators in sinusoidal steady state condition. **05**
- OR**
- Q.2 (a)** State and explain the conditions for synchronizing an alternator with infinite bus. Assume constant field excitation and fixed mechanical power input. **05**
- Q.2 (b)** Explain the effect of change in excitation as well as change in mechanical power input for an alternator connected to infinite bus. **05**
- Q.3 (a)** Briefly describe Park's transformation and explain its importance in power system analysis. **05**
- Q.3 (b)** Explain the difference between sinusoidal steady state analysis and transient analysis. Give suitable examples and briefly explain each one of them. **05**

SECTION : II

Q.4 Draw block diagram of SVC controller and explain the control characteristic of Static VAR Compensator (SVC). **10**

OR

Q.4 Explain the speed governing system for steam turbine with necessary schematic diagram. **10**

Q.5 (a) Mention different types of excitation systems. Draw and explain the block diagram of any one of them. **05**

Q.5 (b) Write a short note on transmission line model used for dynamic analysis of power system. **05**

OR

Q.5 (a) List the types of load model used in power system analysis. Also mention appropriate application for each one of them **05**

Q.5 (b) With suitable example, derive state space equation of a system. **05**

Q.6 (a) State the common assumptions in dynamic analysis of a multi machine system. Develop a simplified system model for the same. **05**

Q.6 (b) What do you mean by small signal analysis of a system? How it is better compared to simulation of a system? **05**

END OF PAPER