

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E –II<sup>st</sup> SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1720703****Date: 10/07/2012****Subject Name: Power System Dynamics & Control****Time: 10:30 am – 13:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) With necessary assumptions derive expression for open circuit voltage phasor for synchronous generator. **07**
- (b) What is the effect of armature reaction in case of modeling of a synchronous generator? Explain procedure of synchronizing a generator to an infinite bus. **07**

- Q.2** (a) What is necessity of Park's transformation for modeling a synchronous machine? Derive expression of flux linkages of an ideal synchronous generator in terms of Park's variables. **07**
- (b) Derive expression of stator self-inductances of ideal salient-pole synchronous machine in terms of rotor position with usual notations. **07**

**OR**

- (b) Sketch and explain the steady state phasor diagram of salient pole synchronous generator. **07**
- Q.3** (a) Describe practical significance of reactive power capability curve for design of synchronous generator. **07**
- (b) What are different types of loads? What are the methods of load modeling? Discuss common methods of load modeling. **07**

**OR**

- Q.3** (a) Classify and explain models of synchronous machine defined in IEEE transaction on energy conservation in 1986. **07**
- (b) Draw functional block diagram of generator excitation system and discuss the following terms in brief: **07**
- (i) Exciter (ii) Regulator (iii) Power system stabilizer

- Q.4** (a) Derive expression for transfer function for separately excited DC generator considering type DC1 excitation system. **07**
- (b) Sketch model of speed governing system for hydro-turbines and discuss permanent droop and transient droop. **07**

**OR**

- Q.4** (a) What is meant by SVS and SVC? Explain variable impedance type SVC in details. **07**
- Q.4** (b) Discuss Model (2.2) of synchronous machine. Develop all equations of stator and rotor and draw its equivalent circuit. **07**

- Q.5** (a) Define voltage stability according to IEEE. Discuss Hopf bifurcation for assessment of voltage stability. **07**
- (b) Explain multi-machine power system detailed model: Case – I for generator with necessary assumptions. **07**

**OR**

- Q.5** (a) Discuss small signal stability analysis of SMIB with the help of state space representation. **07**
- (b) Compare classical method of transient stability analysis with modern methods. **07**

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