

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME – SEMESTER II (OLD) – • EXAMINATION – SUMMER 2016**

**Subject Code: 1720703****Date: 19/05/2016****Subject Name: Power System Dynamics and Control****Time: 10:30 am to 01:00 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) Derive equation for power delivered for round and salient pole rotor, discuss effect of saliency on PG ( m) curve **07**  
 (b) Explain how synchronous machine can be model in terms of equivalent circuit. Also derive equation for instantaneous power output. **07**
- Q.2** (a) State and explain the conditions for synchronizing alternator with infinite bus considering fixed if and fixed mechanical power input. **07**  
 (b) Describe practical significance of reactive power capability curve for design of synchronous generator. **07**
- OR
- (b) What is the significance of load modeling? Explain various load modeling with suitable equations. **07**
- Q.3** (a) Sketch model of speed governing system for hydro-turbines and discuss permanent droop and transient droop. **07**  
 (b) Explain transmission line modeling by D-Q transformation using - variables. **07**
- OR
- Q.3** (a) Explain the effect of field current on synchronous machine terminal voltage with vector diagram. **07**  
 (b) Find out transfer function of a synchronous machine connected to an infinite bus. Also represent its overall block diagram. How its characteristics equations are used to find stability criterion for with and without AVR. **07**
- Q.4** (a) Classify and explain models of synchronous machine defined by IEEE **07**  
 (b) What is meant by SVS and SVC? Explain variable impedance type SVC **07**
- OR
- Q.4** (a) Discuss Hopf bifurcation for assessment of stability **07**  
 (b) Derive Mutual Inductance matrix for synchronous machine. **07**
- Q.5** (a) What do you mean by small signal analysis of a system? How it is better compared to simulation of a system? **07**  
 (b) Explain Various types of Power system oscillations may take place. How PSS is useful to damp out the oscillations? **07**
- OR
- Q.5** (a) Discuss small signal stability analysis of SMIB with the help of state space representation **07**  
 (b) Draw general functional block diagram of an excitation control system. And explain the function of each block. **07**

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