Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M.E. SEMESTER III–EXAMINATION – WINTER 2015**

**Subject code: 2730706** **Date: 04/12/2015**

**Subject Name: Power System Dynamics And Control**

**Time: 2:30 PM to 5:00 PM** **Total Marks: 70**

**Instructions:**

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

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|---|---|---|---|
| **Q.1** | **(a)** | Using Park transformation, derive voltage equation of synchronous machine. Also state importance of Park transformation. | **07** |
| | **(b)** | Draw general functional block diagram of an excitation control system. And explain the function of each block. | **07** |
| **Q.2** | **(a)** | From basic of energy consumption principle derive mechanical equation for alternator. | **07** |
| | **(b)** | Explain energy equilibrium theorem applied for power system stability. What is SEP and UEP explain with an example. | **07** |
| | | **OR** | |
| | **(b)** | How to determine parameters of equivalent circuits of synchronous machine. i.e. reactance, time constant. Derive any one reactance and time constant of stator circuit. | **07** |
| **Q.3** | **(a)** | Explain SVC. Draw block diagram of SVC controller and develop its mathematical model. | **07** |
| | **(b)** | Why to Classify the system load. Also state various mathematical models to represent system load. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain transmission line modeling by D-Q transformation using $\alpha$-$\beta$ variables. | **07** |
| | **(b)** | Draw overall block diagram of SMIB & Explain how RH Criterion can be used to check stability of the system. | **07** |
| **Q.4** | **(a)** | What is SSR Explain. | **07** |
| | **(b)** | What is PSS? Explain with neat block diagram. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | For a multi machine system state steps in the form of equations and assumptions for stability analysis. | **07** |
| | **(b)** | What are the counter measures for SSR? Explain any one in detail. | **07** |
| **Q.5** | **(a)** | What is voltage stability? Explain with neat diagrams. | **07** |
| | **(b)** | Draw and explain speed governing system and model of speed-governing system for hydro turbines. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Draw and explain speed governing system and model of speed-governing system for steam turbines. | **07** |
| | **(b)** | Compare voltage and angle stability. How to carry out integrated analysis of the same. | **07** |

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