

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3170915****Date:27/12/2021****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.
4. Simple and non-programmable scientific calculators are allowed.

- Q1** (a) Draw the systematic diagram for 3phase synchronous machine. **3**  
(b) State basic assumptions made in steady state analysis of an alternator. **4**  
(c) Briefly describe Park's transformation and explain its importance in power system modeling and analysis. **7**

- Q2** (a) What is meant by speed governing system? **3**  
(b) Explain three- Damper winding model with figure. **4**  
(c) Explain transmission line modeling by D-Q transformation using  $\alpha$ - $\beta$  variables. **7**

**OR**

- (c) Draw general functional block diagram of an excitation control system and explain the function of each block.

- Q3** (a) Derive equation for power delivered for round and salient pole rotor. **3**  
(b) Define the Classification of stability and Explain any one in details. **4**  
(c) What is Sub-Synchronous Resonance (SSR)? Explain any one SSR mitigation technique. **7**

**OR**

- (a) Briefly explain the procedure of small signal analysis. **3**  
(b) Explain in the types of load models used in power system analysis. **4**  
(c) What is voltage stability? Explain with neat diagrams. **7**

- Q4** (a) Define power system stabilizer. **3**  
(b) Draw general functional block diagram of an excitation control system. **4**  
(c) Compare voltage and angle stability. How to carry out integrated analysis of the same. **7**

**OR**

- (a) Explain classification of Bracking. **3**  
(b) Using Part transformation derive voltage equation of synchronous machine. **4**  
(c) Briefly explain : Discrete Control of HVDC Links. **7**

- Q5** (a) Why load is consider as a constant impedance model? **3**  
(b) Explain any one method for analysis of voltage instability. **4**  
(c) Briefly explain: Dynamic Braking. **7**

**OR**

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|------------|---|----------|
| <b>(a)</b> | Explain application of Model 1.1.   | <b>3</b> |
| <b>(b)</b> | Describe the steps for calculating initial conditions of a synchronous generator. | <b>4</b> |
| <b>(c)</b> | What is PSS? Explain with neat block diagram.                                     | <b>7</b> |

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3170915****Date:06/06/2022****Subject Name:Power System Dynamics and Control****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

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|------------|---|-----------|
| <b>Q.1</b> | (a) Define power system stabilizer.   | <b>03</b> |
|            | (b) Explain in the types of load models used in power system analysis.  | <b>04</b> |
|            | (c) Mention the transformation matrix used and corresponding assumptions for Park's transformation. Describe the significance of Park's transformation. | <b>07</b> |
| <b>Q.2</b> | (a) Draw the systematic diagram for 3phase synchronous machine.   | <b>03</b> |
|            | (b) Explain three- Damper wiring model with figure.   | <b>04</b> |
|            | (c) Give a classification of load models used in power system analysis. Briefly explain any one load model in detail.                                   | <b>07</b> |
|            | <b>OR</b>   |           |
|            | (c) Draw general functional block diagram of an excitation control system and explain the function of each block.                                       | <b>07</b> |
| <b>Q.3</b> | (a) What is meant by speed governing system?  | <b>03</b> |
|            | (b) State basic assumptions made in steady state analysis of an alternator  | <b>04</b> |
|            | (c) Briefly describe the phenomenon of Sub-Synchronous Resonance. Describe any two techniques for SSR mitigation.                                       | <b>07</b> |
|            | <b>OR</b>   |           |
| <b>Q.3</b> | (a) Briefly explain the procedure of small signal analysis  | <b>03</b> |
|            | (b) Define the Classification of stability and Explain any one in details.  | <b>04</b> |
|            | (c) What is voltage stability? Explain with neat diagrams.  | <b>07</b> |
| <b>Q.4</b> | (a) Explain classification of Bracking.   | <b>03</b> |
|            | (b) Using Part transformation derive voltage equation of synchronous machine.   | <b>04</b> |
|            | (c) Explain transmission line modeling by D-Q transformation using $\alpha$ - $\beta$ variables.  | <b>07</b> |
|            | <b>OR</b>   |           |
| <b>Q.4</b> | (a) Explain excitation system.  | <b>03</b> |
|            | (b) Explain three- Damper wiring model with figure.   | <b>04</b> |
|            | (c) Briefly explain : Discrete Control of HVDC Links.   | <b>07</b> |
| <b>Q.5</b> | (a) Explain application of Model 1.1.   | <b>03</b> |
|            | (b) Why load is consider as a constant impedance model?   | <b>04</b> |
|            | (c) Compare voltage and angle stability. How to carry out integrated analysis of the same.  | <b>07</b> |

**OR**

- |            |            |   |           |
|------------|------------|---|-----------|
| <b>Q.5</b> | <b>(a)</b> | Explain classification of Bracking.                         | <b>03</b> |
|            | <b>(b)</b> | Explain any one method for analysis of voltage instability. | <b>04</b> |
|            | <b>(c)</b> | Briefly explain: Dynamic Braking.                           | <b>07</b> |

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