

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021**

**Subject Code:3170919**

**Date:29/12/2021**

**Subject Name:Power System Operation 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.

		MARKS
<b>Q.1</b>	(a) What is deregulation? Enlist the advantages of deregulation.	<b>03</b>
	(b) Explain restoration process of black out.	<b>04</b>
	(c) Explain turbine speed governing mechanism.	<b>07</b>
<b>Q.2</b>	(a) List main components of Automatic voltage control scheme.	<b>03</b>
	(b) Define: (1) Generator Shift Factor and (2) Line Outage Distribution Factor	<b>04</b>
	(c) Obtain the expression for reactive power requirement of uncompensated line.	<b>07</b>
	<b>OR</b>	
	(c) Develop a relation between voltage and reactive power at a node in power system.	<b>07</b>
<b>Q.3</b>	(a) Explain surge impedance loading with its expression.	<b>03</b>
	(b) Two alternators rated for 120 MW and 220 MW have generator drop characteristic of 5% from no load to full load. They are connected in parallel to share a load of 275 MW. Determine the load shared by each machine assuming free governing action.	<b>04</b>
	(c) For a transmission line connected between two buses, derive the expression of voltage regulation and also prove from the phasor diagram that the Q and V have a strong coupling.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Give comparison between voltage stability and angle stability	<b>03</b>
	(b) Define voltage collapse. Enlist the main factors that contribute to the phenomena of voltage collapse.	<b>04</b>
	(c) Explain function of different entities in deregulated power system.	<b>07</b>

- Q.4** (a) What do you mean by state estimation? **03**  
 (b) Explain various applications of state estimations in power systems. **04**  
 (c) What is bad data in state estimation? How bad data are detected and suppress in state estimation. **07**
- OR**
- Q.4** (a) What do you mean by Network Observability and Pseudo Measurement? **03**  
 (b) Discuss the role of research and professional bodies in Indian power sector. **04**  
 (c) Discuss present scenario of power system structure in India. **07**
- Q.5** (a) Explain the meaning of contingency analysis. **03**  
 (b) Describe least square approximation state estimation. **04**  
 (c) Give flow chart for contingency selection. **07**
- OR**
- Q.5** (a) List out different load forecasting methods. **03**  
 (b) Explain the various state of power system. **04**  
 (c) Describe Auto-Regressive Model and Auto- regressive Moving Average Model for load forecasting. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3170919****Date:10/06/2022****Subject Name:Power System Operation 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**

- Q.1**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain the concept of SIL with necessary calculations.                                     | <b>03</b> |
| (b) | Explain about the combined operation of load frequency control & Economic Dispatch control. | <b>04</b> |
| (c) | Explain optimal load frequency control for two area control system.                         | <b>07</b> |

- Q.2**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain the role of Power System Security in Power System Operation.               | <b>03</b> |
| (b) | Give the classification of Various State of Power system.                          | <b>04</b> |
| (c) | Develop a relation between voltage and reactive power at a node in a power system. | <b>07</b> |

**OR**

- |            |  |           |
|------------|--|-----------|
| (c)        | What is decoupling concept? Show that for a lossless transmission two-bus model, Q-V and P- $\delta$ quantities are closely coupled. | <b>07</b> |
| <b>Q.3</b> | (a) Explain the reactive loss characteristics of a transmission line.  | <b>03</b> |
|            | (b) Explain the concept of state estimation and briefly describe the necessity of state estimation.                                  | <b>04</b> |
|            | (c) Explain the concept of contingency Analysis and Derive the equations of sensitivity factors in the system.                       | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain Network Observability and Pseudo-Measurements.              | <b>03</b> |
| (b) | What is load forecasting? Give its objectives.                      | <b>04</b> |
| (c) | Explain function of different entities in Deregulated Power System. | <b>07</b> |
- Q.4**
- |     |   |           |
|-----|---|-----------|
| (a) | Give the Comparison of Static and Dynamic State Estimation.                                   | <b>03</b> |
| (b) | Obtain the necessary relation between maximum power and line length.                          | <b>04</b> |
| (c) | Describe Auto Regressive Model and Auto Regressive Moving Average Model for load forecasting. | <b>07</b> |

**OR**

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | What is line load ability? Obtain an expression for load ability.                            | <b>03</b> |
| (b) | Give Flow chart of one scheme of Fast Decoupled State Estimation.                            | <b>04</b> |
| (c) | List the entities involved in Electricity market and its role in restructuring power system. | <b>07</b> |
- Q.5**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain the least square method for state estimation.                                      | <b>03</b> |
| (b) | List Out Different Load Forecasting Methods.   | <b>04</b> |
| (c) | Explain the factors which motivate for the Restructuring and Deregulation of Power System. | <b>07</b> |

**OR**

<b>Q.5</b>	<b>(a)</b>	Express Computational Considerations of state estimation of power system.	<b>03</b>
	<b>(b)</b>	State and explain the techniques use for data treatment.	<b>04</b>
	<b>(c)</b>	Explain Tracking State Estimation of Power Systems.	<b>07</b>

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