Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**ME- SEMESTER II– EXAMINATION – SUMMER 2015**

**Subject Code: 2720716** **Date: 30/05/2015**

**Subject Name: FACTS**

**Time: 2:30 PM – 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)** | Mention the full names of series and shunt FACTS devices. Discuss the advantages of FACTS devices. | **07** |
| | **(b)** | Briefly describe Sub-Synchronous Resonance. Mention the methods of mitigation of SSR. | **07** |
| **Q.2** | **(a)** | Explain Static Voltage Compensator (SVC) in detail. | **07** |
| | **(b)** | Write a short note on midpoint shunt compensation for a transmission line. | **07** |
| | | **OR** | |
| | **(b)** | Discuss the application of SSSC as an active power controller. Draw and discuss the necessary control circuit. | **07** |
| **Q.3** | **(a)** | Explain the construction and working of a Unified Power Flow Controller (UPFC). | **07** |
| | **(b)** | Explain the schematic diagram and working principle of a STATCOM. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Draw the necessary block diagram and describe the application of a TCSC for SSR mitigation. | **07** |
| | **(b)** | Write a short note on TSC-TCR. | **07** |
| **Q.4** | **(a)** | Mention the modes of operation of a TCSC. Describe the Vernier Capacitive mode of operation in detail with steady state waveforms of voltages and currents. | **07** |
| | **(b)** | Describe the Thyristor Controlled Reactor (TCR) with suitable diagram. Discuss its applications in the power system. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Mention the methods of passive reactive power compensation. Compare them with compensation using FACTS devices. | **07** |
| | **(b)** | Mention the advantages of having slope in the dynamic characteristics of an SVC. | **07** |
| **Q.5** | **(a)** | Discuss the role of TCSC as a power flow controller. | **07** |
| | **(b)** | Explain the operating principle of FC-TCR in detail. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain the application of a suitable FACTS device to improve steady state power transfer capability of transmission line. | **07** |
| | **(b)** | Draw and discuss the firing delay angle versus the net fundamental reactance characteristic of a TCSC. | **07** |