Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (OLD) – • EXAMINATION – SUMMER 2016

Subject Code: 734501 **Date:03/05/2016**

Subject Name: Application of Power Electronics to Power System

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)**	State the benefits and limitations of various conventional shunt and series compensation schemes used for performance improvement of AC transmission systems.	**07**
	(b)	Derive an expression for mid-point voltage of a symmetrical lossless transmission line as a function of power flow on it.	**07**
Q.2	**(a)**	List the FACTS devices. Give a classification of series, shunt and hybrid FACTS devices. Mention the advantages of FACTS devices over conventional compensating methods.	**07**
	(b)	Explain Design of the SVC Voltage Regulator.	**07**
		OR	
	(b)	Draw and explain V-I characteristics of Mechanically Switched Capacitor (MSC) – Thyristor Controlled Reactor (TCR) with and without voltage control.	**07**
Q.3	**(a)**	Explain V – I characteristic of TSC – TCR with and without voltage control.	**07**
	(b)	With suitable diagram describes the Thyristor Controlled Reactor (TCR) also discuss its applications in the power system.	**07**
		OR	
Q.3	**(a)**	Explain the FC-TCR configuration. Explain operating characteristic without step down transformer and losses in FC-TCR.	**07**
	(b)	Briefly describe the working of a Thyristor Controlled Transformer (TCT).	**07**
Q.4	**(a)**	Draw the dynamic V-I characteristics for reduction in the SVC reactive-power rating by the current slope and explain it.	**07**
	(b)	Draw and explain the V-I characteristics of STATCOM and give a brief comparison with the V-I characteristics of TSC-TCR.	**07**
		OR	
Q.4	**(a)**	Explain load sharing between parallel connected SVCs with diagram.	**07**
	(b)	Explain the application of STATCOM for improving transient stability of a power system. Discuss the control strategy used.	**07**
Q.5	**(a)**	Explain principle of operation of UPFC with relevant phasor diagram and describe its implementation using back to back VSCs with schematic diagram.	**07**
	(b)	Explain three phase six pulse VSC - STATCOM with circuit diagram and waveform.	**07**
		OR	
Q.5	**(a)**	Explain the operation of Static Synchronous Series Capacitor (SSSC).	**07**
	(b)	Draw and explain compensating voltage Vs line current characteristics of TCSC in voltage control mode and reactance control mode.	**07**

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