Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (OLD) – • EXAMINATION – SUMMER 2017

Subject Code:734501 Date : 02/05/2017

Subject Name: Application of Power Electronics to Power System

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.**

Q.1	**(a)**	Derive the ratio of change in active power transfer to incremental rating of the series capacitor compensation for short symmetrical transmission line with necessary phasor diagram.	**07**
	(b)	Justify: Voltage Source Converter is building block of Flexible AC Transmission System. Draw necessary diagram in support.	**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)	Draw and explain V-I characteristics of Mechanically Switched Capacitor (MSC) – Thyristor Controlled Reactor (TCR) with and without voltage control.	**07**
		OR	
	(b)	Explain various arrangement of a Thyristor Controlled Transformer (TCT).	**07**
Q.3	**(a)**	Explain operating characteristics of FC-TCR without step-down transformer.	**07**
	(b)	Draw the dynamic V-I characteristics for reduction in the Static Var Compensator (SVC) reactive-power rating by the current slope and explain it.	**07**
		OR	
Q.3	**(a)**	Draw a basic block diagram for Static Var Compensator (SVC) controller incorporating voltage regulator. Also explain function working of each block.	**07**
	(b)	Explain V – I characteristic of TSC – TCR with and without voltage control.	**07**
Q.4	**(a)**	List various operating modes of Thyristor Controlled Series Capacitor (TCSC) for controlled series compensation. Also analyze the same for Vernier control operation.	**07**
	(b)	Explain three phase six pulse VSC - STATCOM with circuit diagram and waveform.	**07**
		OR	
Q.4	**(a)**	Explain the operation of Thyristor Controlled Series Capacitor (TCSC) with the help of Impedance Vs delay angle α Characteristics.	**07**
	(b)	List and discuss issues related to voltage regulator design with respect to Static Var Compensator (SVC).	**07**
Q.5	**(a)**	Explain the principle of operation of Static Synchronous Series Capacitor (SSSC) scheme.	**07**
	(b)	Explain load sharing between parallel connected SVCs with diagram.	**07**
		OR	
Q.5	**(a)**	Discus the operating principle of a Unified Power Flow Controller (UPFC) with its phasor diagram.	**07**
	(b)	Explain construction, working principle and V-I characteristics of STATCOM.	**07**

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