Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- VIIth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 170905 Date: 29/05/2012

Subject Name: Advanced Power System-I

Time: 02:30 pm – 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)**	Explain conventional methods of real power control in the transmission line.	**07**
	(b)	Discuss in brief various sources and sinks of reactive power in power system.	**07**
Q.2	**(a)**	What is meant by compensation? Discuss shunt and series compensation in power system.	**07**
	(b)	Sketch and explain characteristics of an ideal & realistic Static VAR System (SVS).	**07**
		OR	
	(b)	Explain modeling of thyristor controlled reactor (TCR) in details with necessary expressions and usual notations.	**07**
Q.3	**(a)**	Sketch basic single phase unit and three phase unit of thyristor – switched capacitor (TSC). Explain how TSC improves voltage profile in power system with the help of its characteristics	**07**
	(b)	Explain load compensation and system compensation with the help of phasor diagram.	**07**
		OR	
Q.3	**(a)**	Prove that power transmitted by bipolar DC line is same as that of 3 – phase AC line with necessary assumptions.	**07**
	(b)	An existing 400 kV, 3-phase AC line transmitting power of 100 MW is converted into bipolar DC line. Compute the DC voltage per pole and DC line loss in kW if the resistance of each conductor is 0.01 Ω. Assume power factor of 0.9 lagging. Also comment on the insulation to be provided for DC line in comparison with that of AC line.	**07**
Q.4	**(a)**	Discuss in brief: (i)Different types of HVDC links (ii)Equipment for a typical HVDC transmission scheme.	**07**
	(b)	State advantages of HVDC transmission over EHVAC transmission for bulk power transmission.	**07**
		OR	
Q.4	**(a)**	For 6-pulse converter derive equivalent circuit for rectifier and inverter for an HVDC power transmission system with usual expressions.	**07**
	(b)	Compare HVDC power transmission with current source converter (CSC) and voltage source converter (VSC).	**07**
Q.5	**(a)**	Write a short note on causes and consequences of harmonics in HVDC system.	**07**
	(b)	Classify FACTS devices and explain any of them in detail.	**07**
		OR	

Q.5 **(a)** Explain conduction sequence in 6-pulse converter configuration used for HVDC system. **07**

(b) A bipolar two terminal HVDC link is delivering 1000 MW at ±500 kV at the receiving end. The total losses in the DC circuit are 50 MW. Calculate the following: **07**

(i) Sending end power
(ii) Sending end voltage
(iii) Power in the middle of the line
(iv) Voltage in the middle of the line
(v) Total resistance of the DC circuit

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