Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) EXAMINATION – WINTER 2018

Subject Code: 170905 **Date: 15/11/2018**

Subject Name: Advanced Power System - I

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)**	For a lossless distributed parameter symmetrical line, derive the equation for the midpoint voltage on the line in terms of wave number and surge impedance of the line. Also draw graph for the voltage distribution, midpoint voltage V_m and load angle δ.	**07**
	(b)	Draw schematic diagram of 12-pulse converter. With the help of transformer line side current waveforms, explain how the Y-Y and Y-Δ arrangement of the secondaries of two transformers helps in reducing harmonics in the line current.	**07**
Q.2	**(a)**	Draw the schematic arrangement of single phase TCR and explain its working. Draw the waveforms of TCR current, TCR voltage and Reactor voltage for TCR firing angle of 105°.	**07**
	(b)	With appropriate schematic arrangements of FC-TCR, draw and explain FC-TCR operating characteristics without and with a coupling transformer.	**07**
		OR	
	(b)	In HVDC control, explain Individual Phase Control system and explain the following approaches for this system: a) Cosine control of phase delay b) Linear control of phase delay	**07**
Q.3	**(a)**	With necessary diagrams and equations, discuss the effect of shunt and series compensation on power-transmission capacity of a transmission line.	**07**
	(b)	Explain in detail, advantages of HVDC transmission system over EHVAC transmission system.	**07**
		OR	
Q.3	**(a)**	Enlist various conventional control mechanisms in power system. Explain the concept and operation of phase shifting transformer with its schematic diagram and phasor diagram.	**07**
	(b)	Draw the schematic arrangement of HVDC voltage source converter and explain its working.	**07**
Q.4	**(a)**	Explain with suitable figures, the conduction sequence in 6-pulse converter configuration.	**07**
	(b)	Draw schematic layout of a complete HVDC transmission system. For this schematic, explain: a) smoothing reactor, b) AC filter, c) Shunt capacitor d) Converter transformer.	**07**
		OR	
Q.4	**(a)**	Explain converter transformers and AC-DC converters as sources of harmonics in HVDC system.	**07**
	(b)	Explain various types of HVDC systems with their schematic arrangements. Which type of system is most widely used and why?	**07**
Q.5	**(a)**	With reference to HVDC control, explain current compounding of rectifier and inverter.	**07**

(b) Explain operating (Voltage-current) characteristics of TCR without voltage control and with voltage control. **07**

OR

Q.5 **(a)** Explain, with suitable output voltage waveforms, operation of six pulse converter with commutation overlap angle μ. Briefly discuss the effect of commutation overlap on output voltage. **07**

(b) Give schematic arrangement of TSC and in it, explain the functions of series reactor. Also draw and explain operating characteristics of TSC. **07**

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