

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 170905****Date: 31-05-2014****Subject Name: Advanced Power systems - 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) Compare EHVAC link with HVDC link. Specify standard rated voltages of HVDC and EHVAC system. **07**

(b) Describe real power control method employed at generating station. **07**

Q.2 (a) Explain effect of shunt compensation and series compensation on power transfer capacity of transmission line. **07**

(b) List out different types of reactive power compensators. Compare them on basis of losses, control range, control capability and response time. **07**

OR

(b) Explain operating characteristics of TCR with and without voltage control **07**

Q.3 (a) Sketch different TSC configurations and general TSC scheme. Explain Operating characteristics of TSC. **07**

(b) Explain how power transfer capacity of transmission line can be doubled by mid point compensation. **07**

OR

Q.3 (a) Explain role of UPFC in advanced power system with diagram. **07**

(b) Discuss advantages of FACTS. **07**

Q.4 (a) With neat schematic diagram, state the various apparatus required for HVDC station and explain purpose of each. **07**

(b) Discuss features, advantages and application of an HVDC-VSC system with single line diagram. **07**

OR

Q.4 (a) Compare performance of Bipolar D.C with 3-ph AC system for same power transfer and (i) equal voltage (insulation level) and (ii) equal power losses **07**

(b) Discuss operation, characteristics, features of IGBT with symbol and equivalent circuit. What are the advantages of IGBTs over SCRs for HVDC converters? **07**

Q.5 (a) Draw schematic diagram of a 12-pulse converter and analyze it. **07**

(b) With neat sketches, Explain how a converter transformer is responsible for generation of harmonics and suggest various methods for minimizing harmonics. **07**

OR

Q.5 (a) With relevant diagram explain pulse frequency control method of EPC scheme employed in control schemes of firing circuits of HVDC stations. State merits and demerits of the EPC Scheme. **07**

(b) Explain the term Firing angle delay and commutation delay as applied to HVDC converter. Sketch the voltage and current waveform for 6-pulse bridge converter with $\alpha = 30^\circ$ and $\alpha = 120^\circ$ **07**
