

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2015**

**Subject code: 170905****Date: 06/05/2015****Subject Name: Advanced power system-I****Time: 02.30pm-05.00pm****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 expression for active as well as reactive power flow in a lossless transmission line? Draw necessary phasor diagram **07**
- (b) What are the types of converters basically used in FACTS devices & what are the differences between them? **07**

OR

- Q.2** (a) Explain how VSC will act as an inverter or a rectifier in inductive or capacitive mode? **07**
- (b) Explain the functional control scheme for **07**
- 1) TSC
  - 2) TSC – TCR
  - 3) FC – TCR

OR

- (b) Draw control schemer of STATCOM & explain. **07**
- Q.3** (a) Explain with a neat sketch and waveforms the TCSC type of series controller. **07**
- (b) Explain TSC, TSC-TCR, FC-TCR, TSR & TCR by covering the following points. **07**
- (I) Diagram .
  - (II) Operation .
  - (III) V-I Char.
  - (IV) Loss char.

- Q.3** (a) Explain briefly about different types of HVDC links. **07**
- (b) Why are harmonics generated in HVDC converter and what the problems are as associated with the harmonics? **07**

- Q.4** (a) Compare the HVDC transmission HVAC transmission with reference to following factors: **07**
- i. Economics
  - ii. Technical performance
  - iii. Reliability.
- (b) List out the different components of a point to point HVDC link and give the schematic arrangement at one end. **07**

OR

- Q.4 (a)** With the help of state equations, derive the model for the operation of a six pulse rectifier circuit with an overlap angle of less than  $60^\circ$ . Sketch the relevant output waveforms. **07**
- Q.4 (b)** Briefly explain the different types of DC links and why homo polar links are mostly used? **07**
- Q.5 (a)** With the help of a circuit diagram, analyze the operation of 3-valve conduction mode and derive the expression for the currents of the incoming and outgoing valves during commutation. **07**
- (b)** Explain different conventional methods of voltage control **07**
- OR
- Q.5 (a)** Discuss the relative merits and demerits of using E.H.V.A.C transmission and HVDC transmission for bulk power transmission over long distances. **07**
- (b)** Draw the DC output voltage waveform of a bridge converter for **07**
- a.  $\alpha = 15^\circ$  and  $u = 15^\circ$
- b.  $\alpha = 120^\circ$  and  $u = 15^\circ$

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