

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII • EXAMINATION – SUMMER 2013****Subject Code: 180907****Date: 09/05/2013****Subject Name: Advanced Power Electronics-II****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)** Derive equation showing effect of series compensation on power transfer capability of transmission line. State advantages and limitations of series compensation. **07**
- (b)** Explain operation of 3-phase fully controlled 6-pulse bridge converter with gate control. **07**
- Q.2 (a)** Draw following waveforms for different firing angle $\div \phi$ in TCR: **07**
- V_{TCR} , I_{TCR} and V_L , when $=90^\circ$
 - V_{TCR} , I_{TCR} and V_L , when $=160^\circ$
 - V_{TCR} , I_{TCR} and V_L , when $=180^\circ$
- Comment on active & reactive power control in each case.
- (b)** State different conventional control mechanisms required to control active and reactive power flow of transmission line. Discuss phase-shifting transformer with necessary diagram in brief. **07**
- OR**
- (b)** Discuss the drawback of thyristor-switched capacitor (TSC). How this drawback can be rectified? Justify your answer with appropriate figures and equations. **07**
- Q.3 (a)** Draw different TSC configuration. Discuss its operating characteristics. **07**
- (b)** Discuss components of VSC converter. **07**
- OR**
- Q.3 (a)** Give comparison of different SVCs. **07**
- (b)** Discuss 12-pulse bridge converter. Give its merits over 6-pulse bridge converter. **07**
- Q.4 (a)** Explain the effect of overlap angle (μ), when VSC is operating as rectifier. **07**
- (b)** Using phasor diagram, explain active and reactive power control using basic VSC transmission system. **07**
- OR**
- Q.4 (a)** Discuss following in relation to HVDC link. **07**
- Power flow and current control
 - Power loss in the DC system
- (b)** Explain constant control and constant control strategy **07**
- Q.5 (a)** Determine the output DC voltage, peak to peak ripple and peak inverse voltage of 12 pulse converter given that the secondary side voltage of converter transformer (line to line) is 200 kV (rms). **07**
- (b)** Discuss block diagram of pole and converter controllers. **07**
- OR**
- Q.5 (a)** A 3-phase fully controlled bridge converter is connected to a 400 V, 50 Hz supply having a source reactance of $0.3 \div \text{ph}$. The converter is operating as a rectifier at a firing angle of 60° . Find the average load voltage and overlap angle when the converter is supplying a steady current 100 A. **07**
- (b)** Discuss inverter extinction angle control (EAG) in brief. **07**
