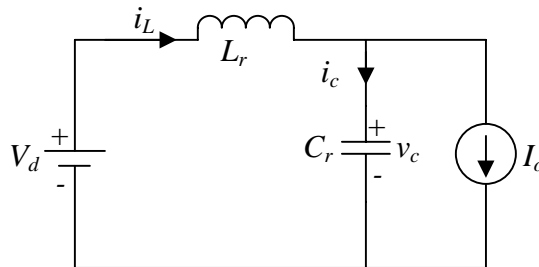


GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –IIst SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1720709****Date: 12/07/2012****Subject Name: Advanced Power Converters****Time: 10:30 am – 13:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss in brief the significance of Δ/Z transformers in context to the multipulse converters and derive the necessary equations for a Δ/Z -1 configuration that helps to determine the number of turns to achieve the desired phase shift. **07**
- (b) How are resonant DC-DC converters different from that of conventional DC-DC converters? Explain the operation of series loaded resonant (SLR) half-bridge DC-DC converter operating in discontinuous mode. **07**
- Q.2** (a) What does one mean by multi-pulse converter? What are its advantages? With appropriate block-diagram explain how a 12 pulse converter can be obtained. **07**
- (b) Derive the equation for the inductor current in the following resonating circuit. I_{L0} and V_{c0} are initial conditions (values at $t = 0$) for inductor current and capacitor voltage, respectively. **07**

**OR**

- (b) With neat waveforms discuss the operation of ZCS (Zero Current Switching) resonant switch converter. **07**
- Q.3** (a) What factors lead to deviation of neutral-point voltage? How can this deviation be minimized in a three level diode clamped inverter? **07**
- (b) Why does one require bi-directional switches for a matrix converter? How can such bi-directional switches be obtained? Also, critically evaluate/compare these bi-directional switches. **07**

OR

- Q.3** (a) State the two basic rules to be observed for operating the switches of a Matrix converter and hence, group the possible switching state combinations of a 3-phase Matrix converter. Also, discuss the significance of LC filter in context to the converter. **07**
- (b) Discuss the four-step current commutation strategy for Matrix converter. **07**
- Q.4** (a) Draw the space vector diagram for diode-clamped 3-level inverter. Hence, derive the dwell time equations for the space vectors for any one region. **07**
- (b) Write a brief note on NPC/H-bridge inverter. **07**

OR

- Q.4** (a) List the advantages of static active reactive power compensators over conventional passive reactive power compensators. Also, discuss the scheme for instantaneous reactive power compensation. **07**
- (b) Write a brief note on UPFC converter. **07**
- Q.5** (a) Draw a one line diagram of an HVDC transmission system for interconnecting two ac systems and explain the functions of component involved in it. **07**
- (b) What is MPPT when referred to solar photovoltaic systems? How is it achieved with a DC-DC converter feeding a DC load? **07**

OR

- Q.5** (a) With neat diagram explain the operation of seven-level cascaded H-bridge inverter employing phase-shifted multi-carrier modulation control. **07**
- (b) Discuss in brief how to control the converters for HVDC transmission system. **07**
