Seat No.:	Enrolment No
GUJARAT TECHNOLOGICA	AL UNIVERSITY
M.E –II st 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.	

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



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

OR

- Q.3 State the two basic rules to be observed for operating the switches of a Matrix converter and 07 (a) 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
 - Discuss the four-step current commutation strategy for Matrix converter. **(b)**
- 0.4 Draw the space vector diagram for diode-clamped 3-level inverter. Hence, derive the dwell time (a) 07 equations for the space vectors for any one region. 07
 - **(b)** Write a brief note on NPC/H-bridge inverter.

OR

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

OR

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