

GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015****Subject Code: 1720709****Date:15/05/2015****Subject Name: Advanced Power Converters****Time: 02:30 pm to 5:00 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) How are resonant dc to dc converters different from that of conventional dc to dc converters? Explain the operation of series loaded resonant (SLR) half bridge DC-DC converter when operating with the condition $\frac{1}{2} \leq \alpha < \pi$. **07**
- (b) Discuss in brief the significance of \hat{v}/Z transformers in context to multi pulse converter and derive necessary equations for a \hat{v}/Z -1 configuration that helps to determine number of turns to achieve the desired phase shift. **07**
- Q.2** (a) With relevant waveforms and circuit diagram explain operation of parallel loaded resonant half bridge dc to dc converter operating in discontinuous mode. **07**
- (b) What does it mean by multi pulse converter? Discuss the significance of phase shifting transformer for multi pulse converters and discuss transformer connection for 24 pulse converter. **07**
- OR**
- (b) What do you mean by soft switching? How ZCS and ZVS principle can help in achieving it? Also draw switching loci (characteristic representing current through switch vs voltage across switch) for the switch when operating under following conditions (i) with snubber circuit (ii) with ZCS and ZVS (iii) when snubber and ZCS/ZVS is not employed. **07**
- Q.3** (a) Write brief note on NPC/H-bridge inverter. **07**
- (b) Explain difference between direct modulation and indirect modulation for matrix converter. Discuss any one modulation technique for 3 phase matrix converter. **07**
- OR**
- Q.3** (a) Classify the space vectors into different groups for 3 level NPC inverter. With relevant analysis obtain the magnitude and orientation for at least three vectors from different groups. Also draw entire space vector for this inverter. **07**
- (b) Discuss four step commutation strategy for matrix converter. **07**
- Q.4** (a) Explain the switching sequence to get minimal neutral point voltage deviation for NPC multilevel inverter. **07**
- (b) Compare AC and DC transmission lines. Explain the function of each component involved in HVDC transmission. **07**
- OR**
- Q.4** (a) Write brief note on UPQC. **07**
- (b) With neat diagram, explain seven level cascaded H-bridge multi level inverter employing level shifted PWM control method. Comment on number of carrier waveforms and draw relevant wave forms with all details. **07**
- Q.5** (a) What do you mean by MPPT with respect to PV system? With circuit diagram and PV characteristic, explain how maximum power can be obtained from PV array. **07**

- (b) Explain with block diagram scheme for instantaneous VAR compensation. How does this method differ from that of fixed capacitor thyristor controlled reactors? **07**

OR

- Q.5** (a) How one can get more than 5 levels in phase voltage with only two cascaded H-bridge converters? List all possible levels available in phase voltage and line voltage. Also mention demerits of the scheme if any. **07**
- (b) Write a brief note on flying capacitor multi level inverter. **07**
