

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER– II • EXAMINATION – SUMMER 2017****Subject Code: 2724502****Date: 25/05/2017****Subject Name: Power Electronics – II****Time: 02:30 PM – 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all the questions.
2. Make suitable assumptions wherever necessary.
3. Notations and symbols used have usual technical meaning.

- Q.1 (a)** Draw any one leg of an NPC 5-level inverter. Explain various alternatives (switching states) which are possible to generate each of the voltage levels: $V_{AO} = -V_{dc}/4$, $V_{AO} = V_{dc}/4$, $V_{AO} = -V_{dc}/2$, $V_{AO} = V_{dc}/2$ and $V_{AO} = 0$. Tabulate these alternatives for each voltage level by showing the states (either 'ON' or 'OFF') of all the switches of the pole - A. **07**
- (b)** For an inverter controlled by single pulse width modulation technique; calculate only %THD of the inverter output voltage waveform for the following values of firing angle (α): **07**

Sr.	Firing angle (α)	%THD
1	0°	?
2	30°	?
3	45°	?

- Q.2 (a)** Explain the principle of operation of electronic ballast. **07**
- (b)** Explain PO, POD and APOD methods for controlling multilevel inverter. **07**

OR

- (b)** Explain resonance charging. **07**

- Q.3 (a)** Explain Extended-Period Quasi-Resonant converter. **07**
- (b)** Compare ZVS and ZCS and clarify which one is better? **07**

OR

- Q.3 (a)** Explain matrix converter. **07**
- (b)** Draw only the circuit diagram of a Class-E resonant inverter. It is having supply voltage = 50V, load = 20Ω , switching frequency = 10kHz and Q-factor = 4. Determine the optimum values of input inductor, input capacitor, resonance inductor and resonance capacitor. **07**

- Q.4 (a)** Explain ZVS resonance converter with 5 different modes and waveform. **07**
- (b)** Classify various DC and AC power supplies. Explain the principle of operation of SMPS with basic block diagram. **07**

OR

- Q.4 (a)** Explain the power schematic of a 7-level inverter formed by cascading two unsymmetrical conventional H-bridge inverters. **07**
- (b)** Discuss Class-E resonance rectifier. **07**

- Q.5 (a)** Explain DC voltage balance techniques for CCMLI. **07**
- (b)** What are the advantages of resonance converter with respect to conventional PWM converter? **07**

OR

- Q.5 (a)** Explain 12-pulse converter with neat diagram and waveforms. **07**
- (b)** Explain series resonance inverter circuit with bidirectional switch with conduction mode and waveform. **07**