

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. Sem. – IV - Examination –June- 2011****Subject code: 142402****Subject Name: Fundamentals of Power Electronics****Date:13/06/2011****Time: 10.30 am – 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.
4. Notations/Symbols used have usual meaning.

- Q.1** (a) Define Power Electronics. Draw detailed static Anode-Cathode Characteristic of a thyristor and explain it. **07**
- (b) Draw the Structure, Symbol and characteristic of a Triac. Enlist all triggering modes of a Triac and explain the most sensitive mode. **07**

- Q.2** (a) Define Commutation. Enlist the different types of commutation methods and Explain any two in detail. **07**
- (b) Draw and Explain the schematic diagram, symbol and V-I characteristic of LASCR in detail. **07**

OR

- (b) Compare half controlled and fully-controlled rectifiers. **07**
- A three phase half-wave controlled rectifier has a supply of 300V/phase. Determine the average load voltage for firing angles of 0° , 45° and 60° , assuming a thyristor voltage drop of 1V and continuous load current.

- Q.3** (a) Draw the Power circuit, V-I characteristic and waveforms for UJT as a relaxation oscillator. Also derive the expression for Periodic time T of the UJT relaxation oscillator. **07**
- (b) Define Diac. Draw and Explain Schematic diagram, symbol and V-I characteristic of a Diac. **07**

OR

- Q.3** (a) Make a comparison chart of power semiconductor devices. **07**
- (b) What do you mean by over voltage protection? Enlist the protective circuit that minimize the effect of over voltage and explain any one in detail. **07**

- Q.4** (a) Define and classify Inverters. Draw and explain the schematic diagram of basic series inverter **07**
- (b) Draw and explain single phase MC-MURRAY Inverter circuit with voltage and current waveforms. **07**

OR

- Q.4** (a) Draw schematic diagram and symbol of IGBT. Explain in detail the operation of IGBT. **07**
- (b) Enlist and Explain the over current fault conditions in various power semiconductor switches. **07**

- Q.5** (a) Define Chopper. Enlist and Explain the control strategies employed in DC Chopper for operating the switches. **07**
- (b) Explain Principles of operation of STEP-UP/DOWN Chopper and Derive equation for Output Voltage. **07**

OR

- Q.5** (a) Define and classify a.c. voltage controllers. Explain in Detail single phase a.c. Regulators. **07**
- (b) What do you mean by Cycloconvertors? Explain 1-Phase Cycloconverters in detail. **07**
