Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: POWER ELECTRONICS [ELE 304]

REVISED CREDIT SYSTEM

Time: 3 Hours 13 MAY 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.
- Sine Graph sheets shall be supplied, if required.

1A. Discuss the effects of high dv/dt and high di/dt on SCR's. Explain the protection scheme with the help of a neat circuit diagram. ***(05)***

1B. With neat circuit diagrams and relevant waveforms analyse the Impulse commutation circuit for a thyristor with a resistive load. ***(05)***

2A. Describe the switching characteristics of IGBT with relevant voltage and current waveforms. ***(04)***

2B. A fully controlled full wave rectifier is feeding an RL load; R=10Ω and L=25mH. The input to the rectifier is 230V, 50Hz single phase AC. The converter is periodically gated at 75°. Determine the average voltage across the load and the power factor of the source. ***(06)***

3A. With the help of circuit diagram, and waveforms of load voltage and load current, explain the working of a single phase fully controlled full wave rectifier feeding an RLE load with discontinuous current. ***(04)***

3B. A 3-phase phase fully controlled full wave rectifier is feeding an RL load with R=10Ω, L=10 mH. The input voltage of the converter is 150V (line-to-line), 50Hz, balanced 3-phase supply. If the converter is periodically gated at 90°, determine the average load voltage and current and plot the load voltage, current waveform. ***(06)***

4A. A step-up chopper has input of 200 V and output voltage 480 V. If the conducting time of the switch is 75μs, compute the pulse width of the output voltage. In case the output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage. ***(02)***

4B. Describe the working of Two quadrant type A chopper with appropriate waveforms to demonstrate its operation in first as well as second quadrant. ***(05)***

4C. With a neat circuit diagram and waveforms across the load voltage and load current, explain the working of an single phase AC voltage controller feeding an RL load. ***(03)***

5A. Discuss the switching scheme for 180° mode of operation of three phase square wave inverter. Hence plot the phase voltages and any one line voltage waveform. ***(05)***

5B. Give a technical comparison of square wave switching and Sinusoidal PWM switching of single phase full bridge voltage source inverters. Explain Bipolar switching of single phase full bridge voltage source inverters with the help of suitable waveforms. Also draw and explain its harmonic spectrum. ***(05)***

6A. With the help of neat circuit diagram and waveform, explain a diode –clamped multi-level inverter that produces four voltage levels on each side of the bridge inverter. ***(05)***

6B. What is the difference between hard switching and soft switching scheme? Explain with the help of neat circuit diagram and waveform of Zero Current Switching technique can be used in Buck converter. ***(05)***