Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH ELECTRICAL & ELECTRONICS ENGINEERING

MAKEUP EXAMINATIONS JULY 2016

SUBJECT: POWER ELECTRONICS [ELE 304]

REVISED CREDIT SYSTEM

Time: 3 Hours | 06 JULY 2016 | MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A. Explain latching current, holding current and different modes of operation of an SCR with the help of its I-V characteristics. ***05***

1B. 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 RL load with discontinuous current. Derive the average output voltage. ***05***

2A. With the help of neat diagram explain the Safe Operating Area (SOA) of Power BJT and MOSFET. ***05***

2B. With neat circuit diagrams and relevant waveforms analyse the forced current commutation circuit for a thyristor with a resistive load. ***05***

3A. What is the necessity of connecting SCR's in series? What are the problems associate with series connection of SCRs? How are they eliminated? ***04***

3B. An R-L-E load with R = 2 ohms, L = 20 mH and E= 100V is fed from a half wave controlled rectifier which is periodically gated at 45 degrees. The input to the rectifier is 120 V, 60 Hz single phase AC supply. Determine the Power observed by the resistor and power absorbed by the dc source in the load average load voltage and current. ***06***

4A. With the help of neat circuit diagram, explain all possible quadrants of operation of Class E Chopper fed DC motor. ***05***

4B. Describe the working of the three phase fully controlled converter with RL load with continuous conduction mode. Draw the load voltage and load current at firing angle 60°. And also derive the average value of output voltage. ***05***

5A. With relevant circuit diagram and neat waveforms with proper triggering sequence discuss the effect of source inductance in 3 phase controlled rectifiers. ***05***

5B. Explain in detail the principle and operation of a step-up cyclo-converter with the help of a neat circuit diagram and output waveform for $f_0 = 8f_s$ where f_s is the supply frequency. ***05***

6A. Discuss the switching scheme for 120º mode of operation of three phase square wave inverter. Hence plot the phase voltages and any one line voltage waveform. ***05***

6B. With the help of neat circuit diagram and relevant waveforms explain the working of cascaded multilevel inverter. What are its advantages and disadvantages? Explain its target applications. ***05***