Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER M.TECH (PESC) MAKEUP EXAMINATIONS, JUNE 2016

SUBJECT: POWER SEMICONDUCTOR CONTROLLED DRIVES [ELE 506]

REVISED CREDIT SYSTEM

Time: 3 Hours | 28 JUNE 2016 | MAX. MARKS: 50

Instructions to Candidates:

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

1A. Explain steady state stability and draw the speed-torque characteristic of DC CLM drive. ***(05)***

1B. What are the main factors which decide the choice of electrical drive? ***(05)***

2A. Explain the operation of a single phase fully controlled rectifier fed by a separately excited DC motor in continuous conduction mode. Draw the switch voltage, load voltage, source and output current waveforms. ***(06)***

2B. A 220 V, 1500 rpm DC motor has $R_a = 2\ \Omega$ and $L_a = 28.36$ mH respectively. It is controlled by 3 phase fully controlled rectifier from an AC source operating at 50 Hz. $V_m = 230.38$ V, K = 1.25, $Z = 9.13\ \Omega$, $\psi = 1.35$ rad. Calculate I_{ac} and T_{ac} values for $\alpha = 60^0$, $T_a = 1$ Nm. ***(04)***

3A. Explain the operation of class B chopper and derive the expression for maximum and minimum armature currents with relevant waveforms. ***(06)***

3B. A 220 V, 24 A, 100 rpm separately excited DC motor has a $R_a = 2\ \Omega$. The motor is controlled by a chopper with a frequency of 500 Hz and a source voltage of 230 V. Calculate the duty ratio for 1.2 times the rated torque and 500 rpm. ***(04)***

4A. Explain the static Kramer's system with a neat diagram. ***(05)***

4B. Explain the brushless DC excitation of wound field synchronous machine drives. ***(05)***

5A. Explain the vector control scheme of PMSM drive with a block diagram. ***(05)***

5B. Explain the direct torque control scheme of AC motors with a neat block diagram. ***(05)***

6A. Discuss any two mitigation methods of AC variable frequency drives in detail. ***(05)***

6B. What is remote power quality monitoring? Explain the role of multi-stage converters in electrical traction system. ***(05)***