Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

II SEMESTER M.TECH (PED) MAKE UP EXAMINATIONS, JUNE 2017

SUBJECT: POWER SEMICONDUCTOR CONTROLLED DRIVES [ELE 5221]

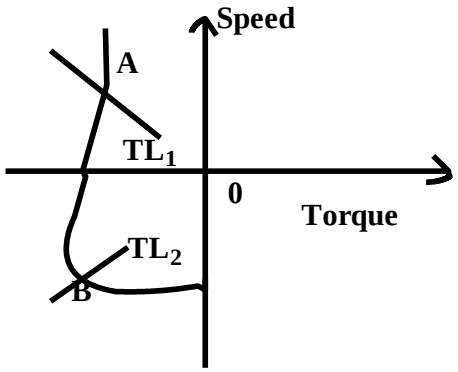
REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 13 JUNE 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Sine Graph may be used.

1A. Fig.1 shows plots of speed Vs motor and load torques. Comment on the steady state stability of the operating points A,B.



(02)

1B. What are the factors are consider for selecting the electrical Drives. Sketch the load torque characteristics of a) Compressor b) Traction Drives c) High speed hoist d) constant power drive **(04)**

1C A motor driving a load through a gear ratio 0.8 and transmission efficiency 95%. The motor and load inertia are 6Kg-m^2 and 0.56Kg-m^2 respectively. The load torque is 25N-m Calculate the motor speed and equivalent inertia, when motor develops 400 w power **(04)**

2A. With relevant waveforms and triggering sequence, explain Singal phase fully controlled rectifier feeding a separately excited DC motor armature operating in motoring mode with continuous conduction. Derive also the expression for the average voltage developed across the armature. **(05)**

2B. 80kW,440V,800rpm DC motor operating at 600rpm and developing 75% of rated torque is controlled by a three phase converter, if the back EMF at rated speed is 410V, Determine the triggering angle of the converter. He input to the converter is a three phase 415V, 50Hz AC supply. **(05)**

3A. What are the advantages of controlled freewheeling in a converter fed dc drive. With relevant current and voltage waveforms explain the operation of a single phase fully controlled rectifier fed dc drive with controlled freewheeling in generating mode with continuous current and derive the average output voltage. Show the clear triggering sequence **(06)**

3B. Explain with the help of relevant wave forms, working of a class C chopper supplying a separately excited DC motor **(04)**

4A. Explain the working of class E chopper fed DC motor with the help of circuit diagram. **(05)**

4B. Explain the concept of slip power recovery scheme of speed control of induction motor with the help of power flow diagram. Discuss how this scheme is implemented in static sub synchronous converter cascade. What modification is needed to achieve super-synchronous mode of operation. List advantages and disadvantages of this scheme? **(05)**

5A. With a neat circuit diagram, explain static control of rotor resistance for a wound rotor induction motor. **(03)**

5B. With the help of torque slip characteristics show that stator voltage control is best suited for pump & fan drive systems. Sketch the power circuit for a reversible adjustable speed induction motor drive. **(04)**

5C. With a block schematic explain how power factor control can be achieved statically in synchronous machine **(03)**