FACULTY OF ENGINEERING
B.E. 4/4 (E & EE) I Semester (Main) Examination, December 2010
ELECTRIC DRIVES AND STATIC CONTROL

Time : 3 Hours]   [Max. Marks : 75

Note : *Answer **all** questions from Part—A, answer **any five** questions from Part–**B**.*

PART – A   (25 Marks)

1. Explain briefly the following types of electrical drives
   a) Group drive   b) Multimotor drive.   3

2. Draw the speed - torque characteristics of a dc series motor with

   a) field diverter   b) armature diverter.   3

3. Derive an expression for energy loss during starting of dc shunt motor.   3

4. Define (a) continuous rating (b) short time rating of a machine.   2

5. Draw the input current wave form of single - phase controlled rectifier fed separately excited dc motor.   2

6. Draw the load current and voltage wave forms for the above circuit with R-L load.   3

7. If two anti-parallel SCRs are used in three phases to control speed of a 3 - ϕ induction motor and firing angle is 45^0, show the firing sequence of all devices.   3

8. A 2 pole 3ϕ induction motor fed with a cyclo converter runs at 475 rpm at a slip of 5%. Calculate the input frequency of the motor.   2

9. What are the similarities and dissimilarities between BLDC motor and synchronous motor.   2

10. Draw the torque - slip characteristics of 3-phase induction for various rotor resistances.   2

(This paper contains 2 pages)   1   **P.T.O.**

PART – B   (50 Marks)

11. a) How load torques are classified into two categories ? Explain with examples.   5

    b) A 500 V dc series motor has an armature resistance of 0.4 Ω and series field resistance of 0.3Ω. It takes a current of 100 A at a speed of 600 rpm. Find the speed of the motor if a divertor of resistance 0.6 Ω is connected across the field, the load torque being kept constant. Neglect armature reaction and assume that flux is proportional to the current.   5

12. a) Explain how dynamic braking is achieved in a dc shunt motor.   5

    b) A 50 H.P, 440 V dc shunt motor is braked by plugging. Calculate the value of the resistance to be placed in series with the armature circuit to limit the initial braking current to 150A. Calculate the braking torque so obtained when the speed of the motor has fallen by 40%. Assume Ra=0.1Ω. Full load Ia=100 A and speed N=600 rpm.   5

13. a) What is healing time constant and cooling time constant ? Explain how rating of a motor is affected by the temperature rise ?   6

    b) What do you mean by load equalization ? Explain.   4

14. Explain in detail the speed control of a separately excited dc motor with inner current loop with a neat block diagram.   10

15. a) Draw and explain the block schematic diagram of static slip power recovery scheme of a 3-phase induction motor.   6

    b) What are its merits and demerits over static rotor resistance control ?   4

16. With a neat schematic block diagram, explain the principle and operation of 4- phase, 4/2 pole switched reluctance motor. State few application of SRM drive.   10

17. Discuss the following :
    a) Transient stability of electric drive.   5
    b) VSI fed induction motor drive.   5