NAME_____ ROLL NO_____

2005 ANNA UNIVERSITY

B.E/B.TECH DEGREE EXAMINATION

SOLID STATE DRIVES

(ELECTRICAL AND ELECTRONIC ENGINEERING)

JUNE-2005

TIME-3HOUR
MARKS-100

ANSWER ALL QUESTIONS

PART - A [10X2=20]

1. Classify the mechanical loads based on their speed- torque characteristics

2. What are the disadvantage of using a motor of wrong rating?

3. Mention two advantage of a dual converter fed DC drive when compared to conventional Ward – scheme.

4. Why thyristors are not preferred now a days for chopper fed DC drives?

5. What happens to the performance of AC motor if the stator voltage control technique is adopted with frequency being constant?

6. Constant torque loads are not suitable for AC voltage controller fed inductor motor drive. Why?

7. List the demerits of the rotor resistance control using SCR switching with external resistance

8. Why the power factor of the slip power recovery scheme of speed control of inducting motor is low?

9. What are the modes of speed control of a synchronous motor?

10. What are the applications of cycle converter fed synchronous motor drive?

PART - B [5X16=80]

11. (i) Discuss the various factors to be considered for selection of drive motor.

(ii) The load cycle of a motor operating a lift for 9 minutes is as follows.

(1) Load period at the bottom – 4 minutes – 1 kw
(2) Load going top – 1 minute – 20 kw
(3) Loading period at the top – 3 minutes – 1 kw
(4) load coming down – 1 minute – 15 kw
Regenerative braking takes place when the load is descending. The cycle is repeated continuously.Estimate a suitable rating of the motor.

12. (a) (i) Explain the operation of a single phase fully controlled converter fed separately excited DC motor with neat wave forms and derive the speed torque characteristics.

(ii) A separately excited DC motor operating from a single phase half controlled bridge at a speed of 1450 rpm, has input voltage of 330 sin 314 t and a back emf of 75 V. The SCRs are fired symmetrically at ?in every half cycle and the armature has resistance of 5???Neglecting armature inductance calculate the average armature current and the developed torque.

(or)

(b) (i) Explain the operation of the two quadrant chopper fed de drive system.

(ii) The speed of a separately excited dc motor is controlled by a chopper. The dc supply voltage is 120 V, armature circuit resistance is 0.5 ???armature circuit inductance is 20 mH, and back emf constant 0.05 V/rpm. The motor drives a constant torque load requiring an average armature current of 20 A. Assuming the motor current to be continuous, determine the range of speed control and the ranger of duty cycle.

13. (a) Explain in detail the speed control scheme for a three phase inducting motor using PWM inverter.Provisions are to be made in the scheme for speed control as well as regenerative braking in the both directions.

(or)

(b) (i) Compare voltage source inverter fed drive with a current source inverter fed drive.

(ii) Discuss briefly the various braking methods for inductions motors.

14. (a) Explain how the slip of slip ring induction motor can be altered by extracting power from the rotor and dissipating it in the external circuit through a switching device. Discuss the principle with neat sketch.

(or)

(b) Explain how slip power recovery scheme helps to achieve sub synchronous speed control of slip ring induction with an improvement in overall efficiency.

15. (a) Explain how three phase synchronous motor fed by a three phase inverter can be made to behave like a simple DC motor . Hence is it proper to call them as a commutator less DC motor.

(or)

(b) Write short notes on the following:

(i) Power factor control of synchronous motor drive.

(ii) True synchronous mode of operation.