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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, April 2015
(2008 Scheme)
08.804 : POWER SEMI CONDUCTOR DRIVES (E)

Time: 3 Hours Max. Marks: 100

Instruction : *Answer* ***all*** *questions from Part – **A** and* ***one*** *question from* ***each*** *Module of Part – **B**.*

PART – A

1. Draw the block diagram of an electric drive system.
2. What are the components of load torque ? Explain.
3. Explain the current limit control scheme employed to limit motor current.
4. Explain the principle of cyclo converter operation.
5. Describe relative merits and demerits of four quadrant d.c. drives employing non circulating and circulating current dual converter.
6. Explain the motoring operation control of a separately excited d.c. motor by using a chopper.
7. Explain the forward motoring and reverse regenerative breaking operations of a single phase fully controlled rectifier fed d.c. motor.
8. Draw and explain the speed torque characteristics of a 3 phase induction motor with V/γ control.
9. Why the slip power recovery scheme is suitable mainly for drives with a low speed range ?
10. Why current source inverter fed induction motor drive is operated at constant rated flux.

(10×4=40 Marks)

P.T.O.

PART – B

Answer **any one full** question from **each** Module.

Module – 1

11. a) Discuss the torque characteristics of different types of loads. **6**

    b) A motor drives two loads. One has rotational motion. It is coupled to the motor through a reduction gear with a = 0.1 and efficiency of 90%. The load has a moment of inertia of 7 kg.m^2 and a torque of 10 Nm. Other load has translational motion and consists of 20 kg weight to be lifted up at the an uniform speed of 15 m/s. Coupling between this load and motor has an efficiency of 85%. Motor has an inertia of 1.2 kg m^2 and runs at a constant speed of 1000 rpm. Determine equivalent inertia referred to the motor shaft and power developed by the motor. **14**

OR

12. a) Derive the expressions for equivalent values of drive parameters for loads with rotational translational motion. **8**

    b) Describe the basic principle of working of a single phase to single phase step down cyclo converter for both continuous and discontinuous conductions for a bridge type cyclo converter. **12**

Module – 2

13. a) The speed of a separately excited dc motor is controlled using a single phase full controlled bridge converter. Explain the working with circuit diagram and waveforms and obtain an expression for average armature voltage for discontinuous conduction mode of operation. **10**

    b) A 220 V, 750 rpm, 200 A separately exerted motor has an armature resistance of 0.05 Ω . Armature is fed from a 3 phase non circulating current dual converter consisting of fully controlled rectifiers A and B. Rectifier A provides motoring operation in the forward direction and rectifier B in the reverse direction. Line voltage of ac source is 400 V. Calculate firing angles of rectifiers for the following assuming continuous conduction :

    i) Motoring operation at rated torque and 600 rpm.

    ii) Regenerative braking operation at rated torque and 600 rpm. **10**

OR

14. a) Explain the four quadrant operation of dc separately excited motor using a dual converter. 10

b) Draw the circuit diagram and explain the operation of a 4 quadrant chopper fed dc motor. 10

Module – 3

15. a) Explain the slip power recovery schemes at sub-synchronous and super synchronous speeds of3 phase slip ring induction motors. 10

b) Discuss the operation of voltage source inverter fed three phase induction motor with circuit diagram. 10

OR

16. a) With neat diagram explain speed controlling methods of synchronous motor. 10

b) A 3 phase, 400 V, 6 pole, 50 Hz delta connected, slip ring induction motor has rotor resistance 0.2 Ω and leakage reactance of 1 Ω per phase referred to stator. When driving a fan load it runs at full load at 4% slip. What resistance must be inserted in the rotor circuit to obtain a speed of 850 rpm. Neglect stator impedance and magnetizing branch. Stator to rotor turns ratio is 2.2. 10
