



B.E. (FULL-TIME) DEGREE END SEM EXAMINATIONS April/May 2012  
ELECTRICAL AND ELECTRONICS ENGINEERING  
VII SEMESTER (REGULATION 2008)  
**EE 9401: SOLID STATE DRIVES**

Time: 3 Hours

Max. Marks: 100

Answer ALL Questions

**PART – A (10 x 2 = 20 Marks)**

- 1 What is active load torque? Give examples
- 2 What do you understand by the steady state stability? What is the main assumption?
- 3 Distinguish between time ratio and current control
- 4 Draw the speed torque curve of dc motor with armature voltage control
- 5 What are the drawbacks of stator voltage control?
- 6 What are the methods to control the voltage of six step VSI
- 7 State and explain the roles of a damper winding in a synchronous motor
- 8 Explain the steady state stability limit for synchronous motor
- 9 List out the factors concerned with selection of converter
- 10 What are the advantages of closed loop speed control?

**PART – B (5 x 16 = 80 Marks)**

- 11 a (i) Explain the slip power recovery schemes of induction motor (8)  
(ii) Distinguish between voltage source and current source inverter (8)
  - 12 a (i) Develop a criteria for evaluating the steady state stability of an electrical drives (8)  
(ii) Explain the multi-quadrant operation of an electric motor driving hoist load (8)
- OR**
- b (i) Discuss the different modes of operation of an electrical drive (8)  
(ii) Draw the typical speed –torque characteristics of armature controlled DC shunt motor, dc-series motor (8)
  - 13 a (i) 200V, 875rpm, 150A, separately excited dc motor has an armature resistance of 0.06Ω. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50Hz. Assume Continuous conduction, calculate (16)
    - Motor speed for  $\alpha = 160$  and rated torque
    - firing angle for rated torque and 750 rpm

**OR**

- b (i) Explain the operation of four quadrant chopper fed dc separately excited drive with necessary Diagrams (8)
- (ii) Explain using a power circuit the working of a single phase semi converter fed separately excited motor drive (8)
- 14 a (i) With necessary diagram explain the closed loop speed control of load commutated inverter synchronous motor drive (16)
- OR**
- b (i) Discuss using a diagram the operation of a current source inverter fed synchronous motor drive in self controlled mode (16)
- 15 a (i) Derive the transfer function of dc motor –load system (8)
- (ii) Explain the armature voltage control of dc motor with constant field weakening modes (8)
- OR**
- b (i) Derive the transfer function of speed controller (8)
- (ii) Give the design procedure of current controller (8)