

Register Number: .....

**B.E DEGREE EXAMINATIONS: APRIL/MAY 2012**

Sixth Semester

**ELECTRICAL AND ELECTRONICS ENGINEERING**

EEE114: Solid State Drives

**Time: Three hours**

**Maximum Marks: 100**

**Answer All Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The equilibrium condition for electrical drives.  
a)  $T_m = T_L$                       b)  $T_{sh} = T_L$                       c)  $T_m = 0$                       d)  $T_L = 0$
2. The example of continuous duty is  
a) Crane                      b) paper mill                      c) cutting Machine                      d) Drilling machine
3. The condition for regenerative braking for DC motor  
a)  $E < V$                       b)  $E < V$  and  $I_a$  negative                      c)  $E > V$                       d)  $E > V$  and  $I_a$  negative
4. The four quadrant operation is possible for  
a) Semi converter                      b) Full converter                      c) dual converter                      d) class A chopper
5. Which Device is not preferable for chopper controlled DC drive?  
a) SCR                      b) IGBT                      c) MOSFET                      d) GTO
6. Which type of braking is not suitable for DC series motor?  
a) Dynamic                      b) plugging                      c) Rheostatic                      d) Regenerative
7. Which diode is required for CSI fed induction motor drive?  
a) Flyback                      b) feedback                      c) freewheeling                      d) zener diode
8. What type of speed control is applicable for only wound rotor induction motor?  
a) Pole changing                      b) stator voltage                      c) supply frequency                      d) slip power recovery scheme
9. Which type of synchronous motor is suitable for low power applications requiring smooth start and quiet operation?  
a) Wound filed                      b) PMSM                      c) Hysteresis                      d) SRM
10. Which motor is used as condenser?  
a) Induction motor                      b) synchronous motor                      c) SRM                      d) PMDC

**PART B (10 x 2 = 20 Marks)**

11. What is meant by Constant torque mode?
12. State the drawbacks when the selected motor power is insufficient.

13. What are all the conditions to be satisfied for the regenerative braking operation to take place?
14. When is discontinuous conduction mode expected with the operation of converter fed DC drive?
15. Draw the diagram of a regenerative chopper fed separately excited DC motor drive.
16. Compare Class C and class E chopper
17. What are the disadvantages of static rotor resistance control?
18. Compare CSI and VSI fed induction motor Drives.
19. Mention any two advantages of self control of synchronous motor.
20. What is commutatorless DC motor?

**PART C (5 x 14 = 70 Marks)**

21. a) (i) Develop a relation between the temperature rise and fall time of an electric motor.  
There from show that heating and cooling curve are exponential in nature (7)  
(ii) Explain in detail the multi quadrant dynamics in the speed torque plane. (7)  
**(OR)**
- b) (i) Explain the various classes of duty of electric drives (6)  
(ii) Explain the various types electric braking applicable to electric drives (8)
22. a) Explain in detail the operation and steady state analysis of 1 phase fully controlled converter fed DC drive with neat waveforms in continuous and discontinuous conduction mode.  
**(OR)**
- b) Explain in detail the operation of dual converter fed DC drive with circulating and non circulating mode.
23. a) Explain the operation of class B chopper fed separately excited DC motor drive also explain the braking operation.  
**(OR)**
- b) Explain the operation of four quadrant chopper fed separately excited DC motor drive also explain the braking operation

24. a) A Y connected squirrel cage induction motor has following ratings and parameters 400 V, 50Hz, 4 pole 1370 rpm,  $R_s = 2\Omega$ ,  $R_r = 3\Omega$ ,  $X_s = X_r = 3.5\Omega$  and  $X_m = 55\Omega$ .

It is controlled by a current source inverter at a constant flux. Calculate

- (i) Motor torque, speed and stator current when operating at 30Hz and rated slip speed
- (ii) Inverter frequency and stator current for rated motor torque and motor speed of 1200 rpm.

**(OR)**

b) Explain the static Kramer drive and show that the no load speed of an induction motor in the Kramer drive can be varied from near standstill to full speed as the firing angle  $\alpha$  is varied from almost  $180^\circ$  to  $90^\circ$

25. a) (i) Explain the operation of self control mode of synchronous motor. (8)

(ii) Explain the operation of vector control mode of synchronous motor (6)

**(OR)**

b) Write short note on

(i) Permanent magnet synchronous motor

(ii) Permanent magnet synchronous motor applications to paper and steel rolling mill

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