

M.E DEGREE EXAMINATIONS: JUNE/JULY 2013

Second Semester

POWER ELECTRONICS AND DRIVES

PED507: Solid State AC Drives

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

1. What is meant by hybrid method of speed control in an Induction Motor?
2. Write the main applications of slip power recovery scheme.
3. What is meant by v/f control?
4. Compare VSI and CSI fed Induction motor drives
5. List the methods used for flux vector estimation
6. What is meant by field oriented or vector control?
7. Write the advantages of DTC control
8. Write the torque expression with stator flux of an Induction motor.
9. What is meant by brushless excitation and why it is required?
10. What is meant by load commutation?

PART B (5 x 16 = 80 Marks)

11. a) Discuss briefly about the conventional speed control methods of an Induction motor.

(OR)

- b) Explain with neat diagram about the slip power recovery scheme using static Kramer drive and mention its advantages

12. a) (i) A star connected squirrel cage Induction motor has the following specifications (8)
400V, 50 Hz, 6 pole, 1500 rpm, $R_s = 4$ ohm, $R_r = 6$ ohm, $X_s = X_r = 5$ ohm Motor is controlled by a voltage source inverter at constant v/f ratio and the frequency is 50 Hz. Calculate the starting torque and current of this drive.

- (ii) Explain the operation of AC voltage controller fed Induction motor with necessary diagrams. (8)

(OR)

- b) Explain with necessary diagrams about the operation and characteristics of CSI fed Induction motor drive.

13. a) Explain in detail about the flux estimation technique in an Induction motor drive.

(OR)

b) Explain the DC drive analogy of an Induction motor drive.

14. a) Derive an expression for torque of an induction motor with stator and rotor fluxes and draw the vector diagram.

(OR)

b) Explain with neat block diagram about the DTC control strategy.

15. a) Explain in detail about the synchronous mode and self mode of variable frequency control of synchronous motor.

(OR)

b) (i) Explain shortly about the excitation of brushless motor drive. (8)

(ii) A 6 MW, 3 phase, 11 KV, star connected, 6 pole, 50 Hz, 0.9 (leading) p.f synchronous motor has $X_s = 9$ ohms and $R_s = 0$, rated field current is 50 A. Machine is controlled by variable frequency control at constant v/f ratio up to base speed and at constant V above base speed. Calculate torque and field current for the rated armature current and also at 750 rpm and 0.8 power factor leading. (8)
