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**Question Paper Code : 11417**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Seventh Semester

Electrical and Electronics Engineering

EE 1403 — SOLID STATE DRIVES

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention any two advantages of electrical drives.
2. Draw the speed torque curve of traction load.
3. What are the drawbacks of controlled converter fed dc drives?
4. What are the advantages of chopper fed drives?
5. Write are the methods of electric braking applicable to induction motors?
6. Write down the advantages of vector control method.
7. What do you mean by self-control?
8. Why is the delay circuit used in open loop v/f control?
9. What are the advantages of BLDC motor?
10. Write any two applications of SRM.



PART B — (5 × 16 = 80 marks)

11. (a) Explain the thermal model of motor for heating and cooling and hence prove that both heating and cooling time constants depend on the velocity of cooling air. (16)

Or

- (b) Explain the closed loop speed control technique of multi motor drives in detail. (16)
12. (a) Explain the operation of single phase fully controlled converter fed dc separately excited motor in continuous and discontinuous modes with necessary waveforms and also give the steady state analysis. (16)

Or

A 250 V separately excited dc motor has an armature resistance of  $2.5 \Omega$ . When driving a load at 600 rpm with constant torque, the armature takes 20 A. This motor is controlled by a chopper circuit with a frequency of 400Hz and an input voltage of 250 V.

- (i) What should be the value of duty ratio if one desires to reduce the speed from 600 to 400 rpm, with the load torque maintained constant?
- (ii) What should be the minimum value of armature inductance, if the maximum armature current ripple expressed as a percentage of the rated current is not to exceed to 10% percent?

13. (a) (i) Explain the operation of induction motor with unbalances source voltage and single phasing. Draw the speed torque curves also. (10)
- (ii) Explain the different methods of braking of induction motors. (6)

Or

- (b) (i) Explain the static Scherbius system of slip power recovery scheme in detail. (8)
- (ii) Explain the stator voltage control method of induction motor drive in detail. (8)
14. (a) (i) Explain the operation of open loop v/f control of synchronous motor. (8)
- (ii) Explain the concept of self-control technique of synchronous motor drives. (8)

Or

- (b) Explain the vector control technique of permanent magnet synchronous motor in detail. (16)



15. (a) Explain the operation of BLDC motor in detail with necessary waveforms and equations. (16)

Or

- (b) Explain the different controllers used in Switched Reluctance Motor in detail with neat sketches. (16)

