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**Question Paper Code : 33133**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Seventh Semester

Electrical and Electronics Engineering

EE 1403 — SOLID STATE DRIVES

(Regulation 2007)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name the factors governing the choice of electric drives.
2. How is the rating of a drive motor chosen for particular application?
3. Why is a free wheeling diode always used along with semi conductor fed drives?
4. Where is a regenerative chopper fed drive preferred?
5. What are the limitations of stator voltage control of induction motor?
6. Name the different type of slip power recovery?
7. How is the power factor controlled in the open loop operation of synchronous motor?
8. Define the term marginal angle in the operation of synchronous motor.
9. What the difference between PMSM and BLDC motor?
10. How is the speed of the switched reluctance motor regulated?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the Torque – Speed characteristics of DC series Motor. (8)  
(ii) Develop a model for a DC motor and therefore establish its cooling characteristics. (8)

Or

- (b) Develop an expression for the power rating of an electric motor when it is subjected to both continuous duty constant and continuous duty variable loads. (16)
12. (a) (i) Describe using a diagram the operation of a single phase semi converter fed separately excited DC motor drives. (10)  
(ii) Deduce an expression relating the speed and torque when the same motor operates in the continuous current mode. (6)

Or

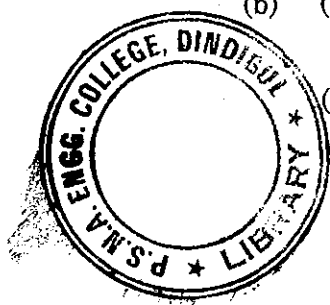
- (b) Explain using sub circuits the operation of a four quadrant chopper fed separately excited DC motor. (16)
13. (a) (i) Describe using a diagram the stator frequency control method of varying the speed of a three phase induction motor. (10)  
(ii) Show how the induction motor can be made to operate as DC series motor using its torque speed characteristics. (6)

Or

- (b) (i) Derive an expression for the torque of static rotor resistance controlled three phase induction motor. (10)  
(ii) Bring out the need for vector control of induction motor drives. (6)
14. (a) (i) Discuss using a diagram the self control mode of operation of a synchronous motor. (10)  
(ii) Bring out the merits and demerits of the self and separate controlled modes of operation of synchronous motor drives. (6)

Or

- (b) (i) Discuss how a current source inverter is preferred over a voltage source inverter for use in the synchronous motor drive. (6)  
(ii) Explain how the speed of the Synchronous motor can be controlled using a cycloconverter. (10)



15. (a) (i) Describe the theory and operation of a variable reluctance stepper motor. (8)
- (ii) Deduce a control logic suitable for the converter interface to regulate the speed of the motor. (8)

Or

- (b) (i) Explain using a diagram the working of a switched reluctance motor. (10)
- (ii) Deduce an expression for the torque developed in the motor. (6)
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