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Question Paper Code : 13938

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Second Semester

Power Electronics and Drives

PX 7203 — SPECIAL ELECTRICAL MACHINES

(Common to M.E. Control and Instrumentation Engineering and M.E. Electrical Drives and Embedded Control)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is PMBLDC motor called as electronically commutated motor?
2. Compare PMBLDC and switched reluctance motor.
3. List the features of permanent magnet synchronous motor.
4. What are the classifications of PMSM with respect to direction of field flux?
5. Why do you need position sensors for SRM?
6. List the main applications of synchronous reluctance motor.
7. What are the different modes of excitation in stepper motor?
8. What is hybrid stepper motor?
9. Distinguish between AC series motor and DC series motor.
10. State the applications of linear induction motor.

PART B — (5 × 16 = 80 marks)

11. (a) Draw the constructional diagram of PMBLDC motor and explain the functions of various blocks.

Or

(b) A PMBLDC motor has no load speed of 6000 rpm when connected to 120V DC supply. The armature resistance is 2.5 Ω. Rotational and iron losses may be neglected. Find the speed when the supply voltage is 60V and the torque is 0.5 N-m.

12. (a) Explain the concept of self control and vector control with respect to permanent magnet synchronous motor.

Or

(b) Discuss the construction and working principle of synchrnous reluctance motor.

13. (a) Explain the various types of control circuits used in switched reluctance motor.

Or

(b) Explain in detail the construction and working principle of switched reluctance motor.

14. (a) Discuss the classification of stepper motor in terms of construction and working principle.

Or

(b) (i) Explain the mechanism of torque production in variable reluctance stepper motor. (8)

(ii) Find the pulse rate required to obtain a rotor speed of 2400 rpm for a stepper motor having a resolution of 200 steps/rev. (8)

15. (a) Explain the construction and operation of hysteresis motor.

Or

(b) Describe the working principle of linear induction motor and compare its operational characteristics with conventional induction motor.

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