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Question Paper Code : 52966

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulation 2013)

(Common to PTEE 6703 – Special Electrical Machines for B.E. (Part-Time) – Sixth Semester – Electrical and Electronics Engineering – Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention some applications of synchronous reluctance motor.
2. Compare SyRM and Induction motor.
3. Draw the block diagram of the drive system of a stepping motor.
4. State some applications of stepper motor.
5. State the principle of operation of switched reluctance motor.
6. What are the types of power controllers used for SRM?
7. What are the advantages of brushless dc motor drives?
8. List the permanent magnet materials used in PMBLDC motors.
9. What are the types of PMSM?
10. Why PMSM operating in self controlled mode is known commutatorless dc motor?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the construction and principle of working of a universal motor and mention its applications.

Or

(b) Draw the phasor diagram and explain the performance characteristics of repulsion motor.

12. (a) Explain the operating principles, constructional features of three different types of stepper motor.

Or

(b) Explain the various modes of excitation of PM stepper motor with a bridge driver scheme.

13. (a) Describe the various power controller circuits applicable to switched reluctance motor and explain the operation of any one scheme with suitable circuit diagram.

Or

(b) Draw a schematic diagram and explain the operation of a "C"-dump converter used for the control of SRM.

14. (a) With relevant waveforms, derive the expression for torque and emf of PM brushless DC motor.

Or

(b) Describe the operation of power controllers for PMBLDC motor with neat diagram.

15. (a) Enumerate the design considerations of permanent magnet synchronous motor.

Or

(b) With necessary phasor diagram and circle diagram, describe torque speed characteristics of PMSM.

PART C — (1 × 15 = 15 marks)

16. (a) A brushless PM sinewave motor has an open circuit voltage of 173V at its corner point speed of 3000 rpm. It is supplied from a p.w.m. converter whose maximum voltage is 200V rms. Neglecting resistance and all other losses, estimate the maximum speed at which maximum current can be supplied to the motor.

Or

(b) Derive the relationship between magnetic field intensity and flux density by performing the magnetic circuit analysis of a brushless dc motor on open circuit.

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