Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 80387

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by reluctance torque in synchronous reluctance motor?

2. Write down the applications of synchronous reluctance motor.

3. Define lead angle.

4. What is the need of suppressor circuits in stepper motor?

5. What is the need of a rotor positioning sensor in Switched Reluctance Motor?

6. Write any four applications of SRM.

7. What are the merits of the brushless dc motor drives?

8. Write the difference between electronic and mechanical commutator.

9. Classify the different types of PMSM.

10. Differentiate square wave and sine wave motor.

PART B — $(5 \times 16 = 80 \text{ marks})$

11. (a) Explain with neat diagram, the construction, working principle and types of synchronous reluctance motor. (16)

Or

(b) Draw the steady state phasor diagram of synchronous reluctance motor and derive the expression for torque of synchronous reluctance motor. (16)

12. (a) (i) Explain in detail the multi stack construction of stepper motor. (8)

(ii) Explain the modes of excitation of a stepper motor with neat diagram. (8)

Or

(b) (i) A stepper motor has resolution of 180 steps/rev. Find the pulse rate required in order to obtain a rotor speed of 2400 rpm. (8)

(ii) Explain in detail, the static and dynamic characteristics of a stepper motor. (8)

13. (a) (i) Explain with neat diagram, the microprocessor based control of Switched reluctance motor. (10)

(ii) Derive the expression for static torque in SRM. (6)

Or

(b) (i) Explain with the neat diagram any two converter topologies for SRM. (8)

(ii) Explain the torque speed characteristics of SRM in detail. (8)

14. (a) Explain the construction and principle of operation of PMBLDC motor. (16)

Or

(b) (i) Explain in detail, the power controllers for PMBLDC. (8)

(ii) A BLPM motor has a no load speed of 6000 rpm when connected to a 120 V DC supply. The armature resistance is 2 Ω. Rotational and iron losses may be neglected. Determine the speed when the supply voltage is 60 V and the torque is 0.5 N-m. (8)

80387