Question Paper Code : 41013

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Electrical and Electronics Engineering
EE6703 – SPECIAL ELECTRICAL MACHINES
(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Mention any two advantages of synchronous reluctance motors.

2. Define 'Reluctance Torque' with reference to synchronous reluctance motor.

3. What are the different modes of excitation in a stepper motor ?

4. What is meant by Lead angle in stepper motors ?

5. What is the need for shaft position sensor for Switched Reluctance Motor ?

6. Draw the speed-torque characteristics of Switched Reluctance Motor.

7. List any four permanent magnet materials.

8. State some important applications of Permanent Magnet Brushless DC Motors.

9. Write the important features of Permanent Magnet Synchronous Motor.

10. State the types of power controllers for Permanent Magnet Synchronous Motor.

PART – B   (5×16=80 Marks)

11. a) Explain the constructional details and working principle of synchronous
    reluctance motor with neat diagrams.   (10+6)

        (OR)

    b) Explain the phasor diagram and characteristics of synchronous reluctance
    motor.   (10+6)

12. a) i) Describe the principle of operation of hybrid stepper motor. (8)

      ii) Explain briefly a closed-loop operation system using a microprocessor for a hybrid stepping motor. (8)

          (OR)

   b) i) Explain the mechanism of static torque production in a variable reluctance stepping motor. (10)

      ii) Describe the dynamic characteristics of a variable reluctance stepper motor. (6)

13. a) Draw the cross sectional view of switched reluctance motor and explain the principle of operation. State the advantages of switched reluctance motor. (10+6)

          (OR)

   b) Draw and explain four converter topologies for a 3-phase SRM. Write the merits and demerits of each topology. (16)

14. a) i) Explain the magnetic circuit analysis of permanent magnet brushless DC motor on open-circuit. (10)

      ii) Derive the EMF equation of permanent magnet brush less DC motor. (6)

          (OR)

   b) i) Draw and explain the general structure of a controller for a permanent magnet brush less DC motor. (8)

      ii) Describe the torque/speed curve of the ideal burshless DC motor. (8)

15. a) For an ideal sine wave permanent magnet motor, derive the EMF and Torque equations. (8+8)

          (OR)

   b) i) Describe the construction of phasor diagram of surface-magnet sine wave motor. (8)

      ii) Explain the torque/speed characteristic of sine wave motor. (8)