

Register Number.....

M.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

POWER ELECTRONICS AND DRIVES

P07PEE 01 Special Electrical Machines

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Define Reluctance torque
2. What are the classifications of synchronous reluctance motor based on their rotor?
3. Write the voltage equation of Switched Reluctance Motor.
4. Mention any four disadvantages of Switched Reluctance Motor.
5. Write the EMF equation of Permanent Magnet Synchronous Motor.
6. Mention any four applications of Permanent Magnet Synchronous Motor.
7. Draw the torque speed characteristics of Permanent Magnet Synchronous Motor.
8. List out the classification of Permanent Magnet Brushless DC motor.
9. Differentiate Switched Reluctance Motor and Stepper motor.
10. Draw the dynamic characteristics of a stepper motor.

PART B (5 x 16 = 80 Marks)

11. (a) With the aid of neat sketch, explain the constructional features and principle of operation of synchronous reluctance motor. (16)

(OR)

- (b) (i) Explain in detail about the torque speed characteristics of synchronous reluctance motor. (8)
- (ii) Explain the principle of operation of Vernier motor. (8)

12. (a) Explain in detail about the power controllers for switched reluctance motor. (16)

(OR)

- (b) (i) Explain the different modes of operation of switched reluctance motor and their current waveforms. (8)

(ii) Draw and explain the torque speed characteristics of switched reluctance motor. (8)

13. (a) Explain the torque speed characteristics of the permanent magnet synchronous motor. (16)

(OR)

(b) What is meant by vector control? Explain the vector control scheme in detail with suitable circuit. (16)

14. (a) Draw the structure of a controller for permanent magnet brushless DC motor and explain the functions of various blocks. (16)

(OR)

(b)(i) A permanent magnet brushless DC motor has a no load speed of 6000rpm when connected to a 120V DC supply. The armature resistance is 2.5 Ohms. Rotational and iron losses may be neglected. Determine the speed when the supply voltage is 60V and the torque is 0.6Nm. The no load speed is 6000rpm when it is supplied by 120V. (8)

(ii) Write short notes about the sensors used for rotor positioning. (8)

15. (a) Explain the different modes of excitation of stepper motors. (16)

(OR)

15.(b)(i) Discuss in detail about the dynamic characteristics of stepper motor. (8)

(ii) Compare variable reluctance, hybrid and permanent magnet stepper motors. (8)
