KUMARAGURU
college of technology
character is life

Register Number: ………………..

B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE311:Special Electrical Machines

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. When compared to Induction motor, the synchronous reluctance motor is
   a) High power factor & heavy weight
   b) low power factor & heavy weight
   c) High power factor & light weight
   d) Low power factor & light weight

2. The synchronous reluctance motor is capable of operating at
   a) Low speed
   b) Medium speed
   c) High speed
   d) Very high speed

3. In a stepper motor the angular displacement
   a) can be precisely controlled
   b) it cannot be readily interfaced with micro computer based controller
   c) the angular displacement cannot be precisely controlled
   d) it cannot be used for positioning of work tables and tools in NC machines.

4. A stepper motor is
   a) a dc motor
   b) a single-phase ac motor
   c) a multi-phase motor
   d) a two phase motor.

5. A switched reluctance motor differs from a VR stepper motor in the sense that it
   a) has rotor poles of ferromagnetic material
   b) rotates continuously
   c) is designed for open-loop operation only.
   d) has lower efficiency

6. The step angle of switched reluctance motor is
   a) $360° / (N_r q)$
   b) $180° / (N_r q)$
   c) $90° / (N_r q)$
   d) $60° / (N_r q)$

7. The emf equation of PMBLDC motor is

   a) $E_{ph} = 2 B_g rl T_{ph}\omega_m$
   b) $E_{ph} = 4 B_g rl T_{ph}\omega_m$

   c) $E_{ph} = 4 rl T_{ph}\omega_m$
   d) $E_{ph} = 2rl T_{ph}\omega_m$

8. The coercivity force in PMBLDC motor is defined as

   a) Magnetizing force
   b) Demagnetizing force

   c) Cross magnetizing force
   d) Pre magnetizing force

9. In permanent magnet synchronous motor

   a) Slip rings & field windings are present
   b) Slip rings & field windings are absent

   c) Slip rings are present & no field windings
   d) Slip rings are absent & field windings are present

10. Which of the following motor would suit applications where constant speed is absolutely essential to ensure a consistent product?

   a) brushless dc motor
   b) disk motor

   c) permanent-magnet synchronous motor
   d) stepper motor.

PART B (10 x 2 = 20 Marks)

11. Define torque angle of synchronous reluctances motor.

12. What are the factors to be considered while designing a vernier motor?

13. What is hybrid stepper motor?

14. What is meant by power drive circuit in stepper motor?

15. What is switched reluctance motor?

16. Define energy ratio in SRM.

17. Compare conventional d.c. motor and PMBLDC motor.

18. List some important application of PMBLDC motor.

19. State the principle of operation of PMSM.

20. State the types of power controllers for PM synchronous motor

PART C (5 x 14 = 70 Marks)

21. a) Explain the constructional details and working principle of synchronous reluctances motor.

   (OR)

   b) (i) Draw and explain a typical torque speed characteristic of a synchronous reluctance motor. (7)

   (ii) Explain the phasor diagram of synchronous reluctances motor (7)

22. a) Explain the construction and various modes of excitation of variable reluctance stepper motor.

    (OR)

    b) Draw and explain the drive circuits for stepper motor.

23. a) (i) Derive the torque equation of SRM. (7)

       (ii) Explain with neat sketch the operation of power controller in SRM. (7)

    (OR)

    b) With neat diagram, explain microprocessor based control of SRM.

24. a) Explain the principle of operation of PMBLDC motor.

    (OR)

    b) Explain the speed- torque characteristics of PMBLDC motor.

25. a) Explain the Torque – speed characteristic of PMSM.

    (OR)

    b) Derive the emf and torque equation of PM synchronous motor.

****