



B.E DEGREE EXAMINATIONS: APRIL/MAY 2016

(Regulation 2013)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U13EETE11: Special Electrical Machines

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

- The variation of reluctance R_l with space angle θ_r depends on the shape of _____
 - stator poles
 - rotor poles
 - stator or rotor poles
 - both stator and rotor poles
- For a reluctance motor, the maximum average torque occurs when $\delta =$ _____
- A stepper motor may be considered as a _____.
 - dc to dc converter
 - ac to ac converter
 - dc to ac converter
 - digital actuator
- A 3 stack stepper motor has 12 teeth on stator as well as on rotor. The step size when each stack excited is _____.
- Switched reluctance motor means
 - Salient pole synchronous motor without excitation winding
 - A stepper motor with salient poles
 - Synchronous motors with salient poles
 - A stepper motor with closed loop control and on stator and rotor with rotor position sensor
- The single phase reluctance machine acts as a generator when angle δ is _____
- The speed of permanent magnet D.C motor cannot be controlled by _____.
 - Flux control method
 - Rheostatic control method
 - Electronic circuits
 - Gate control method
- In the biomedical instruments like artificial heart pumps, the commonly used motor is _____
- The power factor of a synchronous motor _____.
 - Improves with increase in excitation and may even become leading at high excitations
 - Decreases with increase in excitation
 - Is independent of its excitation
 - Increases with loading for a given excitation
- State any one feature of permanent magnet synchronous motor : _____

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Draw the torque angle characteristics of synchronous reluctance motor.
12. What are the properties of Reluctance motor?
13. List the different types of stepper motor.
14. What is meant by synchronism in stepper motor?
15. Draw the speed-torque characteristics of switched reluctance motor.
16. Draw the inductance profile of SRM.
17. Compare 120 degree and 180 degree operation of BLDC motor.
18. Write down the torque equation of P.M Brushless DC Motor?
19. Compare PMSM and PMBLDC motors.
20. What are the applications of PMSM?

PART C (5 x 14 = 70 Marks)
(Answer not more than 400 words)

Q.No. 21 is Compulsory

21. Discuss the characteristics of stepper motor with neat sketch.

22. (a) Explain the constructional details and working principle of synchronous reluctance motor.

(OR)

- (b) (i) Explain the working of Vernier motor with a neat diagram. (10)
- (ii) What are the types of synchronous reluctance motor? (04)

23. (a) List the various power controller circuits to Switched Reluctance motor and explain the operation of any one scheme with suitable circuit diagram.

(OR)

- (b) (i) Explain with a neat block diagram, the microprocessor based control in switched reluctance motor. (10)
- (ii) List the applications of switched reluctance motors. (04)

24. (a) (i) Derive the emf equation of PMBLDC motor. (10)
- (ii) Give the merits of PMBLDC motor compared to conventional motor. (04)

(OR)

- (b) Draw and explain the speed-torque characteristics of PMBLDC motor with relevant equations.

25. (a) Derive the EMF and Torque equations of permanent magnet synchronous motors.

(OR)

(b) Explain the microprocessor based control of permanent magnet synchronous motors with a neat block diagram and list the advantages.
