Register Number: ……

B.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Seventh Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EEE10: Special Electrical Machines

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

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The advantage of increasing L_d/ L_q ratio in Synchronous reluctance motor will be _____
   a) Increase in I^2R Losses b) Decrease in I^2R Losses
   c) Decrease in Power factor d) Increase in Volt-ampere ratings
2. A vernier motor is a_____ motor.
   a) Low torque at High Speed b) High torque at High Speed
   c) Low torque at Low speed d) High torque at Low speed
3. In a stepper motor, the number of steps needed to complete one revolution of rotor shaft is called as _____
   a) Stepping frequency b) Resolution c) Slewing rate d) Synchronous stepping rate
4. Start-Stop Mode of stepper motor is called as _____.
   a) Single stepping mode b) Double stepping mode c) Multi stepping mode d) Pulse mode
5. Switched reluctance motor is a _____motor.
   a) Self-starting b)Non-self starting c) Sensorless d)permanent magnet
6. Switched Reluctance motor has _____ types of operating modes.
   a) one b) two c) four d)More than four
7. In a PMBLDC .motor _____ accommodates permanent magnets.
   a)Stator b)Rotor c) Commutator d)Magnetic slip-rings
8. PMBLDC motor has_____
   a) Mechanical commutator b) Sliprings c) Electronic commutator d) Damper windings
9. The nature of voltage induced in a PM synchronous motor stator is _____.
   a) Triangular b) Trapezoidal c) Square d) Sinusoidal

10. PM synchronous motor has _____ commutators.

a) one b) two c) no d) three

PART B (10 x 2 =20 Marks)

11. How a PM synchronous motor can be made to operate as a synchronous reluctance motor?
12. What is a vernier motor?
13. A single-stack, 3 phase VR motor has a Step angle of 15^0 find the number of its rotor and stator poles.
14. List the applications of Stepper motor.
15. Write the expression for reluctance torque.
16. Draw the general speed torque characteristics of SRM.
17. Give any four Merits of PMBLDC motor compared to conventional DC motor.
18. Give the necessity of Rotor position sensor in BLDC motor and list any two types of sensors used?
19. Classify PM synchronous motor based on rotor configuration?
20. What is Synchronous Reactance?

PART C (5 x 14 = 70 Marks)

21. a) Describe the construction and principles of operation of Synchronous reluctance motor. List advantages and disadvantages of it .

(OR)

b) Explain the construction, operation and working principle of Vernier motor?

22. a) Explain in detail the construction and principle of operation of Single stack VR stepping motor.

(OR)

b) (i) List various power driver circuits of Stepper motor and explain a driver circuit in detail. (8)

(ii) Sketch the dynamic characteristics of stepper motor and explain the various regions in it. (6)

23. a) Describe the various power controller circuits applicable to SRM and explain any two with neat diagram.

(OR)

b) Explain the computer based control of SRM drive and write the operating modes of SRM in detail?

24. a) (i)With a neat sketch explain the blocks of Power controller for PMBLDC square wave motor? (10)

(ii) List the advantages and disadvantages of BLDC? (4)

(OR)

b) Derive the torque equation of the PMBLDC Square wave motor and explain speed torque Characteristics.

25. a) Give short notes on vector control of PM synchronous motor?

(OR)

b) (i) Explain the speed torque characteristics of PM synchronous motor? (7)

(ii) Explain the working of microprocessor based control of PM synchronous motor? (7)

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