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**Question Paper Code : 91456**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Seventh Semester

Electrical and Electronics Engineering

EE 2403/EE 73/10133 EEE 25 — SPECIAL ELECTRICAL MACHINES

(Regulation 2008/2010)

(Common to PTEE 2403/10133 EEE 25 – Special Electrical Machines for  
B.E. (Part-Time) Sixth/Seventh Semester – EEE – Regulation 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Express and explain the voltage and torque equation of a synchronous reluctance motor.
2. Write the different types of controllers used for synchronous reluctance motors.
3. Distinguish the half step and full step operations of a stepping motor.
4. Write the principle of operation of a variable reluctance motor.
5. Mention the applications of micro stepping VR stepper motor.
6. List out the advantages and disadvantages of the converter circuit with two power semiconductor devices and two diodes per phase.
7. Write the principle of operation of PM-BLDC motor.
8. What is meant by demagnetization in PM-BLDC motor?
9. Briefly explain the vector control of permanent magnet synchronous motor.
10. Mention the various assumptions in deriving the EMF equation of permanent magnet synchronous motor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss in detail, about the construction and working principle of synchronous reluctance motors with diagrams. (8)
- (ii) Draw and explain phasor diagram with characteristics of synchronous reluctance motors. (8)

Or

- (b) (i) Discuss the various stator current modes in a Synchronous reluctance motor in detail. (8)
- (ii) Write a detailed technical note on the variable reluctance and hybrid motors and their advantages. (8)
12. (a) Discuss the construction and working principle of Hybrid Stepper motor with neat diagrams. (16)

Or

- (b) Draw and explain the drive circuits and their performance characteristics for stepper motor. (16)
13. (a) (i) Along with circuit diagrams explain the hysteresis type and PWM type current regulator for one phase of a switched reluctance motor. (10)
- (ii) Explain briefly the various modes of excitation of variable reluctance motor. (6)

Or

- (b) (i) Discuss the microprocessor based control of switched reluctance motor. (8)
- (ii) Derive the torque equations of the variable reluctance motor and illustrate the various dependent parameters. (8)
14. (a) Enumerate in detail, about the construction and working principle of rotary and linear SRMs with appropriate schematic diagrams. (16)

Or

- (b) (i) Discuss the various methods of rotor position sensing in SRMs. (8)
- (ii) Explain the closed loop control operation of SRM and its performance characteristics in detail. (8)
15. (a) (i) Discuss the current control scheme of permanent magnet synchronous motor in detail. (8)
- (ii) Explain the speed-torque characteristics of permanent magnet synchronous motors. (8)

Or

- (b) Enumerate the construction and performance of a permanent magnet synchronous motor diagrams. (16)