



**B.E. DEGREE EXAMINATION APRIL/MAY 2013**  
**VII SEMESTER**  
**EE9036 SPECIAL ELECTRICAL MACHINES**

**Time:3 Hours**

**Marks:100**

**(Answer all questions)**  
**PART A (10 X 2 =20 MARKS)**

1. Differentiate between PMSM and PMBLDC motor.
2. What is meant by coercivity in permanent magnets?
3. Explain slewing mode operation of stepper motor..
4. Explain bifilar winding in stepper motors .
5. Explain the operation of hall sensor used for rotor position sensing.
6. Differentiate between radial flux machines and axial flux machines.
7. Draw the speed torque characteristics of SRM .
8. What are the advantages of SR motor compared to PMBLDC motor?
9. What are the applications of AC series motor?
10. Explain whether field weakening mode can be achieved in PMSM machine with surface mounted magnets.

**PART B (5 X 16 = 20 MARKS)**

- 11.a. (i) Explain commutation of dc motor and how it is achieved using electronic switches in brushless dc motor. (9)
- (ii) A PM brushless d.c motor has a torque constant of 0.12 Nm/A referred to the d.c supply. Estimate its no load speed in rpm when connected to a 48 V dc supply. If the armature resistance is 0.15 ohm/phase and the total voltage drop in the controller transistors is 2 V determine the stall current and the stall torque. (7)
- 12.a. Explain the principle of operation of linear motor.  
(OR)
- 12.b. Explain the operation of AC series motor.
- 13.a. Derive the emf equation for p polepair PMSM with practical 3 phase winding on the stator .  
(OR)
- 13.b. Derive the torque equation for p polepair PMSM with practical 3 phase winding on the stator .

14a. Explain with neat diagram the operation of any two converter circuits of SR motor.

**(OR)**

14.b. (i) Explain the principle of operation of SRM motor. (10)

(ii) Derive the torque equation of SRM using field energy. Prove that torque is independent of current direction for SR motor having linear  $i-\Psi$  curve. (6)

15.a. Explain with neat diagram the operation of i) variable reluctance and ii) hybrid stepper motor

**(OR)**

15.b. (i) Explain the different modes of excitation of stepper motors (9)

(ii) Why do you need current suppression circuit? Explain any one current suppression circuit used in stepper motor converter circuits. (7)