Time:3 Hours   Marks:100

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

1. Differentiate between sinusoidal distributed winding and practical winding.
2. What is meant by remanent flux density?
3. Explain slewing mode operation of stepper motor..
4. Differentiate between monopolar and 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. What are the differences between variable reluctance stepper motors and SRM motors?
8. compare SRM with PMBLDC in terms of speed, airgap, size and converter circuits
9. Explain the operation of synchronous reluctance machine.
10. Explain why highly coercive magnet should be used in order to achieve high power factor in PMSM machine.

PART B (5 X 16 = 20 MARKS)

11.a. .(i) Explain electronic commutation of brushless dc motor.
(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..

12.a. Explain the principle of operation of brushless dc motor and derive emf and torque equation. Show that these equations are similar to that of dc motor.
(OR)
12.b. Explain the principle of operation of synchronous reluctance machine and derive the torque equation for synchronous reluctance machine.

13.a. Derive the emf equation for p polepair PMSM with practical 3 phase winding on the stator using Faraday's law

(OR)
13.b Derive the torque equation for p polepair PMSM with practical 3 phase winding on the stator using Faraday's law

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.

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

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

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