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**Question Paper Code : 87056**

**M.E. DEGREE EXAMINATION, MAY/JUNE 2016**

**Second Semester**

**Power Electronics and Drives**

**PX 7203 – SPECIAL ELECTRICAL MACHINES**

**(Common to M.E. Control and Instrumentation Engineering and M.E. Electrical Drives  
and Embedded Control)**

**(Regulations 2013)**

**Time : Three Hours**

**Maximum : 100 Marks**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. State the modes of operation of square wave BLDC motor.
2. List the advantage of Brushless DC motor drives.
3. What are the features of permanent magnet synchronous motor ?
4. Draw the torque speed characteristics of PMSM.
5. What are the types of power controllers used for Switched Reluctance motor ?
6. Why Switched Reluctance motor is preferred in adjustable speed drives ?
7. Define: pull out torque of stepper motor.
8. Write the effects of magnetic saturation in stepper motor.
9. Compare A.C and D.C series motor in terms of construction.
10. List the applications of Linear Induction motor.

**PART – B (5 × 13 = 65 Marks)**

11. (a) Derive the torque and EMF equations of the permanent magnet brushless DC motor.

**OR**

- (b) Explain the magnetic circuit analysis of brushless DC motor on open circuit in detail.

12. (a) Briefly explain the vector control and microprocessor based control of PMSM .

**OR**

- (b) Explain the working principle of synchronous reluctance motor with neat diagram.

13. (a) Discuss the various power controller circuits for Switched Reluctance motor and explain the operation of any one scheme.

**OR**

- (b) (i) Draw and explain torque - speed characteristics of Switched Reluctance motor. (8)  
(ii) Discuss the merits and demerits of Switched Reluctance motor. (5)

14. (a) Explain the construction and operation of permanent magnet Stepper motor.

**OR**

- (b) Discuss the static and dynamic characteristics of stepper motor with neat diagram.

15. (a) With a neat diagram, discuss the principle of working of AC series motor.

**OR**

- (b) Explain the commutation in ac series motor and Derive the torque equation of ac series motor.

**PART – C (1 × 15 = 15 Marks)**

16. (a) A 100W , 2pole ,50Hz, 230V single phase series motor with salient poles has a total resistance of 15  $\Omega$  leakage resistance of 40  $\Omega$ , mutual resistance of 80  $\Omega$  in d-axis and 50  $\Omega$  in q-axis. If the stray power losses are 20watts, calculate the current, speed and power factor of the motor at full-load.

**OR**

- (b) (i) Compare the brushless-DC motor with PM commutator motor. (7)  
(ii) Analyze the drawbacks of open loop system and need for closed loop control of stepper motor. (8)