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**Question Paper Code: 53001**

M.E. DEGREE EXAMINATION, NOV 2018

Third Semester

Power Electronics and Drives

15PPE301 – SPECIAL ELECTRICAL MACHINES AND CONTROLLERS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

1. Classification of PMBLDC motor CO1- R
  - (a) PMBL SQW motor
  - (b) PMBL Sine wave motor
  - (c) BLDC motor
  - (d) Both (a) and (b)
2. PMSM motor has CO2 -R
  - (a) Rotor has permanent magnet
  - (b) Rotor has no permanent magnet
  - (c) Rotor has electro magnet
  - (d) None of these
3. A switched reluctance motor differs from a VR stepper motor in the sense that it CO3- R
  - (a) Has rotor poles of ferromagnetic material
  - (b) Rotates continuously
  - (c) Is designed for open-loop operation only
  - (d) Has lower efficiency
4. Holding torque in a stepper motor is CO4 -R
  - (a) Maximum Load torque
  - (b) Minimum Load torque
  - (c) Both (a) and (b)
  - (d) None of the above
5. Types of linear induction motor based on the principle of operation CO5- R
  - (a) Linear Induction motor
  - (b) Linear synchronous motor
  - (c) DC commutator linear motor
  - (d) All the above

PART – B (5 x 3= 15Marks)

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|-----|---|---------|
| 6.  | Mention some applications of PMBLDC Motor.                        | CO1-U   |
| 7.  | Compare electromagnetic excitation with permanent magnet of PMSM. | CO2-Ana |
| 8.  | Define voltage pulse width modulation control.                    | CO3-U   |
| 9.  | List the applications of stepper motor.                           | CO4-U   |
| 10. | Application of AC series motors.                                  | CO5-U   |

PART – C (5 x 16= 80Marks)

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|-----|---|---------|------|
| 11. | (a) Write a note on power controllers used in PMBLDC motor.   | CO1- U  | (16) |
|     | Or  |         |      |
|     | (b) Explain the closed loop control scheme of a PMBLDC motor drive with a suitable schematic diagram.                                   | CO1- U  | (16) |
| 12. | (a) Derive the expression for synchronous reactance of PM synchronous motor.  | CO2-App | (16) |
|     | Or  |         |      |
|     | (b) Show the power output of PMBLDC motor is more than PMSM for the same size.  | CO2-App | (16) |
| 13. | (a) Explain in detail about torque prediction in SRM.   | CO3-U   | (16) |
|     | Or  |         |      |
|     | (b) Sketch the general torque speed curve of SR motor and discuss the type of control strategy used for different regions of the curve. | CO3-U   | (16) |
| 14. | (a) Describe construction and principle of operation of a variable reluctance type stepper motor.                                       | CO4 -U  | (16) |
|     | Or  |         |      |
|     | (b) With a neat sketch explain the construction working principle of hybrid stepper motor.  | CO4 -U  | (16) |
| 15. | (a) Draw and explain any one of the linear motor.   | CO5-U   | (16) |
|     | Or  |         |      |
|     | (b) Describe the principle of operation of AC series motor and mention its applications.  | CO5-U   | (16) |