Hall Ticket No | | | | | | | | | | |

Question Paper Code: BPE003

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech I Semester End Examinations (Supplementary) - July, 2017

Regulation: IARE–R16

SPECIAL MACHINES AND CONTROLLERS

(Power Electronics and Electric Drives)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Distinguish between Axial and Radial air gap Synchronous Reluctance Motors with relevant diagrams. **[7M]**

   (b) Compare the advantages of Synchronous Reluctance Motor over Permanent Magnet Machines. **[7M]**

2. (a) Draw and discuss the torque speed characteristics of Single Phase Synchronous Reluctance Motor. **[7M]**

   (b) Explain the construction and principle of Vernier Motor. **[7M]**

UNIT – II

3. (a) Explain in detail about the constructional features of Single Stack Variable Reluctance Motor. **[7M]**

   (b) Calculate the step angle of a single stack 4 phase, 8/6 pole Variable Reluctance Stepper. What is its Resolution. **[7M]**

4. (a) Explain the principle of operation of Stepper motor, which can be operated with combined principles of Permanent magnet and Variable Reluctance motors in order to achieve a small step angle & high torque from a small size. **[7M]**

   (b) Explain in detail linear and non-linear analysis of Stepper motor. **[7M]**

UNIT – III

5. (a) Predict the torque speed characteristics of Switched Reluctance motor **[9M]**

   (b) List out basic requirements of Power Semiconductor Switching Circuits for SRM. **[5M]**

6. (a) Discuss microprocessor based control of Switched Reluctance Motor Drive. **[8M]**

   (b) Determine the step angle of 3-phase switched reluctance motor having 12 stator poles and 8 rotor poles. Calculate Commutation frequency at each phase at a speed of 600 rpm. **[6M]**

UNIT – IV

7. (a) Draw the torque speed characteristics of Brushless Permanent Magnet Square Wave DC motor. **[7M]**

   (b) A brushless Permanent Magnet DC Motor has no load speed of 6000 rpm ,when connected to 120 V DC supply.R_a =2.5 Ω. Rotational & Iron losses may be neglected. Determine the speed when supply voltage is 60 V and the torque is 0.5 NM. No load speed when supply voltage is 120 V, is 6000 rpm. **[7M]**

8. (a) Derive the general EMF equation of Permanent Magnet Brushless DC Motor. **[7M]**

   (b) Give the merits & demerits of Brushless Permanent Magnet DC Motors. **[7M]**

UNIT – V

9. (a) Draw the phasor diagram of Brushless Permanet Magnet Synchronous Motor. **[7M]**

   (b) Derive the torque equation of an ideal Brushless Permanent Magnet Sine Wave Motor. **[7M]**

10. (a) Explain about microprocessor based control of permanent magnet synchronous motor. **[7M]**

    (b) Identify the applications of Permanent magnet Synchronous Motor. **[7M]**

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