CBCS SCHEME

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Special Electrical Machines

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing full question from each module.*

Module-1

1   a.   Describe the construction and working of four-phase, eight pole variable reluctance motor.
                                                                               (08 Marks)
    b.   Sketch and explain the static and dynamic characteristics of stepper motor.   **(08 Marks)**

OR

2   a.   Derive the torque equation of stepper motor.   **(08 Marks)**
    b.   With a block diagram and flow chart, explain the micro processor –based control of stepper motor.   **(06 Marks)**
    c.   Find the resolution of a stepper motor that is to be operated at an input pulse frequency of 6000 pulse/sec and travel a distance of 180° in 0.025 sec.   **(02 Marks)**

Module-2

3   a.   With a block diagram explain a control scheme for Switched Reluctance Motor(SRM).
                                                                               (08 Marks)
    b.   Sketch and explain performance characteristics of a PMDC motor.   **(04 Marks)**
    c.   Write any four comparision of conventional DC motor and BLDC motor.   **(04 Marks)**

OR

4   a.   With a neat sketch, explain the current regulators used for Switched Reluctance Motor (SRM).   **(08 Marks)**
    b.   With a neat sketch, explain the micro processor based control of BLDC motor.   **(08 Marks)**

Module-3

5   a.   Derive the emf equation of Permanent Magnet Synchronous Motor(PMSM).   **(08 Marks)**
    b.   Write the advantages and applications of Synchronous Reluctance Motor(SyRM).   **(08 Marks)**

OR

6   a.   Explain with the help of a neat diagram, construction and working of permanent magnet synchronous motor.   **(08 Marks)**
    b.   A 3 phase, 4 pole, 60Hz 230V star connected synchronous reluctance motor has direct axis and quadrature axis synchronous recactances of 22.5 and 3.5Ω respectively. The load torque is 12.5 N-m. The voltage to frequencies ratio is maintained constant at rated value.
         Find : i) torque angle ii) line current iii) power factor. Neglect rotational losses and armature resistance.   **(08 Marks)**

Module-4

7   a.   Explain construction and principle of working of AC series motor.   **(08 Marks)**
    b.   Derive the transfer function of a field controlled DC motor. Draw the block diagram.
                                                                               (08 Marks)

OR

8 a. Draw and explain the torque-speed, performance characteristics of AC series motor.

(06 Marks)

   b. List the advantages and limitations of universal motor. (05 Marks)

   c. Explain the principle of operation of DC servo motor. (05 Marks)

Module-5

9 a. Obtain the thrust equation of DCLM. (06 Marks)

   b. Define and explain goodness factor of LIM. (04 Marks)

   c. Derive the output equation of a Permanent Magnet Axial Flux (PMAF) motor. (06 Marks)

OR

10 a. With a neat circuit diagram and block diagram, explain the control of Linear Synchronous Motor(LSM). (08 Marks)

   b. Write a note on pulsating torque and its minimization. (04 Marks)

   c. Write the applications of PMAF motors. (04 Marks)

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