CBCS SCHEME

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15EE554

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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