Q. P. Code : PE0819211(A)-I   (Pages: 2)
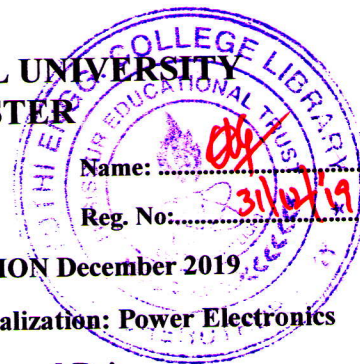
Third SEMESTER M.TECH. DEGREE EXAMINATION December 2019

Branch: Electrical &Electronics Engineering   **Specialization: Power Electronics**

08EEE7211 (A) Special Electrical Machines and Drives

Time:3 hours   Max.marks: 60

Answer all six questions.

Modules 1 to 6:Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	Define the terms for a stepper motor (i) step angle (ii)resolution	3
	Answer b or c	
b	Discuss the different modes of excitation in a stepper motor	6
c	Explain with the help of relevant block diagram on the microprocessor control of stepper motor.	6

Q.no.	Module 2	Marks
2.a	Explain the working principle of SRM. Mention the advantages of SRM	3
	Answer b or c	
b	With the help of circuit diagram and operational waveforms, explain theoperation and highlights of a classical converter for SRM control	6
c	With the help of circuit diagram and operational waveforms, explain the following of a typical Dump-C converter for SRM control (i) Operation (ii) merits and demerits.	6

Q.no.	Module 3	Marks
3.a	List out the advantageous of synchronous reluctance motor. Draw it torque-speed characteristics	3

Answer b or c

b   Describe the constructional features of axial and radial flux synchronous reluctance motor.   **6**

c   A 3 phase, 400V, 60 Hz, 4 pole star connected synchronous reluctance motor with negligible armature resistance, has direct and quadrature axis reactance values are given as X_{sd}=22.5 ohms and X_{sq} = 3.5 ohms respectively. The load torque is T_L=12.5 N-m. The voltage to frequency ratio is maintained constant at rated value. Calculate (i) torque angle (ii) line current.   **6**

Q.no.	Module 4	Marks

4.a   Compare mechanical and electronic commutators   **3**

Answer b or c

b   Explain the constructional features of PMBLDC motor. How the construction different from that of conventional DC motor.   **6**

c   Compare the principle of position detection using optical and Hall elements in Permanent magnet brushless DC motor..   **6**

Q.no.	Module 5	Marks

5.a   Obtain the emf equation of a PMBL square wave DC motor   **4**

Answer b or c

b   With the help of relevant figures and waveforms, Explain the working principle of BLDC square wave motor with 120 degree magnetic arc.   **8**

c   Explain the microprocessor-based control of BLDC motor in detail.   **8**

Q.no.	Module 6	Marks

6.a   Discuss the principle of operation and torque-speed characteristics of a PMSM   **4**

Answer b or c

b   (i) Derive the emf equation of Permanent magnet synchronous motor   **8**

(ii) Discuss the sensor less control of PMSM

c   With the help of relevant figures, explain theprinciple of vector control for PMSM   **8**