Reg. No.												

Question Paper Code	12594

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Seventh Semester

Electrical and Electronics Engineering

20EEEL713 - SPECIAL ELECTRICAL MACHINES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Define step angle.	2	K1	CO1
2.	What is meant by pull out range?	2	K1	CO1
3.	Give basic features of Switched Reluctance motor.	2	K1	CO2
4.	What are the merits of classic converter in SRM?	2	K1	CO2
5.	List the permanent magnet materials used in PMBLDC motors.	2	K1	CO3
6.	Name the position sensors that are used for PMBLDC motor.	2	K1	CO3
7.	Define load angle.	2	K1	CO4
8.	Summarize the distribution factor for PMSM.	2	K2	CO4
9.	Describe in short about SYNREL motors.	2	K2	CO5
10.	Outline the various design parameters of a synchronous reluctance motor.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Draw and explain in detail the static and dynamic characteristics of stepper motor.	13	K2	CO1
		OR			
	b)	Summarize about the suppressor circuits for stepper motor.	13	K2	CO1
12.	a)	Explain the construction and working of Switched Reluctance motor.	13	K2	CO2
		OR			
	b)	Derive the voltage and torque equation of SRM.	13	K2	CO2
13.	a)	Explain in detail about various types and working of PMBLDC motor with necessary diagrams.	13	K2	CO3
		OR			
	b)	Identify appropriate power controllers for PMBLDC motor and explain with neat diagram.	13	K2	CO3

14.	a)	Derive the expression for power input and torque of a PMSM. Explain how its torque speed characteristics are obtained.	*13*	*K2*	*CO4*
		OR			
	b)	A 3 ϕ, 4 pole, brushless PM rotor has 36 stator slots. Each phase winding is made up of three coils per pole with 10 turns per coil. The coil span = 7 slots. If the fundamental component of magnet flux is 1.8mWb. Estimate the open circuit phase emf (Eq) at 3000 rpm.	*13*	*K2*	*CO4*
15.	a)	Compare a reluctance motor with an equivalent induction motor and list out the merits and demerits of reluctance motor over induction motor.	*13*	*K2*	*CO5*
		OR			
	b) i)	Distinguish between Axial and Radial air gap motors.	*7*	*K2*	*CO5*
	ii)	List out the applications of synchronous reluctance motor.	*6*	*K2*	*CO5*

PART - C (1 × 15 = 15 Marks)

16.	a)	A Variable Reluctance stepper motor has a step angle of 3˚, Determine the following: (i) Resolution. (ii) Number of steps per shaft to make 10 revolutions (iii)Shaft speed if stepping frequency is 2400pulse/sec.	*15*	*K3*	*CO1*
		OR			
	b)	Develop the various modes of operation of permanent magnet stepper motor with neat diagram.	*15*	*K3*	*CO1*