Q. Code: 437704

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Seventh Semester

EE16701 – SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

(Regulation 2016)

Time: Three Hours **Maximum : 100 Marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	A stepper motor has a resolution of 900 steps/rev in the single phase ON mode of operation. If it is operated in half step mode, determine the number of steps required to turn the rotor to 72°.	1	AP
2.	Enumerate the various types of driver circuits in stepper motor.	1	R
3.	Compare Synchronous reluctance motor with Switched reluctance motor.	2	AN
4.	Mention some applications of synchronous reluctance motor.	2	U
5.	Outline the advantages of sensorless operation of Switched Reluctance Motor.	3	AN
6.	Compute the step angle of a 3phase, Switched Reluctance Motor having 12 stator poles 8 rotor poles, also calculate commutation frequency at each phase and speed of 6000 rpm?	3	AP
7.	Give examples of various permanent magnet materials.	4	U
8.	Differentiate mechanical and electronic commutator.	4	AN
9.	Mention the various types of rotor used in PMSM.	5	R
10.	List out any four applications of PMSM.	5	U

PART B - (5 X16 = 80 Marks)

11.	(a)	Explain the construction, types and operation of VR stepper motor. List out the various modes of excitation and explain any one mode in detail.	**(16)**	1	AP
		(OR)			
	(b)	(i) State and explain the static characteristics of a stepper motor.	**(8)**	1	U

		(ii)	With neat block diagram, explain the microprocessor based control of stepping motor.	**(8)**	**1**	**AP**
12.	(a)		Explain the constructions and working principle of axial and radial flux SyRM.	**(16)**	**2**	**U**
			(OR)			
	(b)	(i)	Explain the phasor diagram of SyncRel motor.	**(8)**	**2**	**AP**
		(ii)	Explain the N-T and T-angle characteristics of SyncRel Motor.	**(8)**	**2**	**AP**
13.	(a)	(i)	Briefly discuss about the closed loop control of Switched Reluctance Motor.	**(8)**	**3**	**U**
		(ii)	Derive the voltage and torque equation of Switched Reluctance Motor.	**(8)**	**3**	**AP**
			(OR)			
	(b)		Enumerate various power converter circuits applicable to switched reluctance motor and describe with suitable diagram, the operation of any two power converter circuits.	**(16)**	**3**	**U**
14.	(a)		From the magnetic circuit analysis of permanent magnet brushless DC motor, derive the expression for permeance coefficient.	**(16)**	**4**	**AP**
			(OR)			
	(b)	(i)	Derive the EMF equation of a PMBLDC motor.	**(6)**	**4**	**AP**
		(ii)	Sketch the structure of controller for PMBLDC motor and explain the functions of various blocks.	**(10)**	**4**	**U**
15.	(a)	(i)	Explain the construction, working principle and operation of Permanent Magnet Synchronous Motor.	**(16)**	**5**	**U**
			(OR)			
	(b)	(i)	Explain the torque - speed characteristics of Permanent Magnet Synchronous Motor.	**(6)**	**5**	**U**
		(ii)	Explain in detail the self control of Permanent Magnet Synchronous Motor.	**(10)**	**5**	**U**