Reg. No.:										
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(d) None of the above

**Question Paper Code: 47303** 

## B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Seventh Semester

Electrical and Electronics Engineering

## 14UEE703- SPECIAL ELECTRICAL MACHINES

		(Regula	tion 2014)		
Du	ration: Three hours			Maximum: 100 Marks	
		Answer AI	LL Questions		
		PART A - (10	x 1 = 10 Marks)		
1.	What is the angle between (a) 30°	een stator direct ax (b) 0°	is and quadrature ax (c) 45°	tis? (d) 90°	
2.	The material's resistance  (a) Resistance		gnetized is called (c) Reluctance	(d) Permeance	
3.	Operation of stepper mo  (a) Fast forward	otor at high speed	(b) Slewing		
	(c) Inching		(d) Jogging		
4.	The rotational speed of (a) Shaft load	a given stepper m		olely by the of stator current	
	(c) Step pulse frequen	ncy	(d) Magnitude of stator current.		
5.	Reluctance Motors are				
	(a) Doubly excited		(b) Si	ingly excited	

(c) Either doubly excited or singly excited

6.	For which one (a) Electric s	of the following applicati havers		r is preferred? frigerators			
	(c) Signaling	g and timing devices	(d) Lifts and hoists				
7.	(a) Cobalt –	samarium	nt magnet material has low coercive force?  (b) Alnico				
	(c) Barium a	nd strontium ferrites	(d) Neodymium – iron - boron				
8.	Permanent Ma	gnet Brushless DC Motor	s are compact in size du	ue			
	(a) Absence of	of field winding	(b) Presence of smaller field winding				
	(c) Present of	magnets	(d) Any of the mentioned				
9.	· ·	naximum torque in Perma tor flux and rotor flux is k	•	ous Motor, the angle			
	(a) 90°	(b) 45°	(c) 30°	(d) 60°			
10. Which of the following motor would suit applications where constant speed is absolutely essential to ensure a consistent product?							
	(a) brushless d	c motor	(b) disk motor				
	(c) permanent-	-magnet synchronous mot	or (d) stepper mot	or			
		PART - B (5	x = 10  Marks				
11.	Skewing is req	uired for Synchronous rel	uctance motor. Justify?				
12.	Define holding	torque and detent torque	in Stepper motor.				
13.	Mention some	position sensors used in s	witched reluctance mot	tor.			
14.	How the dema	gnetization occurs in PMI	BLDC motor.				
15.	What are the as	ssumptions made in derivations of the state	ation of torque equation	n for Permanent Magnet			

PART - C (5 x 
$$16 = 80 \text{ Marks}$$
)

16. (a) A 10 HP, 4 pole, 240V, 60Hz, reluctance motor operating under rated load condition has a torque angle of 30°. Determine (a)Load torque on shaft (b)Torque angle if the voltage drops to 224V (c)For the above torque angle, will the rotor pullout of synchronism (16)

	(b)	Derive the voltage and torque equation of synchronous reluctance motor (16)	5)
17.	(a)	Describe the construction and operation of Variable Reluctance Stepper Motor w different modes.	rith (16)
		Or	
	(b)	Explain the closed loop control concept of Stepper motor with neat diagram.	(16)
18.	(a)	(i) Describe the various operating modes of Switched Reluctance motor	(8)
		(ii) Explain the speed-torque characteristics of Switched Reluctance Motor.	(8)
		Or	
	(b)	Describe the various operating modes of Switched Reluctance motor (	16)
19.	(a)	(i) Explain in detail about magnetic circuit analysis of Permanent Magnet Brushles DC Motor on open circuit.	ss (8)
		(ii) Explain the speed- torque characteristics of Permanent Magnet Brushless DC motor in detail.	(8)
		Or	
	(b)	A PMBLDC motor has toque constant 0.12 Nm/A referred to DC supply. Find motors no load speed when connected to 48V DC supply. Find the stall current stall torque if armature resistance is $0.15\Omega$ /phase and drop in controller transisto 2V.	and or is
20.	(a)	Explain microprocessor based control of Permanent Magnet Synchronous Motor in detail.	16)
		Or	
	(b)	(i) Discuss about Volt-ampere requirements in Permanent Magnet Synchronous Motor.	3)
		(ii) Derive an EMF equation of Permanent Magnet Synchronous Motor.	(8)