A		Reg. No. :								
	Question Paper Code: 54326									
B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023										
Fourth Semester										
Electronics and Communication Engineering										
15UEE426- PRINCIPLE OF ELECTRICAL MACHINES										
(Regulation 2015)										
Dura	Duration: Three hours Maximum: 100 Marks									
	Answer ALL Questions									
		PART A - (10	x 1 = 1	0 Mar	ks)					
1.	How the eddy current losses are reduced in a DC machine? CO1-R									
	(a) using low hysteresis co-efficient material									
	(b)using stalloys									
	(c)using laminated core									
	(d)using high electrical resistive material									
2.		relation between torque and armature current for a series CO1-R case of prior to magnetic saturation.								
	(a) T ∞ KI _a	(b) T $\propto \Phi I_a^2$	(c) $T \propto \Phi I_a$ (d) $T \propto$				∞I^{s}	$\circ I_a^2$		
3.	As I _o is very small, the no-load primary copper loss is negligibly small CO2-U which means that no-load primary input is practically equal to the in the transformer.									
	(a) iron loss	(b) copper loss	(c)]	hystere	esis lo	SS	(d) (eddy	curr	ent loss
4.	Give the condition fo	ve the condition for maximum efficiency of a transformer. CO2-R								
				(b) iron loss + copper loss = total loss						
				ss = copper loss + 2(iron loss)						

5.	The stator of a 3-phase induction motor has three slots per pole per phase. If supply frequency is 50Hz, calculate the number of stator poles and total number of slots on the stator.						
	(a) 6-poles,32-slo	ts (b) 6-poles, 54-slots	s (c) 12-poles,32-slots (2-poles, 32-slots (d) 12-poles,			
6.	Find the slip valu starting	he slip value of a 3-phase, 4-pole induction motor at the time of ag					
	(a) 0	(b) 1	(c) 2	(d) 0.02			
7.	Which alternator	is called as high-speed al	led as high-speed alternator?				
	(a) Salient pole		(b)Smooth cylindrical ty				
	(c) Projected pole	Projected pole type (d) a & b					
8.	A synchronous m	A synchronous motor is said to be over-excited at the condition					
	·						
0							
9.	Name the additional winding which is provided for a single phase CO5-R motor to be self starting.						
	(a) auxillary wind	ling (b) main winding	(c) running winding	(d) lap v	vinding		
10.	-	Calculate the step angle of a stepper motor having three phases with 4-rotor poles and 6-stator poles					
	(a) 45°	(b) 60°	(c) 30°	(d) 90°			
PART - B (5 x 2 = 10 Marks)							
11.	Draw the various		CO1-R				
12.	Give a view on inrush current in a transformer.				CO2-R		
13.	Why is rotor rheostat starter unsuited for a squirrel cage motor?				CO3-U		
14.	How can we change the operating speed of synchronous motor?						
15.	What are the various methods of making a single phase induction motor self starting?				CO5-U		
PART – C (5 x 16= 80Marks)							
16.	(ii) A 230 V 1200rpm an	d draws a current of 4.5	generator. no-load runs at a speed of Amperes. The armature an and 230 ohms respectively	d	(10) (6)		

Calculate the back EMF induced and speed, when loaded and drawing a current of 36 Amperes.

Or

- (b) Why Starters are necessary in a motor? Explain in detail the CO1-U (16) construction and working operation of 4-point starter.
- 17. (a) With the circuit explain how to obtain equivalent circuit by CO2-U (16) conducting Open Circuit and Short Circuit test in a single phase transformer.
 - Or
 - (b) (i) Derive the EMF equation of the single phase transformer. CO2-U (8)
 (ii) Discuss the constructional details of a single phase CO2-U (8) transformer with neat sketches and working principle.
- 18. (a) (i) Develop the approximate equivalent circuit of a 3-phase CO3-U (8) induction motor.
 (ii) Derive the expression for torque under running condition of a CO3-U (8) 3-phase induction motor and obtain the condition for maximum
 - Or

torque.

	(b)	 With neat diagrams, explain the working of (i) Stat-Delta Starter (ii) Auto Transformer Starter for 3 phase induction motor. 	CO3-U	(16)
19.	(a)	(i) Describe with neat sketches, the constructional details of an Alternator.	CO4-U	(10)
		(ii) Derive the EMF equation of an Alternator.	CO4-U	(6)
		Or		
	(b)	Explain about the starting methods of Synchronous motor.	CO4-U	(16)
20.	(a)	(i) Explain in detail the operation of a capacitor start and run induction motor.	CO5-U	(8)
		(ii) Discuss in detail the operation of a hysteresis motor.	CO5-U	(8)
		Or		
	(h)	Explain the construction and principle of operation of a	CO5 U	(16)

(b) Explain the construction and principle of operation of a CO5-U (16) Permanent Magnet Brushless DC Motor.