

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2140906

Date:15/05/2019

Subject Name: AC Machines

Time:02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	(a)	Explain only constructional difference between squirrel case and wound rotor 3 phase Induction Motor	03
	(b)	Derive the torque equation of 3 phase Induction Motor	04
	(c)	List the types of starters for a 3 Phase Induction Motor. Explain any two starters in brief.	07
Q.2	(a)	What is Linear Induction motor? Explain in brief with its application	03
	(b)	Draw Slip Torque characteristic of 3 phase Induction motor and explain in brief	04
	(c)	A 30 KVA 2400/120-V, 50 Hz transformer has a high voltage winding resistance of 0.1 ohm and a leakage reactance of 0.22 ohm. The low voltage winding resistance is 0.035 ohm and the leakage reactance is 0.012 ohm. Find the equivalent winding resistance, reactance and impedance referred to the (i) High voltage side and (ii) the low voltage side.	07
		OR	
	(c)	Describe the procedure to construct the circle diagram of induction motor. Also Explain the method to determine losses, Motor efficiency and slip at full load condition using circle diagram.	07
Q.3	(a)	What do you mean by Synchronous Condenser and how it's different than Synchronous motor?	03
	(b)	Explain V-curves and Inverted V-curve of synchronous motor in brief	04
	(c)	List the types of Single Phase induction motor. Explain the operational principal of any one split phase induction motor with necessary sketch and vector diagram	07
		OR	
Q.3	(a)	Why synchronous motor is not self starting? Describe in brief	03
	(b)	What is auto synchronous motor and how it is different than synchronous motor.	04
	(c)	Draw the schematic diagram and explain the construction and working of shaded pole single phase motor.	07
Q.4	(a)	What is Hunting of Synchronous machine and how it prevents	03
	(b)	Which are the conditions need to satisfy for successful parallel operation of 3 ph Alternator?	04
	(c)	What is synchronization? Explain two bright one dark lamp method and all dark lamp method of synchronization in brief.	07
		OR	
Q.4	(a)	Derive the EMF equation of an alternator	03

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| | (b) | Define pitch factor and distribution factor of an alternator with necessary equations. | 04 |
| | (c) | Mention the methods of determination of voltage regulation of an alternator. Describe the Synchronous impedance (EMF) method in detail. | 07 |
| Q.5 | (a) | What is short circuit ratio of synchronous machine and how it's effect to machine performance. | 03 |
| | (b) | Explain the construction and working of universal motor | 04 |
| | (c) | A 3-phase, 16-pole alternator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 Wb, Sinusoidally distributed and the speed is 375 r.p.m. Find the Line and phase EMF. Assume full-pitch coil ($K_c=1$). | 07 |
| | | OR | |
| Q.5 | (a) | Describe Induction Generator in brief | 03 |
| | (b) | Explain the construction and working of Repulsion motor | 04 |
| | (c) | A three phase star connected alternator is rated at 1600 KVA, 13.5 KV. The per phase armature effective resistance and synchronous reactance are 1.5 ohm and 30 ohm respectively. Calculate voltage regulation for a load of 1.280 MW at power factor of (i) Unity p.f and (ii) 0.8 lagging. | 07 |
