Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(OLD) • EXAMINATION – WINTER 2016

Subject Code:130904 **Date:09/01/2017**

Subject Name:Electrical Machines-1

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Explain in detail the working and construction of 3-Φ Induction motor	**07**
	(b)	Draw and explain the characteristics of DC generator and state their application.	**07**
Q.2	**(a)**	Explain with neat diagram SC and OC test on a transformer and how parameters of equivalent circuit can be calculated with the help of this test	**07**
	(b)	Derive the relation for starting and running torque for a 3- Φ Induction motor. Also draw and explain the torque-slip characteristics.	**07**
		OR	
	(b)	Draw and explain the vector diagrams for actual transformer on-load.	**07**
Q.3	**(a)**	Write a short note on auto-transformer. Give its applications and derive the relation for saving of copper compared to 2-winding transformer.	**07**
	(b)	Explain the voltage build-up process in a self excited DC shunt generator. Also explain critical resistance.	**07**
		OR	
Q.3	**(a)**	Write short note on pitch factor and distribution factor of an alternator.	**07**
	(b)	Explain the method of determining voltage regulation of an alternator by synchronous impedance method.	**07**
Q.4	**(a)**	Explain the conditions necessary for parallel operation of two alternators. Also explain any one method for synchronizing the two alternators.	**07**
	(b)	With a neat diagram explain the power stages in a DC motor	**07**
		OR	
Q.4	**(a)**	Explain with a neat circuit diagram Swinburne's test to find the efficiency of a DC motor. Also state it's limitation.	**07**
	(b)	A 3-phase, 50-Hz, 4-pole induction motor has a slip of 4%. Determine the frequency of rotor emf and speed of motor if rotor has a resistance of 1Ω and standstill reactance of 4Ω, Calculate the power factor of the motor(i) at standstill and (ii) at a speed of 1400rpm.	**07**
Q.5	**(a)**	Explain with a neat diagram working of a 3-point starter.	**07**
	(b)	A short shunt compound wound DC generator supplies a load current of 50-A at 220-V. The generator has the following winding resistance: Armature winding resistance 0.5Ω, Series field resistance 0.2Ω, shunt field resistance 100Ω. Calculate the generated e.m.f. Assume brush drop 1-V per brush.	**07**
		OR	
Q.5	**(a)**	State and explain the necessary condition for parallel operation of two single phase transformer.	**07**
	(b)	State different methods of speed control of DC motors. Explain Ward Leonard method of speed control in detail.	**07**

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