GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-III EXAMINATION – SUMMER 2016

	Subject Code:130904Date:13/06/2016Subject Name:Electrical Machines-1Total Marks: 70Time:10:30 AM to 01:00 PMTotal Marks: 70		
	Instru	 ctions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. 	
Q.1	(a) (b)	Explain the working principle and construction of a DC machine. Draw and derive the equivalent circuit of a 1- Φ transformer.	07 07
Q.2	(a)	What are different losses occurring in a DC motor. Explain the power stages of a DC motor.	07
	(b)	Define slip. Derive the relation for starting torque and running torque for an Induction motor.	07
		OR	
	(b)	Explain OC and SC test of a single transformer with a neat diagram. Also explain how efficiency of a transformer for a given load can be found with the help of these tests.	07
Q.3	(a)	Derive the EMF equation for an alternator. Also explain distribution factor and pitch factor.	07
	(b)	State the conditions necessary for parallel operation of two 1- Φ transformer. OR	07
Q.3	(a)	Classify different types of DC generator. Draw and explain the Load characteristics of each type of DC generator.	07
	(b)	State the different methods used for speed control of DC motor. Explain Ward Leonard method in detail.	07
Q.4	(a)	Explain the torque–slip characteristics of a $3-\Phi$ induction motor. Also derive the relation for maximum torque.	07
	(b)	With a neat diagram explain the working of a 3-point starter. OR	07
Q.4	(a)	Explain the voltage build up process of a DC shunt generator and critical field resistance.	07
	(b)	Calculate the flux per pole required on a 55-kW, 400-V, 8-pole, 600 r.p.m DC shunt generator with 256 conductors arranged in a lap-connected winding. The armature resistance is 0.15Ω , the shunt field resistance is 200Ω and the total brush contact drop is 2-V on full-load.	07
Q.5	(a)	Explain with a neat diagram parallel operation of two alternator and conditions necessary for parallel operation.	07
	(b)	Derive the relation for copper saving in an auto-transformer compared to 2-winding transformer. Also state the applications of an auto transformer.	07

OR

Q.5 (a) Explain voltage regulation for an alternator. State the different indirect methods to find 07 voltage regulation of an alternator. Explain any one in detail.

- (b) A 5-kVA, 220/440-V, 50Hz, single phase transformer gave the following test results: 07 O.C. Test: 220-V, 2-A, 100-W on L.V.side
 S.C. Test: 40-V 11.4A, 200-W on H.V.side .
 - Find (i)the percentage efficiency at half load, 0.9 p.f. lagging (ii) the regulation at full load, 0.9 p.f. lagging.
