Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2015

Subject Code:2131005 **Date:29/12/2015**

Subject Name: Electrical Machines

Time: 2:30pm to 5:00pm **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	**Answer the following :**	**14**
1	A transformer having 1000 primary turns is connected to a 250-V a.c. supply. For a secondary voltage of 400 V, the number of secondary turns should be (a) 1600 (b) 250 (c) 400 (d) 1250	
2	Before removing the ammeter from a current transformer, its secondary must be short circuited in order to avoid (a) excessive heating of the core (b) high secondary e.m.f. (c) increase in iron losses (d) all of the above.	
3	The principle of operation of a 3-phase. Induction motor is most similar to that of a (a) synchronous motor (b) repulsion-start induction motor (c) transformer with a shorted secondary (d) capacitor-start, induction-run motor.	
4	One of the characteristics of a single- phase motor is that it (a) is self-starting (b) is not self-starting (c) requires only one winding (d) can rotate in one direction only.	
5	The frequency of voltage generated by an alternator having 4-poles and rotating at 1800 r.p.m. is .....hertz. (a) 60 (b) 7200 (c) 120 (d) 450	
6	In a d.c. generator, the generated e.m.f. is directly proportional to the (a) field current (b) pole flux (c) number of armature parallel paths (d) number of dummy coils	
7	Overall efficiency of Thermal Power Plant is (a) 45 (b) 25 (c) 55 (d) 85	
8	What do you understand by step up and step down transformers ?	
9	What is meant by single Phasing?	
10	Why is a single Phase Induction Motor not self starting?	
11	State the advantages of Synchronous Motors.	
12	What are the remedies of Armature Reaction ?	
13	What is load factor?	
14	What is Ferranti effect?	

Q.2	**(a)**	(i) A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core. Neglect leakage drops and no-load primary current.	**03**
	(b)	(ii) Explain how 3-phase supply can be converted into 2-phase supply using scott connection?	**04**
	(c)	Derive EMF equation of single phase transformer. Which parameters are responsible for variation in output voltage?	**07**
		OR	
	(c)	What is the constructional difference between core type and shell type transformer? What are the merits and demerits of each?	**07**
Q.3	**(a)**	What is basic principle and construction of synchronous motor?	**03**
	(b)	Write short note on O.C test and S.C. test on transformer.	**04**
	(c)	What is autotransformer? Derive its equation for saving in copper.	**07**
		OR	
Q.3	**(a)**	A 3-φ induction motor is wound for 4 poles and is supplied from 50-Hz system. Calculate (i) the synchronous speed (ii) the rotor speed, when slip is 4% and (iii) rotor frequency when rotor runs at 600 rpm.	**03**
	(b)	Explain cogging and crawling in a 3 phase induction motor with their remedies.	**04**
	(c)	What is slip in induction motor? Explain torque-slip curve of induction motor.	**07**
Q.4	**(a)**	Discuss the conditions to be satisfied before a 3- phase alternator is synchronized with infinite bus.	**03**
	(b)	What is pitch factor and distribution factor in alternator ?	**04**
	(c)	Explain ZPF method for finding regulation of alternator.	**07**
		OR	
Q.4	**(a)**	An 8-pole d.c. shunt generator with 778 wave-connected armature conductors and running at 500 r.p.m. supplies a load of 12.5 Ω resistance at terminal voltage of 50 V. The armature resistance is 0.24Ω and the field resistance is 250 Ω. Find the armature current, the induced e.m.f. and the flux per pole.	**03**
	(b)	Explain armature reaction of the d.c. machine.	**04**
	(c)	Derive the e.m.f. equation of D.C. generator.	**07**
Q.5	**(a)**	A d.c. motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2 Ω. The machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate (i), the speed and (ii) the gross torque developed by the armature.	**03**
	(b)	Explain Swinburn's test of dc shunt motor.	**04**
	(c)	Write short note on Three point starter.	**07**
		OR	
Q.5	**(a)**	What is diversity factor and plant utilization factor ?	**03**
	(b)	Explain three phase four wire and three phase three wire system.	**04**
	(c)	What do you mean by power factor? How can we improve power factor ?	**07**

****