Seat No.:	Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER - VI (NEW). EXAMINATION - WINTER 2016

	•	ect Code: 2160912 Date: 22/10/2016 ect Name: Design of DC Machines and Transformer	
7	Sime	: 10:30 AM to 01:30 PM Total Marks: 70 ctions:	
1	nstr u	 Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks. 	
Q.1	(a)	Derive equation Et = $k\sqrt{Q}$ where Q = kVA rating of a transformer. Explain how service conditionof transformer affect the value of K.	07
	(b)	Explain: (a) Significance of mitered joints in transformer. (b) Difference between power transformer and distribution transformer	07
Q.2	(a)	What is design optimization? Derive necessary condition for designing a transformer with minimum cost.	07
	(b)	Prepare a technical note on classification of insulating materials. OR	07
	(b)	Determine the main dimensions of the core for a 5 kVA , $11000/400 \text{ V}$, 50 Hz , single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross section of iron in the core. Assume a square cross-section for the core, a flux density 1 Wb/m^2 , a current density 1.4 A/mm^2 , and a window space factor 0.2. The height of window is 3 times its width.	07
Q.3	(a) (b)	The current densities in the primary and secondary windings of a transformer are 2.2 and 2.1 A/mm² respectively. The ratio of transformation is $10:1$ and the length of the mean turn of the primary is 10 percent greater than that of the secondary . Calculate the resistance of the secondary winding given that the primary winding resistance is 8Ω . Explain guidelines used for selection of No. of armature slots in D.C. machine.	07
Q.3	(a)	OR Explain different methods used to improve armature reaction effect in D.C.	07
Q.C	, ,	machine. Explain various factors affecting selection of airgap length in D.C. machine.	07
Q.4	(a)	A design is required for a 50 kW, 4 pole, 600 r.p.m. d.c. shunt generator, the full load terminal voltage being 220 V. If the maximum gap density is 0.83 Wb /m² and the armature ampere conductors per metre are 30000, Calculate suitable dimensions of the armature core to give a square pole face. Assume that the full load armature voltage drop is 3 percent of the rated terminal voltage, and that the field current is 1 percent of rated full load current. Ratio of pole arc to pole pitch is 0.67.	07
	(b)	Discuss the factors affecting No. of poles in D.C. machine. OR	07
Q.4	(a) (b)	Explain Commutation in dc machine. Explain how interpole improves it. Explain steps to design shunt field winding of a D.C. machine.	07 07
Q.5	(a)	Derive the equation of leakage reactance of 3 phase core type distribution transformer.	07
	(b)	State the function of enclosers for the rotating machines and state the differnt	07

types of enclosers and specific use of them.

OR

Q.5	(a)	Derive the output equation of D.C. machine.	07
	(b)	Explain different cooling methods used in oil immersed transformer.	07
