Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 150802 **Date: 05/06/2012**

Subject Name: Electrical Machine-II

Time: 02:30 pm – 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.**

Q.1	**(a)**	Discuss the difference between single layer and double layer winding. Under what conditions are dummy coils needed in a wave winding.	**06**
	(b)	What are the advantages of Hopkinson's test over Swinburne's test and what are its limitations.	**04**
	(c)	A 6-pole,DC armature with 36 slots and 2 coil-sides/slot is to be wave – wound(double-layer).Calculate the back-pitch, front –pitch and commutator-pitch.How many dummy coils, if any, are required?	**04**
Q.2	**(a)**	Explain the basic purpose of a tertiary winding in transformer. To what additional use it can be put? Explain Scott connection with neat diagram for 3 phase transformer.	**07**
	(b)	A 50kVA,2200/110 V transformer when tested gave the following results: OC test, measurements on the LV side:400W,10A,110V SC test, measurements on the HV side:808W,20.5A,90V Compute all the parameters of the equivalent circuit referred to the HV and LV sides of the transformer.	**07**
		OR	
	(b)	A 500kVA ,11/0.43kV,3-phase delta/star-connected transformer has the rated load an HV copper-loss of 2.5kW and an LV loss of 2kW.The total leakage reactance is 0.06pu.Find the ohmic values of the equivalent resistance and leakage reactance on the delta side.	**07**
Q.3	**(a)**	Describe briefly the methods of controlling speed of an Induction motor.	**07**
	(b)	A 3-phase, 400V, star-connected induction motor has a star-connected rotor with a stator to rotor turn ratio of 6.5.The rotor resistance and standstill reactance per phase are 0.05 ohm and 0.25 ohm respectively. What should be the value of external resistance per phase to be inserted in the rotor circuit to obtain maximum torque at starting and what will be rotor starting current with this resistance.	**07**
		OR	
Q.3	**(a)**	Why are large squirrel cage IM's not stared direct on line? How they are normally started?	**07**
	(b)	A 3-phase,400V induction motor gave the following test readings: No load:400V,1250W,9A,Short circuit:150V.4kW,38A Draw the circle diagram. If the normal rating is 14.9kW,find the circle diagram, the full –load value of current,pf and slip.	**07**
Q.4	**(a)**	Under what conditions does the voltage regulation of a synchronous machine becomes negative? Explain with a phasor diagram.	**07**
	(b)	Explain power developed by a synchronous motor with neat diagram.	**07**
		OR	

Q.4	**(a)**	Discuss the effect of excitation on Armature current and Power factor with neat diagram (synchronous motor).	**07**
	(b)	Explain construction of V curves with neat diagram (synchronous motor).	**07**
Q.5	**(a)**	Explain various types of stepper motors .State the advantages of permanent magnet brushless DC machine.	**07**
	(b)	Explain briefly the action of a transformer with schematic diagram.	**07**

OR

Q.5	**(a)**	State one advantage and one disadvantage in the application of each of the three basic types of DC motors.	**07**
	(b)	A 3-phase induction motor has a 4-pole,star-connected stator winding and runs on 50Hz with 400V between lines. The rotor resistance and standstill reactance per phase are 0.4 ohm and 3.6 ohm respectively. The effective ratio of rotor to stator turns is 0.67.Calculate:(1)the gross torque at 4% slip,(2) the gross mechanical power at 4% slip,(3)maximum torque,(4)speed at maximum torque, and(5) maximum mechanical power(gross).Neglect stator impedance.	**07**

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