Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V • EXAMINATION – WINTER 2016

Subject Code: 150802 Date: 17/11/2016
Subject Name: Electrical Machines
Time: 10:30AM – 01:00PM 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.	**07**
	(b)	Explain demagnetizing and cross magnetizing effects of armature reaction giving neat diagrams.	**07**
Q.2	**(a)**	Describe Swinburne's test with the help of a neat diagram to find out the efficiency of a dc machine.	**07**
	(b)	Determine the number of turns per phase in each winding of a 2-phase transformer with a ratio of 20,000/2000 V at 50 Hz. The high voltage windings is delta connected and the low voltage winding is star connected. Each core has a cross section of 500 cm^2. Assume a flux density of about 1.2 Wb/m^2.	**07**
		OR	
	(b)	Explain the harmonic phenomena in (i) delta connected (ii) star connected winding of three phase transformers.	**07**
Q.3	**(a)**	Explain the construction, operation and equivalent circuit of double cage induction motor.	**07**
	(b)	Explain with necessary circuit diagrams, the experimental test conducted on an induction motor to draw the circle diagram. How will you determine the motor characteristics from the circle diagram?	**07**
		OR	
Q.3	**(a)**	Describe with construction diagrams the working of the direct on-line starter.	**07**
	(b)	Explain the principle of operation of an induction generator. What are its limitations?	**07**
Q.4	**(a)**	Using double field revolving theory, discuss in detail why single phase induction motor is not self starting.	**07**
	(b)	Describe the construction and working of a capacitor start single phase induction motor.	**07**
		OR	
Q.4	**(a)**	A universal series motor has a resistance of 30 Ω and an inductance of 0.5 Henry. When connected to a 250 V dc supply and loaded to take of 0.8 Amp, it runs at 2000 rpm. Determine the speed, torque and power factor, when connected to a 250 V, 50 Hz ac supply and loaded to take the same current.	**07**
	(b)	Explain why a universal motor can operate from dc. as well as ac supplies. Also draw its construction.	**07**

Q.5	**(a)**	What methods are generally used to start the synchronous motors? Explain	**07**
	(b)	Explain the operation of a synchronous motor with its phasor diagram under (a) constant load, varying excitation (b) constant excitation, varying load.	**07**

OR

Q.5	**(a)**	Describe the operation of a permanent magnet type of a stepper motor.	**07**
	(b)	Draw and explain the torque-speed characteristics of a hysteresis motor. What are the common application of hysteresis motor?	**07**

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