Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code: 150802 **Date:05/12/2015**

Subject Name: Electrical Machines

Time: 10:30am to 1:00pm **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)**	Explain with the help of connection and phasor diagram how to obtain 2-phase supply from 3-phase supply mains using scott connection.	**07**
	(b)	With net circuit diagram explain swinburne's test and write the equations of efficiency of D.C. motor and D.C. generator also give advantages and disadvantages of swinburne's test.	**07**
Q.2	**(a)**	Explain construction and working of switched reluctance motor. Give applications of it. Compare variable reluctance motor and switched reluctance motor.	**07**
	(b)	The hopkinson's test on two shunt machines gave the following results for full-load: line voltage = 250 V, current taken from supply system excluding field currents = 50 A, motor armature current = 380 A, generator field current is 5 A and motor field current is 4.2 A. calculate efficiency of machine working as a generator. Armature resistance of each machine is 0.2 Ω.	**07**
		OR	
	(b)	What is commutation? Explain different methods to improve commutation. Also explain function of equalizing connection.	**07**
Q.3	**(a)**	Enlist speed control methods of 3-phase induction motor. Explain rotor rheostat control with net diagram.	**07**
	(b)	Why single phase induction motor is not self-started? Explain double field revolving theory.	**07**
		OR	
Q.3	**(a)**	What is the need of starter in 3-phase induction motor? Explain star-delta starting of 3-phase induction motor.	**07**
	(b)	With net diagram explain working of single value capacitor start and run motor. Also give advantages of capacitor start and run single phase induction motor.	**07**
Q.4	**(a)**	Draw the no-load and short circuit diagram for a 14.92 kW, 400 V, 50 Hz, 3-phase star-connected induction motor from the following data(line values): No load test: 400 V, 9 A, cosΦ = 0.2 Short Circuit test: 200 V, 50 A, cosΦ = 0.4 Rotor Cu loss at standstill is half the total Cu loss. From the diagram find (a) the line current and power factor at full load, and (b) the maximum output power.	**10**
	(b)	Draw and explain equivalent circuit of single phase induction motor without core loss.	**04**
		OR	

Q.4 **(a)** A 20 h.p., 400 V, 950 r.p.m, 3-phase, 50 Hz, 6-pole cage motor with 400 V applied takes 6 times full-load current at standstill and develops 1.8 times full-load running torque. The full-load current is 30 A. Determine, **07**

(a) What voltage must be applied to produce full-load torque at starting?
(b) What current will this voltage will produce?
(c) If voltage is obtained by an auto transformer, what will be line current?
(d) If starting current is limited to full load current by an auto transformer, what will be the starting torque as a percentage of full load torque?

Ignore the magnetizing current and stator impedance drops.

(b) Explain construction working of shaded pole single phase induction motor. **07**

Q.5 **(a)** Explain "V curve" and "invert V curve" of synchronous motor. **07**

(b) Explain construction and 1-phase ON & 2-phase ON mode of operation of variable reluctance stepper motor. **07**

OR

Q.5 **(a)** Give comparison between synchronous motor and induction motor **07**

(b) Explain construction and working of permanent magnet stepping motor with net diagram. **07**

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