Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2131005 **Date: 09/06/2017**

Subject Name: Electrical Machines

Time: 10:30 AM to 01:00 PM **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	**(a)**	**State whether the following statements are true or false**	**5**
	1	In an ideal transformer iron losses are zero.	
	2	The induced e.m.f. in a DC machine is directly proportional to speed.	
	3	A 3-phase induction motor has no starting torque.	
	4	The field winding of an alternator is on rotor side.	
	5	A capacitor starts capacitor run 1-phase induction motor uses two capacitors.	
Q.1	**(b)**	**Choose an appropriate option from the following**	**9**
	1	In DC generator commutator act as (a) Rectifier (b) Inverter (c) Current booster (d) Transformer	
	2	The main purpose of performing short circuit test on transformer is to measure its (a) Cu loss (b) Total loss (c) Core loss (d) insulation resistance	
	3	The number of parallel path in wave winding are _____ (a) 2 (b) 4 (c) 6 (d) No. of pole	
	4	Friction and windage losses in transformer is _____ (a) 0 % (b) 20% (c) 90% (d) 50%	
	5	For a step up transformer number of turn in primary winding is _____ than secondary winding. (a) less (b) more (c) Equal (d) none of the above	
	6	The method of putting an alternator in parallel with bus bars is called __ (a) Synchronizing (b) Short circuit (c) slip test (d) none of the above	
	7	A transformer _____ (a) Converts AC to DC (b) Steps up or down DC Voltages & Current (c) Converts DC to AC (d) Steps up or down AC Voltages & Current	
	8	Core is laminated to reduce _____ (a) Cu loss (b) Efficiency (c) Voltage regulation (d) Eddy current loss	
	9	Which DC motor is more suitable in electric traction system (a) Shunt (b) Separately excited (c) Compound (d) Series	
Q.2	**(a)**	Derive EMF equation of DC generator	**03**
	(b)	Explain hysteresis loss and eddy current loss in DC machine.	**04**
	(c)	Explain different parts of DC machine with neat diagram.	**07**
		OR	
	(c)	Discuss the principle of operation and construction of 1-phase transformer	**07**
Q.3	**(a)**	Develop the condition for maximum efficiency of transformer.	**03**
	(b)	A 6-pole lap wound DC generator has 600 conductors on its armature.	**04**

		The flux per pole is 0.02 Weber. Calculate (i) the speed at which the generator must be run to generate 300 V. (ii) What would be the speed if the generator were wave wound?	
	(c)	Write technical note on open circuit test and short circuit test of 1-phase transformer.	**07**
		OR	
Q.3	**(a)**	Why cylindrical rotor alternators have small diameter and large length of core?	**03**
	(b)	Explain working of capacitor-start capacitor-run 1-phase induction motor	**04**
	(c)	What is the necessity of starter in DC motor? Explain 3-point starter with neat diagram..	**07**
Q.4	**(a)**	"An induction motor may be considered to be a transformer with a rotating short circuited secondary." Justify this statement.	**03**
	(b)	Draw and explain power stages of an induction motor.	**04**
	(c)	Discuss starting of 3-phase induction motors? Explain any one method of starting in detail.	**07**
		OR	
Q.4	**(a)**	What do you mean by synchronous speed of induction motor? Why can not 3-phase induction motor run at synchronous speed?	**03**
	(b)	Derive equation of starting torque of 3-phase induction motor.	**04**
	(c)	What is slip? Explain torque-slip characteristic of induction motor.	**07**
Q.5	**(a)**	What is pitch factor? It is always less than or more than 1?	**03**
	(b)	Discuss the main constructional features of cylindrical rotor and salient pole alternator.	**04**
	(c)	What is power factor? How can we improve power factor?	**07**
		OR	
Q.5	**(a)**	Draw block diagram of Thermal Power Station	**03**
	(b)	Briefly explain Ferranti effect.	**04**
	(c)	What is voltage regulation? Explain any one method to find voltage regulation of alternator.	**07**

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