Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2140906 **Date:21/11/2016**

Subject Name:AC Machines

Time:02:30 PM to 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.**

MARKS

Q.1 Short Questions **14**

1 With normal operating parameters, the effect of increasing the mechanical load of an induction motor will be to increase the:
(A) Power factor (B) Efficiency (C) Slip (D) All of these

2 Zero power factor method of an alternator is used to find its:
(A) Efficiency (B) Voltage regulation (C) Losses
(D) Armature resistance

3 At leading power factor, the armature flux in an alternator …….. the rotor flux.
(A) Opposes (B) Distorts (C) Aids (D) Does not affect

4 The power factor of a squirrel cage induction motor is:
(A) Low at light loads only
(B) Low at heavy loads only
(C) Low at light and heavy loads
(D) Low at rated load only

5 The power factor of an alternator is determined by its:
(A) Speed (B) Losses (C) Prime mover (D) Excitation

6 No load speed of a three phase induction motor connected to a 50 Hz, AC supply is 372 rpm. The number of poles of this motor should be:
(A) 16 (B) 2 (C) 4 (D) 8

7 Full load slip of a three phase induction motor is 4%. If the motor has 16 poles and the frequency of the supply is 50 Hz, the full load speed of motor is:
(A) 375 rpm (B) 390 rpm (C) 360 rpm (D) None of these

8 A three phase induction motor is started with auto transformer starter with 50% supply voltage. The ratio of starting torques (Torque with DOL starter/Torque with auto transformer starter) of this motor is expected to be:
(A) 1/4 (B) 1/2 (C) 2 (D) 4

9 If the rated supply voltage is applied for a long time period while performing blocked rotor test on induction motor, which of the following is **generally** true?
(A) Both stator and rotor windings will burn out
(B) Only stator winding will burn out
(C) Only rotor winding will burn out
(D) There will be no problem with the motor

10 If the resistance and standstill reactance of an induction motor are, 1 Ohm and 3 Ohm respectively. The slip at which the torque developed by the motor is maximum is:
(A) 40% (B) 33% (C) 4% (D) 4.33%

11 Which type of induction motor gives higher starting torque?
(A) All of these (B) Squirrel cage motor
(C) Slip ring motor (D) None of these

12 Mention names of single phase AC motors.
13 Define synchronous condenser.
14 Give reason : “AC commutator motors are obsolete now”.

Q.2	**(a)**	Derive the equation of electromagnetic torque for a three phase induction motor with usual notations from first principles.	**03**
	(b)	Describe the effect of armature reaction with zero lagging power factor in case of a synchronous generator.	**04**
	(c)	Draw the phasor diagram (vector diagram) for a three phase induction motor and justify the statement ‘Power factor of the motor improves from no load to full load’.	**07**
		OR	
	(c)	Explain the parallel operation of two alternators.	**07**
Q.3	**(a)**	Explain the construction of a salient pole synchronous machine.	**03**
	(b)	Discuss the procedure to perform no load and blocked rotor tests on a three phase induction motor.	**04**
	(c)	Mention the types of starters for a three phase induction motor. Explain star-delta starter in detail.	**07**
		OR	
Q.3	**(a)**	Derive the EMF equation of alternator from first principles.	**03**
	(b)	Briefly explain the double field revolving theory in relation to single phase AC motors.	**04**
	(c)	Explain the procedure to construct the circle diagram of induction motor. Also describe the method to determine losses, efficiency and slip at full load condition using circle diagram.	**07**
Q.4	**(a)**	Define voltage regulation of alternator.	**03**
	(b)	Briefly explain V-curves of synchronous motor.	**04**
	(c)	List the methods of determination of voltage regulation of an alternator. Describe any one of them in detail.	**07**
		OR	
Q.4	**(a)**	What do you mean by auto synchronous motor?	**03**
	(b)	What is synchronization? Explain two bright one dark lamp method of synchronization.	**04**
	(c)	Explain with reason why synchronous motor is not self starting. Discuss the methods of starting the synchronous motor.	**07**
Q.5	**(a)**	Draw the schematic diagram and explain the principle of induction generator.	**03**
	(b)	Explain the construction and working of universal motor.	**04**
	(c)	Explain the phenomena of crawling and cogging in induction motor.	**07**
		OR	
Q.5	**(a)**	Briefly explain the role of capacitor in the ceiling fan.	**03**
	(b)	Briefly describe the construction and working of linear induction motor.	**04**
	(c)	Draw the schematic diagram and explain the construction and working of shaded pole single phase motor.	**07**