

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2021****Subject Code:2140906****Date:03/01/2022****Subject Name:AC 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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Mention the types and applications of alternators.	03
	(b) Explain the procedure to obtain the equivalent circuit of induction motor using No load and Blocked rotor test.	04
	(c) Give a list of speed control methods of induction motor. Explain cascaded induction motor control in detail.	07
Q.2	(a) Define voltage regulation of alternator. List the methods to find voltage regulation of alternators.	03
	(b) Briefly describe the working principle of induction motor.	04
	(c) What is synchronization? Explain dark lamp method of synchronization.	07
	OR	
	(c) Explain the procedure to construct the circle diagram of induction motor. Describe the method to determine maximum power factor and maximum output of the motor using circle diagram.	07
Q.3	(a) Briefly describe the construction and working of synchronous induction motor.	03
	(b) Explain double field revolving theory and its application to single phase AC motors.	04
	(c) Explain the rotating magnetic field with balanced three phase AC supply. What is the importance of rotating magnetic field for induction motor?	07
	OR	
Q.3	(a) Justify the statement “Commutator acts as a frequency converter for the Schrage motor”.	03
	(b) Briefly explain double cage induction motor.	04
	(c) Draw the exact and approximate equivalent circuit of induction motor. How is it useful to obtain the performance parameters of motor?	07
Q.4	(a) Briefly explain synchronous impedance method for calculation of voltage regulation of an alternator.	03
	(b) Briefly describe the construction and working of linear induction motor.	04
	(c) A three phase, 400 Volt, Star connected induction motor has a star connected rotor. The stator to rotor turns ratio is 6.5. The rotor resistance and standstill reactance per phase are 0.05 Ohm and 0.25 Ohm respectively. What would be the value of external resistance to be connected in the rotor circuit to obtain the maximum torque at starting? What is the rotor starting current with this resistance? Neglect the magnetizing current of motor.	07
	OR	
Q.4	(a) What is the role of capacitor in case of a ceiling fan?	03

- (b) Explain the construction and working of AC series motor. **04**
- (c) Find the no load induced EMF (line value and phase value) of a star connected, three phase, 6 pole alternator which runs at 1200 rpm. Flux per pole is 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and coils are chorded by one slot. **07**
- Q.5** (a) Draw the schematic diagram and explain the principle of induction generator. **03**
- (b) Briefly explain crawling in induction motor. **04**
- (c) Why the starting torque of a synchronous motor is zero? What are the methods to start the synchronous motor? **07**
- OR**
- Q.5** (a) Define slip. Write the equation of slip. What is the range of full load slip of induction motors? **03**
- (b) Explain the parallel operation of two alternators. **04**
- (c) Why starter is necessary for an induction motor? Mention the names of starters for three phase induction motor. Explain any one of them in detail. **07**
