Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170909   **Date:30/01/2021**
Subject Name:Design of AC Machines
Time:10:30 AM TO 12:30 PM   **Total Marks: 47**

Instructions:
1. **Attempt any THREE questions from Q.1 to Q.6.**
2. **Q7 is compulsory.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain factors to be considered for selecting specific magnetic loading for 3- phase I. M.	**03**
	(b)	Sketch the different types of rotor slot in 3 phase I. M..	**04**
	(c)	What is dispersion coefficient? How does it affect maximum power?	**07**
Q.2	**(a)**	What is the role of damper winding in synchronous generator and motor?	**03**
	(b)	Explain step for designing the field winding of Synchronous machine.	**04**
	(c)	A 1250 kVA, 3 phase, 50 Hz, 3300 V, 300 rpm, synchronous generator with a concentric winding has the following design data: specific magnetic loading, B_{av} = 0.58 Wb/m^2, specific electrical loading, ac = 33000 A/m, gap length = 5.5 mm, field turn per pole = 60, winding factor = 0.955, short circuit ratio = 1.2, The effective gap area is 0.6 times the actual area. Peripheral speed is 30 m/s. Find stator core length, stator bore, turns per phase, mmf for air gap, armature mmf per pole and filed current for no load and rated voltage.	**07**
Q.3	**(a)**	Which factors affecting the size of 3-phase induction motor? Explain in short.	**03**
	(b)	Briefly discuss factors affecting determining air gap length in induction motor design.	**04**
	(c)	Which types of slots are used for stator? How the number of slots is estimated? Which point are to be considered for selecting number of stator slots?	**07**
Q.4	**(a)**	State and explain the factor to be considered for selecting specific electrical loading for 3 phase I. M..	**03**
	(b)	State the rules for the selection of rotor slots in 3-phase squirrel cage induction motor.	**04**
	(c)	List out the method for reducing harmonics in induction motor? Explain in brief.	**07**
Q.5	**(a)**	Explain direct axis and quadrature axis synchronous reactance in synchronous machine.	**03**
	(b)	Explain how mmf is calculated for magnetic circuit in synchronous machine.	**04**
	(c)	Explain design of damper winding with equation.	**07**

1

Q.6 **(a)** Explain the terms "peripheral speed" & "run-away speed" with reference to synchronous machine   **03**

(b) State the important design different between turbo alternators and hydro generators.   **04**

(c) What is SCR? Discuss its effect in synchronous machine performance.   **07**

Q.7 **(a)** Explain application of FEM technique for design problems.   **05**

OR

Q.7 **(a)** State the procedure of designing an auxiliary winding in case of resistance spilt phase motor.   **05**

****