

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VII (NEW) EXAMINATION – WINTER 2021****Subject Code:2170909****Date:03/12/2021****Subject Name:Design of AC Machines****Time:02:30 PM TO 05:30 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) Define specific magnetic loading and specific electric loading.	03
	(b) Derive an output equation for 3- ϕ induction motor.	04
	(c) Discuss the effect of variation of main dimension (D&L) on performance (Rating, losses & efficiency) of 3- ϕ induction motor.	07
Q.2	(a) State why a turbo alternator has smaller diameter and large length but hydro alternator has larger diameter and small length.	03
	(b) Explain the factors that affect the choice of specific electric loading in case of a 3- ϕ induction motor.	04
	(c) Define SCR and its importance in designing of synchronous machine.	07
OR		
	(c) Calculate the value of capacitance for maximum starting torque in 1- ϕ induction motor.	07
Q.3	(a) Explain the terms “critical speed” and “run-away speed” with reference to synchronous machine	03
	(b) Explain the factors which are to be considered while selecting the armature slots of a synchronous machine.	04
	(c) Explain steps for design of field winding of synchronous machine.	07
OR		
Q.3	(a) What is the role of damper winding in (i) synchronous generator and (ii) synchronous motor?	03
	(b) Explain the design difference between turbo and hydro alternator.	04
	(c) Write the steps and necessary equations for armature design of a synchronous machine.	07
Q.4	(a) Explain direct axis and quadrature axis synchronous reactance in synchronous machine.	03
	(b) State the rules for the selection of rotor slots in 3- ϕ squirrel cage induction motor.	04
	(c) Discuss factors affecting determining air gap length in 3- ϕ induction motor design.	07
OR		
Q.4	(a) Explain Harmonic torque in 3- ϕ induction motor.	03
	(b) Explain the factors that affect the choice of specific magnetic loading in case of a 3- ϕ induction motor.	04
	(c) What is dispersion coefficient? Explain its effect on maximum power factor.	07

- Q.5** (a) Derive the equation of MMF of damper winding. **03**
(b) Describe the methods for reducing the effect of harmonics torque. **04**
(c) Write a note on computer aided design of Induction motor. **07**

OR

- Q.5** (a) Explain main differences between design of 1- ϕ and 3- ϕ induction motor. **03**
(b) Explain design of auxiliary winding for capacitor start motor in 1- ϕ induction. **04**
(c) Discuss advantage and application of FEM technique. **07**
