

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER–VIII (OLD) EXAMINATION – WINTER 2020****Subject Code:180904****Date:30/01/2021****Subject Name:Electrical Machine Design -II****Time:02:00 PM TO 04:00 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Show that the output for single phase induction motor is $\frac{2}{3}$ of the output of the 3-phase induction motor for the same diameter and length. **07**
 (b) Explain the effect of skewing the rotor slots in a squirrel cage induction motor. **07**
- Q.2** (a) Explain with diagram current distribution in rotor bars and end rings for squirrel cage rotor. **07**
 (b) Explain the role of damper winding in (i) synchronous generator (ii) synchronous motor. **07**
- Q.3** (a) Discuss the effect of air gap length on the performance of a 3-phase induction motor. **07**
 (b) 11 KW, 3 phase, 6pole, 50Hz, 220V, star connected induction motor has 54 stator slots, each with 9 conductors. Find out values of bar and end ring currents, if number of rotor bars is 64. The efficiency is 86% and pf of 0.85. Also find out bar & end ring cross sections, if current density is 5 A/mm². **07**
- Q.4** (a) Discuss the design differences of a salient pole and non-salient pole synchronous machines. **07**
 (b) Explain the procedure to calculate the value of the capacitor to obtain the maximum starting torque of a capacitor start single phase induction motor. **07**
- Q.5** (a) Explain methods to reduce effect of harmonics on performance of I.M. **07**
 (b) Explain factors affecting selection of number of armature slots for synchronous machine. **07**
- Q.6** (a) Define SCR. Write effect of SCR on synchronous machine performance. **07**
 (b) 500 KVA, 33KV, 50 Hz, 600 rpm, 3 phase salient pole alternator has 180 turns per phase. The mmf required for gap is 80% of no load field mmf. Calculate length of air gap if B_{avg} is 0.54 Tesla, ratio of pole arc to pole pitch 0.65, SCR 1.2, Gap contraction factor 1.15 and winding factor 0.955. **07**
- Q.7** (a) Discuss the factors that governs the choice of average gap density for a synchronous machine. **07**
 (b) Explain evaluation of Direct and Quadrature axis reactance of Alternator. **07**
- Q.8** (a) Explain the terms “critical speed” and “run-away speed” with reference to synchronous machine. **07**
 (b) Explain the importance of circle diagram in designing auxiliary winding of a single phase motor. **07**
