

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3132407****Date:01-08-2023****Subject Name:Electrical Machines and Applications****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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Explain the significance of back EMF in DC motor. **03**
 (b) Derive EMF equation of single-phase transformer. **04**
 (c) Explain the theory of production of rotating magnetic field with three-phase supply in induction motor. **07**
- Q.2** (a) Explain open-circuit test of single-phase transformer. **03**
 (b) List the conditions for parallel operation of single-phase transformers. **04**
 (c) Explain auto-transformer. Derive the equation for the saving in copper. List the applications of auto-transformer. **07**
- OR**
- (c) Explain Scott connection of transformers with necessary diagrams. **07**
- Q.3** (a) List advantages and disadvantages of poly-phase induction motor. **03**
 (b) Derive the condition for maximum torque under running condition for induction motor. Also derive the equation for maximum torque. **04**
 (c) Explain double field revolving theory of single-phase induction motor. **07**
- OR**
- Q.3** (a) Define slip. Derive the equation of speed of rotor field in space. **03**
 (b) Explain primary resistor starter for three-phase induction motor. **04**
 (c) Write technical note on: Shaded-pole single-phase induction motor. **07**
- Q.4** (a) Define pole pitch, coil pitch and commutator pitch. **03**
 (b) Derive the EMF equation of DC generator. **04**
 (c) Explain the necessity of starter in DC Motor and Explain three-point starter with necessary diagram. **07**
- OR**
- Q.4** (a) Draw only torque v/s current, speed v/s current and speed v/s torque characteristics of DC shunt motor. **03**
 (b) Derive the equation of armature torque for DC motor. **04**
 (c) Explain the theory of armature reaction in DC generator. **07**
- Q.5** (a) List the advantages of having stationary armature and rotating field system. **03**
 (b) Explain the working of DC servo motor with necessary diagram. **04**
 (c) Explain the effect of increased load on synchronous motor with constant excitation with the help of vector diagram. **07**
- OR**
- Q.5** (a) Define Distribution factor, Coil-span factor and voltage regulation. **03**
 (b) Explain the working of stepper motor with necessary diagram. **04**
 (c) Explain zero power factor method for finding voltage regulation of an alternator. **07**
