

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: 3132407

Date: 02/07/2026

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) List the functions of yoke, pole coils and commutator in DC generator. **03**
(b) Explain the DOL starter for three-phase induction motor. **04**
(c) Explain the open circuit test and short circuit test of single-phase transformer. **07**
- Q.2** (a) Define slip. Discuss about the frequency of rotor current. **03**
(b) Explain the iron losses and copper losses occurs in DC machine. **04**
(c) Explain the synchronous impedance method for determination of voltage regulation. **07**
- OR
- Q.2** (c) Explain the effect of excitation on armature current and power factor in synchronous motor with necessary diagrams. **07**
- Q.3** (a) Draw the constructional diagram of shell type and core type single-phase transformer. **03**
(b) Explain working of AC servo motor with necessary diagram. **04**
(c) Explain the Scott-connection of transformers with necessary diagram. **07**
- OR
- Q.3** (a) List the conditions for parallel operation of single-phase transformers. **03**
(b) Explain working of DC servo motor with necessary diagram. **04**
(c) Explain the Open-Delta connection of transformers with necessary diagram. **07**
- Q.4** (a) Derive the emf equation of DC generator. **03**
(b) Describe the working of linear induction motor with necessary diagram. **04**
(c) Explain the double field revolving theory of single- phase induction motor. **07**
- OR
- Q.4** (a) Derive the equation of armature torque for DC motor. **03**
(b) Describe the working of stepper motor with necessary diagram. **04**
(c) Explain the production of rotating magnetic field in an induction motor with three-phase supply. **07**
- Q.5** (a) Derive the expression of starting torque for three-phase induction motor. **03**
(b) Define pitch factor and distribution factor for an alternator. **04**
(c) Explain the internal and external characteristics of DC shunt generator. **07**
- OR
- Q.5** (a) Derive the expression of torque under running conditions for three-phase induction motor. **03**
(b) What is armature reaction in alternators? **04**
(c) Explain the working of three-point starter for DC motor with neat sketch. **07**
