

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III EXAMINATION – SUMMER 2025

Subject Code:3132407

Date:06-06-2025

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) Define Transformer. Explain working principle of transformer. **03**
(b) Explain torque-slip characteristics of three-phase induction motor. **04**
(c) Explain three-point starter for DC shunt motor with neat diagram. **07**
- Q.2** (a) Discuss pitch factor and distribution factor of an alternator. **03**
(b) List and explain the conditions for parallel operation of single-phase transformer. **04**
(c) Explain construction and working of BLDC motor with necessary diagram. **07**
- OR**
- (c) Explain construction and working of stepper motor with necessary diagram. **07**
- Q.3** (a) Explain the effect of change in supply voltage on torque and speed of three-phase induction motor. **03**
(b) Explain DOL starter of three-phase induction motor with neat sketch. **04**
(c) Explain the theory of production of rotating magnetic field with three-phase supply in three-phase induction motor. **07**
- OR**
- Q.3** (a) Derive the expression of starting torque for three-phase induction motor. **03**
(b) Explain the methods of speed control for three-phase induction motor. **04**
(c) Explain the double field revolving theory for single-phase induction motor. **07**
- Q.4** (a) Explain short circuit test on single-phase transformer. **03**
(b) Derive the emf equation of DC generator. **04**
(c) Explain Scott connection for three-phase transformer with neat diagram. **07**
- OR**
- Q.4** (a) Derive the emf equation of single-phase transformer. **03**
(b) Explain losses in DC machines. **04**
(c) Draw the vector diagram of single-phase transformer considering the effect of winding resistance and reactance for R, L and C load. **07**
- Q.5** (a) Explain the speed-torque characteristics of DC shunt motor. **03**
(b) Derive the expression of armature torque for DC motor. **04**
(c) Explain synchronous impedance method for voltage regulation of an alternator. **07**
- OR**
- Q.5** (a) Explain function of yoke, pole core and pole shoe in DC generator. **03**
(b) Explain rheostatic control method for speed control of DC motor. **04**
(c) Explain zero power factor method for voltage regulation of an alternator. **07**
