

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: BE04009011

Date: 21/05/2026

Subject Name: Electrical Machines-II

Time: 10:30 AM TO 01:00 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 out parts of DC machine. Write function of any two parts. **03**
 - (b)** Define and explain pitch factor and distribution factor for alternator. **04**
 - (c)** Explain V curves and inverted V curves for Synchronous motor with experimental set up. **07**

- Q.2**
- (a)** Derive the emf equation of a DC generator **03**
 - (b)** Compare salient pole and cylindrical rotor synchronous machine. **04**
 - (c)** A 230 V DC shunt motor runs at 1000 rpm and takes 5 A. The armature resistance of the motor is 0.025 ohm and shunt field resistance is 230 ohms. Calculate the drop in speed when the motor is loaded and takes in the line current of 41 A. Neglect the armature reaction. **07**

OR

- Q.2**
- (c)** A compound generator is supplying a load of 120 A at 240 V. The resistance of its armature, shunt and series windings are 0.1 ohm, 120 ohms and 0.05 ohms resp. Find the induced emf and armature current when the machine is connected as (i) short shunt (ii) long shunt. **07**

- Q.3**
- (a)** Derive the torque equation of a DC motor from first principles. **03**
 - (b)** Draw and explain the phasor diagram of 3-phase alternator with leading and lagging power factor load. **04**
 - (c)** What is synchronizing of an alternator? Explain one dark two bright lamp method in detail. **07**

OR

- Q.3**
- (a)** Describe the effects of armature reaction in Alternators **03**
 - (b)** Draw and explain no load and load characteristics of DC shunt generator. **04**
 - (c)** Explain with reason why synchronous motor is not self-starting. Explain any one method to make the motor self starting. **07**

- Q.4**
- (a)** State and explain the conditions to be satisfied for parallel operation of 3 phase alternators. **03**
 - (b)** Explain different methods of speed control of DC series motor. **04**

- (c) A three phase ,50Hz star connected 1000 kVA, 11000 V alternator has rated current of 52.5 A. The ac resistance of armature winding is 0.45 ohms. The test results are given below: **07**
 OC test: field current =12.5 A, voltage between lines=422 V
 SC test: field current =12.5 A, line current=52.5 A
 Determine the full load voltage regulation of the alternator at (i)0.8 p.f. lagging (ii) 0.8 p.f. leading

OR

- Q.4** (a) Explain synchronous condenser and synchronous phase modifiers **03**
 (b) Explain different methods of speed control of dc shunt motor. **04**
 (c) Derive equation of power developed by synchronous motor . Also give condition for maximum power. Draw vector diagram of motor. **07**
- Q.5** (a) Write short note on servo motor. **03**
 (b) Differentiate between Variable Reluctance Motor (VRM) and Switched Reluctance Motor (SRM). **04**
 (c) Explain construction, working and applications of Permanent magnet synchronous motor. **07**

OR

- Q.5** (a) Write short note on stepper motor. **03**
 (b) Compare the rotor construction of PMSM, BLDC, and SRM. **04**
 (c) Explain construction, working and applications of Switched reluctance motor. **07**
