Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022**

**Subject Code:3170916 Date:10-01-2023**

**Subject Name:Advanced Electric Drives**

**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.**

| | | | **Marks** |
|---|---|---|---|
| **Q.1** | **(a)** | Explain PWM control of inverter in brief. | **03** |
| | **(b)** | Explain in brief, the control of Current Source Inverter with necessary diagram. | **04** |
| | **(c)** | Explain operation of H bridge as a 4-Q drive. | **07** |
| **Q.2** | **(a)** | Describe Selected Harmonic Elimination with necessary figure. | **03** |
| | **(b)** | Compare Direct Torque Control and Flux Oriented Control of an Induction Motor drive | **04** |
| | **(c)** | Draw and explain operation of open loop V/f control of Induction motor with PWM voltage fed converter. | **07** |
| | | **OR** | |
| | **(c)** | Write a note on reference frame theory. | **07** |
| **Q.3** | **(a)** | In brief, discuss about the Space Vector Modulation with relevant diagrams. | **03** |
| | **(b)** | Explain Clarke's transformation for ABC to αβ conversion. | **04** |
| | **(c)** | Write a note on open-loop v/f control of synchronous motor. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Draw the circuit diagram and waveforms for PWM converter as line side rectifier. | **03** |
| | **(b)** | Explain Park's transformation for αβ to dq conversion. | **04** |
| | **(c)** | Explain the CSI fed synchronous motor drive. | **07** |
| **Q.4** | **(a)** | Draw block diagram of synchronous motor drive. | **03** |
| | **(b)** | List different control techniques of PMSM. | **04** |
| | **(c)** | Draw block diagram of speed control of BLDC motor drive. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Compare vector control with direct torque control of synchronous motor drive. | **03** |
| | **(b)** | Explain the working of BLDC motor. | **04** |
| | **(c)** | Draw block diagram of speed control of PMSM motor drive. | **07** |
| **Q.5** | **(a)** | Draw block diagram for closed loop speed control of SRM. | **03** |
| | **(b)** | Discuss PWM module in DSP. | **04** |
| | **(c)** | List and explain various topologies for SRM drives. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Draw the inductance profile for 6/4 SRM motor. | **03** |
| | **(b)** | List the various DSPs available in market and draw the basic block diagram of DSP controller. | **04** |
| | **(c)** | Explain the working of SRM with any-one control topology. | **07** |