

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012****Subject code: 170801****Date: 26/12/2012****Subject Name: Power Electronics and Industrial Drives****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw and explain the structure of power MOSFET. Also explain principal of operation and I-V characteristics of power MOSFET. **07**
- (b) Draw the I-V characteristics of the following: **07**
- | | | |
|----------------|--------|--------|
| 1. Power diode | 2. SCR | 3. BJT |
| 4. IGBT | 5. MCT | 6. GTO |
| | | 7. SIT |

- Q.2** (a) Draw and explain full wave controlled rectifier with the inductive load using required waveforms and equations. **07**
- (b) The three phase full wave rectifier has a load of $L=1.5 \text{ mHz}$, $R=2.5\Omega$ and $E=10 \text{ V}$. The input voltage is $V_{in} = 208\text{V}, 60 \text{ Hz}$. Determine **07**
1. The steady state load current I_o at $\omega t = \pi/3$
 2. The average diode current I_o
 3. The rms diode current I_r
 4. The rms output current I_{rms} .

OR

- (b) Draw and explain three phase half wave controlled rectifier with required waveforms and equations. **07**

- Q.3** (a) Classify the power factor improvement methods for phase controlled rectifiers. Explain any one. **07**
- (b) Explain single phase bridge inverter. **07**

OR

- Q.3** (a) Discuss operation of half bridge inverter with resistive load. Derive the equation of instantaneous output voltage. **07**
- (b) Explain techniques of voltage control of single phase inverter. Explain single pulse width modulation. **07**

- Q.4** (a) Explain DC-DC converter drives. **07**
- (b) Explain three phase cycloconverter and sinusoidal harmonic reduction techniques for cycloconverter. **07**

OR

- Q.4** (a) Discuss operation of three phase inverter in 180° mode of conduction. **07**
- (b) What is DC drive? Discuss basic characteristics of DC motors. **07**

- Q.5** (a) Explain induction motor drives. **07**
- (b) Discuss about choice of AC and DC drive in detail. **07**

OR

- Q.5** (a) Classify synchronous motor drives. Explain brushless DC and AC motor. **07**
- (b) Explain control modes of DC-DC converter drive. **07**
