

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 170801

Date: 19/11/2011

Subject Name: Power Electronics and Industrial Drives

Time: 10.30 am-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.

- Q.1** (a) Explain about the construction, characteristics and gate drive requirements of SCR. **07**
- (b) Make a comparison of SCR, MOSFET and IGBT based on the following parameters **07**
- Power rating
 - Switching speed
 - Switching and conduction losses

- Q.2** (a) Explain the operation of single phase, half wave, and controlled rectifier with R load **07**
using waveforms. Also derive the average and RMS value of the output voltage.
- (b) A three phase uncontrolled full wave bridge rectifier has a purely resistive load of **07**
100 Ω and is supplied from a 280 V, 60 Hz supply. The primary and secondary of the
input transformer are connected in star. Determine the average output voltage of the
rectifier if the source inductances are negligible.

OR

- (b) Discuss the operation of three phase full wave controlled rectifier. Show the gating **07**
sequence of all switches.
- Q.3** (a) Explain the principle of integral cycle control with circuit diagram and waveforms. **07**
- (b) Discuss operation of three phase AC-AC converter with star connected resistive load **07**

OR

- Q.3** (a) A single phase half wave AC voltage controller has a resistive load of 10 Ω and the **07**
input voltage is 120 V, 60 Hz. The delay angle of thyristor is 90° .
Determine (a) RMS value of the output voltage (b) the input Power Factor
(c) the average input current
- (b) Discuss operation of half bridge inverter with resistive load. Derive the equation of **07**
instantaneous output voltage using fourier series.

- Q.4** (a) Discuss operation of three phase inverter in 180° mode of conduction. **07**

- (b) Explain the following PWM methods for control of single phase inverter **07**
- Single pulse width modulation
 - Sinusoidal pulse width modulation

OR

Q.4 (a) Explain the operation of single phase cycloconverter with circuit diagram and waveforms. **07**

(b) What is DC drive? Discuss about controlled rectifier and DC-DC converter fed drive. **07**

Q.5 (a) Explain the operation of closed loop speed control of DC shunt motor with inner current loop and field weakening. **07**

(b) Discuss the rotor voltage control for slip ring induction motor. **07**

OR

Q.5 (a) Explain variable voltage and variable frequency control of induction motor. **07**

(b) Discuss about choice of AC and DC drive in detail. **07**
