

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1722901

Date: 16-06-2014

Subject Name: Advanced Power Converters and Control

Time: 02:30 pm - 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.

Q.1 (a) Explain control characteristics of converters used in HVDC transmission system. 07

(b) Explain 5 level capacitor clamped multi-level inverter with neat diagram. 07

Q.2 (a) The full bridge series resonant inverter with unidirectional switches has $L = 45 \mu\text{H}$, $C = 7 \mu\text{F}$, and $R = 4\Omega$. The frequency of output voltage is 4.5 kHz and DC input is 200 Volt. SCR turn off time is 15 μSec . Calculate: 07

(a) Circuit turn off time,

(b) Maximum possible output frequency and

(c) Capacitor voltage.

(b) Describe M type ZCS resonant converter with neat diagram and appropriate waveforms. 07

OR

(b) With neat circuit diagram and waveform discuss class E resonant inverter. 07

Q.3 (a) Draw circuit diagram and output voltage phasor diagram of 12-pulse converter. Explain 5th and 7th harmonics elimination in 12-pulse converter. 07

(b) What is redundancy in case of cascaded multi-level inverter? Explain with appropriate example. 07

OR

Q.3 (a) Discuss various transformer connections for multi-pulse converter. 07

(b) List the application of multilevel inverter and explain one in detail. 07

Q.4 (a) Discuss pulse width modulation technique for matrix converter. 07

(b) Compare AC and DC transmission lines. And discuss HVDC transmission. 07

OR

Q.4 (a) Discuss venturini control method for matrix converter in brief. 07

(b) What is need of small signal model? Explain small signal model of converter circuit. 07

Q.5 (a) Explain voltage control mode of DC-DC converters. 07

(b) Explain high frequency link integral half cycle converter with neat diagram. 07

OR

Q.5 (a) Discuss the basic concept of multi pulse converter. Explain how the number of pulses can be increased from available three phase supply. 07

(b) What are the advantages of multi-level inverter w.r.t. two-level inverter? 07
