Enrolment No.

# **GUJARAT TECHNOLOGICAL UNIVERSITY** BE - SEMESTER-VI • EXAMINATION – SUMMER 2013

Subject Code: 160902

### Date: 27-05-2013

Subject Name: Power Electronics-II Time: 10.30 am - 01.00 pm Instructions:

## **Total Marks: 70**

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Draw waveforms of line voltage, phase voltage and load current for 120<sup>0</sup> and 07 180<sup>0</sup> conduction mode of 3-phase bridge inverter with Y connected resistive load. Compare them and make comment on output voltage and harmonics present in the load current.
  - (b) Justify the sentence, õSpace vector pulse width modulation (SVPWM) technique 07 is better than sine PWM techniqueö.
- Q.2 (a) Discuss 1-phase current source inverter. Compare VSI with CSI. 07
  - (b) Discuss parallel inverter in brief. OR
  - (b) Explain PWM principle. Discuss selected harmonic elimination PWM technique 07 to eliminate 5<sup>th</sup> and 7<sup>th</sup> harmonics from the output voltage waveform.
- Q.3 (a) Discuss 1-phase full wave controller with R-L load. Derive formulae to obtain 07 RMS output voltage, RMS thyristor current and average value of thyristor current.
  - (b) Discuss in brief the matrix converter.

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### OR

- Q.3 (a) A single phase full wave ac controller has a resistive load of R=10 and the 07 input voltage is 120 V (rms), 60 Hz. The delay angle of thyristor  $T_1$  and  $T_2$  are equal:  $_{1}=_{2}=_{2}=_{2}$ . Find (a) rms value of output voltage, (b) the input PF, (c) average current of thyristor and (d) rms current of thyristor.
  - (b) Explain effect of non sinusoidal supply voltage on AC motor operation. Also 07 discuss principle of variable frequency control.
- Q.4 (a) With appropriate circuit diagram, equivalent circuit and waveform discuss single 07 phase to single phase cycloconverter.
  - (b) Discuss static Scherbius drive. Mention its limitations.

#### OR

- Q.4 (a) How load commutated cycloconverter is different than line commutated 07 cycloconverter? Explain with suitable load example.
  - (b) Explain self controlled synchronous motor drive. How it can be implemented? 07
- Q.5 (a) Discuss role of inverter in HVDC transmission system. Mention various inverter 07 configuration used for the same application.
  - (b) Discuss 3-phase full wave AC voltage controller with Y and connected load. 07

#### OR

- Q.5 (a) What do you mean by static VAR compensator? Discuss any one configuration 07 with appropriate circuit diagram and waveforms.
  - (b) Discuss closed loop control of induction motor.

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