Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160902 **Date: 23/11/2011**
Subject Name: Power Electronics-II
Time: 10.30 am -1.00 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)** Draw and explain the series Inverter circuit employing Class-A type commutation. Draw and discuss the important waveforms. **07**

(b) Design a series Inverter circuit for operation in the frequency range 1 to 5 kHz. The load resistance may vary from 25Ω to 100Ω.The peak load current is limited to 3A and the supply voltage is 100 V. **07**

Q.2 **(a)** A parallel capacitor commutated inverter with an Ideal transformer is supplying a resistive load and has a very large smoothening reactor in the d.c. line. Draw a circuit diagram, sketch the relevant wave forms and explain the operation. **07**

(b) Describe with neat circuit diagram a single phase Mac-Murray Inverter employing auxiliary thyristor commutation method. **07**

OR

(b) List various PWM methods used in inverters for Harmonic reduction and explain Sinusoidal Pulse Modulation with necessary waveforms. **07**

Q.3 **(a)** A three phase bridge inverter has 120° conduction interval for it's SCRs. Draw it's power circuit and state the conduction sequences of the SCRs. How is commutation achieved here without any auxiliary thyristors. **07**

(b) Draw the circuit diagram and explain the working of slip power recovery system using solid state scherbius system. **07**

OR

Q.3 **(a)** Describe in brief about various methods of voltage control of single phase Inverter. **07**

(b) Name the different methods of speed control of 3-Ø Induction motor. Explain the principle of speed control of it by PWM method **07**

Q.4 **(a)** Explain the operation of single phase A C voltage controller using two anti parallel SCR's with R-L load for firing angle α equal to and less than load phase angle Ø. derive relevant equation and draw the waveforms with neat circuit diagram. **07**

(b) A single phase A C voltage controller with R-L load has the following details: **07**

a. The control range of firing angle,
b. The maximum value of RMS load current,
c. The maximum power and power factor,
d The maximum values of average and RMS thyristor current
e. The maximum possible value of di/dt that may occur in the SCR and
f. The conduction angle $\alpha = 0$ and $\alpha = 120^\circ$ assuming a gate pulse of duration Π radian.

OR

Q.4 **(a)** Explain the operation of a self controlled(closed loop) synchronous motor drive fed from a cycloconverter to control the speed of synchronous motor with necessary schematic diagram. **07**

(b) State the various points of comparisons and their choice/criterion for selection between AC and DC drives. **07**

Q.5 **(a)** Describe the operating principle of single phase to single phase step up bridge type cycloconverter. Illustrate your answer with appropriate circuit and waveforms. The conduction of various thyristors must also be indicated in the waveforms. **07**

(b) Draw the neat circuit diagram and explain the sped control of 3 Ø Induction motor by rotor resistance control method using chopper. **07**

OR

Q.5 **(a)** Describe HVDC transmission system with neat schematic diagram. **07**

(b) Draw and explain the operation of DC static circuit breaker and list it's applications. **07**

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