Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-IV Examination June- 2010

Subject code: 142402

Subject Name: Fundamental of Power Electronics

Date: 21 /06 /2010 **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 the operation of center-tap controlled rectifier and draw its input and output waveforms. **07**

(b) What is Power Electronics? Discuss briefly the concept of Power Electronics System with block diagram. **07**

Q.2 **(a)** In a full wave rectifier, the load resistance is 5KΩ. The input voltage to each diode is $200\sin 2\pi 50t$. Calculate the maximum value of current, the Average current, the rms current, DC power output, Form factor and Ripple factor. **07**

(b) What is Power diode? Discuss V-I characteristics of Power diode and Ideal diode. **07**

OR

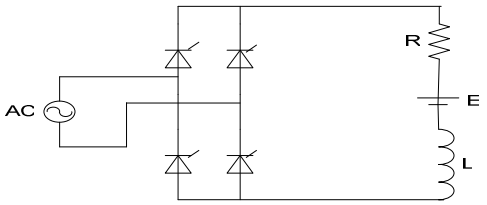
(b) Describe the switching characteristics of Power MOSFET. **07**

Q.3 **(a)** With the help of block diagram explain the working of Switch Mode Power Supply. **07**

(b) Explain the Four mode operation of TRIAC with the help of its V-I characteristics. **07**

OR

Q.3 **(a)** As shown in figure, 1-phase full converter is supplied by a 230V, 50Hz input. If $\alpha = \pi/3$, E = 10V, R = 10Ω, L = 20mH. Determine the Average output voltage, output current and load impedance. **07**



(b) Explain construction and working of thyristor using two transistor analogy. **07**

Q.4 **(a)** Explain the operation of Uni-Junction Transistor (UJT) with basic application circuits. **07**

(b) With necessary waveforms describe the working of 1-phase full bridge inverter for RLC under damped and over damped load. **07**

OR

Q.4 **(a)** Discuss merits and demerits of Thyristor based chopper. **07**

(b) Explain the working of McMurray-Bedford Half bridge inverter with waveforms. **07**

Q.5 **(a)** State the principle of 1-phase to 1-phase step-up cyclo-converter with the help of mid point and bridge type configurations. **07**

(b) State the control strategies for the regulation of output voltage in a. c. voltage controller. **07**

OR

Q.5 **(a)** Explain the operation of single phase semi converter assuming continuous current & draw various waveforms for $\alpha = 45^{o}$. **07**

(b) Write a comprehensive note on protections of Thyristor. **07**

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