

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code: 151703****Subject Name: Electronics in Industries****Date: 18 /12 /2010****Time: 03.00 pm - 05.30 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 depletion type MOSFET with circuit diagram, symbol and plots of characteristic. **07**
(b) Describe half wave controlled rectifier with inductive load and flywheel diode. **07**
- Q.2** (a) A $300\ \Omega$ resistor is connected in series with the gate of the GTO. The gate current required to trigger the GTO is 9 mA. Find value of input voltage required to turn on device when it is properly biased. **07**
(b) Explain thyristor turn on methods. **07**
- OR**
- (b) Explain the operation of Jones commutation. **07**
- Q.3** (a) Explain the switching characteristics of an IGBT. **07**
(b) Describe LASCR. Enlist its applications. **07**
- OR**
- Q.3** (a) How does a GTO differ from a conventional thyristor? **07**
(b) Give a cross-sectional view of a TRIAC and explain different modes of operation. **07**
- Q.4** (a) Explain three-phase twelve-pulse full wave bridge rectifier. **07**
(b) In a full-wave rectifier, the load resistance is $5\ \text{K}\Omega$. 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, input power output, form factor and ripple factor. **07**
- OR**
- Q.4** (a) A half-wave rectifier is connected to an AC supply of 220V and 50 Hz through a transformer having a step-up ratio of 1:3. Calculate the PIV and average output voltage. Assume negligible diode voltage drop. **07**
(b) With necessary circuit diagram explain overvoltage protection of power semiconductor devices. **07**
- Q.5** (a) Explain the operation of a two-thyristor center-tapped controlled rectifier and draw its input and output waveforms. **07**
(b) When two identical thyristor are placed back-to-back in parallel with a load and if each is fired at $\pi/2$, calculate the average DC voltage across the load and draw the output waveforms. **07**
- OR**
- Q.5** (a) Discuss the effect of the load and source inductances in a controlled rectifier. **07**
(b) A three-phase half-wave controlled rectifier is connected to a 230V and 50 Hz input supply with a $100\ \Omega$ load resistance. If the desired average output voltage is 50 % of the maximum possible average output voltage, calculate the delay angle α . **07**
