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TEST – 1 EXAMINATION 2016

B.TECH VI SEMESTER

COURSE CODE: 10B1WEC613 (611)

MAX. MARKS: 15

COURSE NAME: POWER ELECTRONICS

MAX TIME: 1HR

COURSE CREDITS: 04

Roll No.....

Note: *All questions are compulsory. Carrying mobile phone during examinations will be treated as case of unfair means.*

Q1. Describe turn on and turn off process for MCT (MOS Controlled Thyristor) using its equivalent circuit diagram. **[3]**

Q2. For a power transistor V_{CE} falls from 220V to 0V and I_C rises from 0A to 80 A during turn on time. During turn off time I_C drops to 0A from 80A and V_{CE} rises from 0V to 220V. If $t_d = 0.1\mu s$, $t_r = 1.4\mu s$, $t_s = 0.1\mu s$ and $t_f = 3.9\mu s$, find the energy losses during t_{on} and t_{off} time. Also show switching waveform for the transistor used for calculation of energy losses. **[3]**

Q3. a) Describe the effect of gate current on V_{BO} (forward break-over voltage) of a thyristor using VI characteristics of a thyristor. **[1]**

b) The forward characteristics of a power diode are given by, **[2]**

$$v_f = 0.7 + 0.023if$$

Determine the average power losses and rms current for a constant current of 70A for 1/3 of cycle.

Q4 a) Describe the working of UJT relaxation oscillator using circuit diagram and output waveforms. Also derive the expression for frequency of output pulses. **[4]**

b) What is the significance of reverse recovery time and softness factor for any power electronic switch? **[2]**