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TEST-1 EXAMINATION – February 2020

B.Tech, VIth Semester, ECE

COURSE CODE: 11B1WEC611

MAX. MARKS: 15

COURSE NAME: POWER ELECTRONICS

COURSE CREDITS: 4

MAX. TIME: One Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Missing data, if any, can be appropriately assumed.

- 1(a). Describe briefly a power electronics system with its general block diagram. Describe different applications where power electronics is used. (2)
- (b). List the following power semiconductor devices along with their circuit symbols and maximum power ratings: (3)
- (i) SCR (ii) MOSFET (iii) IGBT
- 2(a). Describe the i-v characteristics of power, signal and ideal diode. (2)
- (b). For a power diode, the reverse recovery time is $3.9\mu\text{s}$ and the rate of the diode-current decay is $50\text{A}/\mu\text{s}$. For a softness factor of 0.3, calculate the peak inverse current and the storage charge. (3)
3. A bipolar transistor, with current gain $\beta = 50$, has load resistance $R_C = 10\Omega$, dc supply voltage $V_{CC} = 120\text{V}$ and input voltage to base current, $V_B = 10\text{V}$. For $V_{CES} = 1.2\text{V}$ and $V_{BES} = 1.6\text{V}$, calculate: (5)
- (a) the value of R_B for operation in the saturated state
- (b) the value of R_B for an overdrive factor of 6
- (c) forced current gain
- (d) power loss in the transistor for both parts (a) and (b)