

III B.Tech I Semester Supplementary Examinations, November 2005
DIGITAL ELECTRONICS
(Mechatronics)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the response of RC high pass circuit to a symmetrical square wave input and derive the expression for the % tilt. [16]
2. (a) Design an Astable circuit for output amplitude of 15V and square wave frequency of 500Hz. Assume $h_{FE(min)} = 50$, $I_{C(sat)} = 5\text{mA}$, $V_{CE(sat)} = 0\text{V}$. [8]
 (b) Design a Collector coupled monostable multivibrator using npn Si transistors to produce a pulse of $200\ \mu\text{sec}$ width and of amplitude 10V. Assume: $I_{C(sat)} = 10\text{mA}$, $V_{BE(cutoff)} = -1\text{V}$, $BV_{EBO} = 6\text{V}$, $V_{CE(sat)} = 0.3\text{V}$, $V_{BE(sat)} = 0.7\text{V}$, and $h_{FE(min)} = 30$. Show the circuit diagram with all the component values. [8]
3. (a) Explain the operation of current sweep circuit. List the applications of current sweep circuits. [8]
 (b) Explain about the exponential sweep circuit. [8]
4. Explain the properties of EX-OR gates and prove the following [16]
 - (a) If $A \oplus B = 0$ then $A=B$.
 - (b) if $A \oplus C = B \oplus C$ then $A=B$
 - (c) $A \oplus B = A' \oplus B'$.
5. (a) Implement a Full Subtractor with NOR gates only. Give the expressions for Difference and Borrow with the help of truth table? [8]
 (b) Design a combinational circuit that gives sum of two 2-bit numbers x_1x_0 and y_1y_0 whose outputs are Carry, Sum1, Sum0 by using two Full Adders. Also derive expressions for outputs from truth table? [8]
6. (a) Discuss briefly about any four applications of flip-flops? [6]
 (b) What is the difference between a latch and a Flip Flop? Draw the diagram of JK-FF its truth table and timing diagrams? [10]
7. (a) Give the difference between synchronous and asynchronous counters. [6]
 (b) Draw and design a 3-bit synchronous counter using JK-FFs with the help of K-maps. also give timing diagrams? [10]
8. (a) Distinguish between LED and LCD displays. [10]
 (b) Explain why driver circuits are needed with reference to LED displays. [6]
