

III B.Tech I Semester Supplementary Examinations, November 2006
DIGITAL ELECTRONICS
(Mechatronics)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Classify the clippers and analyze the clipping operation with a neat circuit diagram. [8]
 (b) What is Clamping circuit theorem and prove that $A_f / A_R = R_f / R$. [8]
2. (a) Design an Astable circuit for output amplitude of 15V and square wave frequency of 500Hz. Assume $h_{FE(min)} = 50$, $I_{C(sat)} = 5mA$, $V_{CE(sat)} = 0V$. [8]
 (b) Design a Collector coupled monostable multivibrator using npn Si transistors to produce a pulse of 200 μ sec width and of amplitude 10V. Assume: $I_{C(sat)} = 10mA$, $V_{BE(cutoff)} = -1V$, $BV_{EBO} = 6V$, $V_{CE(sat)} = 0.3V$, $V_{BE(sat)} = 0.7V$, and $h_{FE(min)} = 30$. Show the circuit diagram with all the component values. [8]
3. (a) Explain the hysteresis loss in the Schmitt trigger and how it can be eliminated. [8]
 (b) Design a sweep circuit $R_{b1} = R_{b2} = 0$. The sweep amplitude is to be 12 V. The sweep transition is 2 m sec and sweep speed error is 15%. Specify reasonable values for V_{BB} , $V_{\gamma\gamma}$, R and C. [8]
4. Convert the following decimal numbers to the bases indicated. Mention the procedure.
 - (a) 7562.45 to octal [4]
 - (b) 1938.257 to hexadecimal [4]
 - (c) 175.75 to binary [4]
 - (d) 56.25 to binary [4]
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) What is the difference between a combinational circuit and a sequential circuit? Give some examples and applications of both? [8]
 (b) Draw and explain a clocked RS-FF with the help of truth table and output waveforms? [8]

7. (a) Explain in detail about the operations involved in an universal shift register with timing diagrams? [8]
(b) What is modulus related to counters. Draw and explain the operation of a MOD-8 counter with the help of timing diagrams? [8]
8. (a) Distinguish between LED and LCD displays. [10]
(b) Explain why driver circuits are needed with reference to LED displays. [6]
