

1. Explain the response of $R C$ high pass circuit to a symmetrical square wave input and derive the expression for the $\%$ tilt.
2. (a) Design an Astable circuit for output amplitude of 15 V and square wave frequency of 500 Hz . Assume $h F E(\mathrm{~min})=50, I C(\mathrm{sat})=5 \mathrm{~mA}, V C E(\mathrm{sat})=0 \mathrm{~V}$.
(b) Design a Collector coupled monostable multivibrator using npn Si transistors to produce a pulse of $200 \mu \mathrm{sec}$ width and of amplitude 10 V . Assume: $\mathrm{IC}(\mathrm{sat})=10 \mathrm{~mA}$, $V B E$ (cutoff) $=-1 \mathrm{~V}, B V E B O=6 \mathrm{~V}, V C E($ sat $)=0.3 \mathrm{~V}, V B E($ sat $)=0.7 \mathrm{~V}$, and $h F E(\mathrm{~min})=30$. Show the circuit diagram with all the component values.
[9+7]
3. (a) Explain the operation of current sweep circuit. List the applications of current sweep circuits.
(b) Explain about the exponential sweep circuit.
4. Explain the properties of EX-OR gates and prove the following
(a) If $A \square B=0$ then $A=B$.
(b) if $A \square C=B \square C$ then $A=B$
(c) $A \square B=A O \square B O$.
5. (a) Implement a Full Subtractor with NOR gates only. Give the expressions for Difference and Borrow with the help of truth table?
(b) Design a combinational circuit that gives sum of two 2-bit numbers $x 1 \times 0$ and $y 1 y 0$ whose outputs are Carry,Sum1,Sum0 by using two Full Adders .Also derive expressions for outputs from truth table?
6. (a) Discuss briefly about any four applications of flip-flops?
(b) What is the difference between a latch and a Flip Flop? Draw the diagram of JK-FF its truth table and timing diagrams?
7. (a) Give the difference between synchronous and asynchronous counters.
(b) Draw and design a 3-bit synchronous counter using JK-FFs with the help of K-maps. also give timing diagrams?
8. (a) Distinguish between LED and LCD displays.
(b) Explain why driver circuits are needed with reference to LED displays.
