(3 Hours)   [Total Marks: 80]

N.B.: (1) Question No. 1 is **Compulsory**.
(2) Attempt any **three** questions out of the remaining **five**.
(3) Each question carries 20 marks and sub-question carry equal marks.
(4) Assume suitable data if required.

Q.1 Solve any **Four** from the following: 20
  a Draw the transfer characteristics of MOS transistors state the significance of threshold voltage.
  b List different types of Diff-Amp and state which one is preferred.
  c State and explain Miller's theorem.
  d State the features of IC 555 Timer.
  e Explain the advantages of Switching Voltage Regulator over the Linear Voltage regulator.

Q.2 a Describe the general frequency response of an amplifier and define the low, mid 10
        and high frequency ranges. Define low cut off and high cut off frequency for the amplifier.
  b Draw a neat circuit diagram for non-inverting Amplifier. State what type of 10
        feedback is employed in the circuit. Derive the expression for the gain of an amplifier. Design a circuit to obtain the gain of 11.

Q.3 a Draw small signal equivalent circuit of dual input balanced output MOSFET 10
        differential amplifier. Derive the expression for A_D (Differential mode gain), A_{CM} (Common mode gain) and CMRR.
  b. Draw the circuit diagram for Trans- resistance Amplifier (Current to Voltage 10
        converter). State different applications of the circuit.

Q.4 a Draw the circuit diagram and explain the operation of RC Wien Bridge 10
        oscillator Design the circuit to oscillate with frequency 2 KHz.
  b Draw the circuit diagram of differentiator using OPAMP and derive the 10
        expression of output voltage. State its applications.

Q.5 a Draw neat circuit diagram and explain the operation of Astable multivibrator 10
        using IC 555. How you will modify the circuit to achieve 50% Duty Cycle.
  b Draw the circuit diagram of basic MOSFET differential amplifier and explain 10
        its operation. Sketch and explain its DC transfer characteristics.

Q.6 a Define following OPAMP parameters. State its ideal and practical value for 741 10
        IC.
        i)Input offset voltage ii) Slew rate iii) CMRR iv)Input bias current iv) Power Supply Rejection Ratio)Input resistance.
  b Design the Schmitt Trigger Circuit (Regenerative Comparator) to obtain the 10
        Hysteresis of 2Volts.

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