Printed Pages: 3   NEC-501

(Following Paper ID and Roll No. to be filled in your
Answer Book)

Paper ID : 2012357   Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

B.TECH.

Regular Theory Examination (Odd Sem-V), 2016-17

INTEGRATED CIRCUITS

Time : 3 Hours   *Max. Marks : 100*

SECTION - A

1. Attempt all parts. All parts carry equal marks. Write
    answer of each part in short.   (10×2=20)

    a) Design a multiple feedback Narrow Band Pass filter
        with $f_c = 1$ kHz, $Q = 3$ and $A = 10$.

    b) For a first order Butterworth high-pass filter,
        evaluate the value of R if C = 0.0047 μF and
        $f_c = 10$ kHz.

    c) Implement F = $\overline{AB+A \overline{B}}$ using AND-OR-INVERT
        logic.

    d) Why CMOS NAND is preferred over CMOS NOR?

    e) Name the circuit that is used to detect the peak value
        of non-sinusoidal waveforms. Explain the operation
        with neat circuit diagram.

    f) Draw and explain the generalized impedance
        converter circuit.

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g) What is the advantage of widlar current source over constant current source?

h) For a dual slope ADC, t_1 is 83.33ms and the reference voltage is 100mV. Calculate t_2 if V_i is
  (i) 100mV and (ii) 200mV.

i) Which block of PLL decides capture range? Explain.

j) State the reasons for the offset currents at the input of the op-amp.

SECTION - B

Attempt any five questions from this section

(5×10=50)

2. For 555 astable multivibrator $R_A = 4.7k\Omega$, $R_B = 1k\Omega$ and $C = 1\mu F$. Determine the positive pulse width, the negative pulse width, and the free-running frequency. What is the duty cycle of output waveform?

3. Why we need BJT base current compensation mirror circuit? Draw the circuit and express relation between I_{ref} and I_o for same.

4. Explain the working of PLL with suitable block diagram. Write down the different applications of PLL.

5. Realize a simpler CMOS implementation of clocked SR flip flop. Also explain the working of circuit.

6. Design a wide band pass filter with lower cutoff frequency $f_L = 200$ Hz, higher cutoff frequency $f_H = 1kHz$ and a passband gain $= 4$?

7. Explain working of precision full wave rectifier with necessary waveform.

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8. Draw the circuit of KHN filter and derive the expression for its voltage gain.

9. Explain the types of phase detector with suitable circuit diagram and input-output waveforms.

SECTION - C

Attempt any two questions from this section

(2×15=30)

10. Explain the generation of square and triangular waveforms from astable multivibrator Operation using op-amp. Also find expression of the time period for both cases.

11. a) Design a CMOS half adder circuit with inputs A & B.
  b) Derive the formula for V_{IL} and V_{IH} of CMOS inverter.

12. Explain the circuit of Wilson MOS current mirror. Also discuss how it can be improved. Draw the circuits and find expression of I_o for both, Wilson and modified Wilson current mirrors.

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