

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

Paper ID : 2012357

Roll No.

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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)

- Design a multiple feedback Narrow Band Pass filter with $f_c = 1$ kHz, $Q = 3$ and $A = 10$.
- For a first order Butterworth high-pass filter, evaluate the value of R if $C = 0.0047 \mu\text{F}$ and $f_c = 10$ kHz.
- Implement $F = \overline{AB + \overline{A} \overline{B}}$ using AND-OR-INVERT logic.
- Why CMOS NAND is preferred over CMOS NOR?
- Name the circuit that is used to detect the peak value of non-sinusoidal waveforms. Explain the operation with neat circuit diagram.
- Draw and explain the generalized impedance converter circuit.

- 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 $f_H = 1$ kHz and a passband gain = 4?
- 7. Explain working of precision full wave rectifier with necessary waveform.

- 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.

