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 $F = \overline{AB + \bar{A}\,\bar{B}}$ 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.

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.

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.