

23/5/17 - 11/19

B. TECH.

THEORY EXAMINATION (SEM-VI) 2016-17
INTEGRATED CIRCUITS

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION - A

1. Attempt all 10 parts from the following: (2x10=20)
- Design a non-inverting amplifier with a gain of 2. At the maximum output voltage of 10 V and the current in the feedback resistance is 10 microampere.?
 - Why we preferred constant current bias in op-amp?
 - What is hysteresis voltage in Schmitt-trigger?
 - Which type of ADC is fastest and which type having high accuracy?
 - How the quality factor changes the frequency response of filter ?
 - How Ex-or gate work as a phase detector?
 - Show the waveform for inverting comparator output, if input signal is $5\sin\omega t$ and reference voltage is 1V.
 - What is sample and hold circuit, explain with diagram?
 - If the three Mos-transistors are connected in series with different aspect ratio, calculate total aspect ratio.
 - A second order filter has its poles at $s = -(1/2) \pm i(\sqrt{3}/2)$. The transmission is zero at $\omega = 2$ rad/sec and is unity at $\omega = 0$. Find the transfer function.

SECTION - B

2. Attempt any 5 parts from the following 8 parts: (10x5=50)
- Explain Wilson current mirror and Wildar current source with circuit diagram. Design Wildar current source for output current $10 \mu\text{A}$ and reference current is 1mA and $V_{cc} = 15 \text{ V}$ and $\beta = 100$.
 - Design IInd order low pass filter for cut-off frequency 2 KHz. also draw the frequency response. Also Design Band -pass filter for frequencies $f_h = 10 \text{ KHz}$ and $f_l = 1 \text{ KHz}$ for pass-band gain 4.
 - Find truth table and CMOS implementation of following Boolean function----
 - $Y = \overline{AB} + \overline{CD}$
 - $Y = A\overline{B} + B\overline{A}$
 - $Y = A + B + C$
 - $Y = AB$
 - Explain Half-wave precision rectifier with diagram. Design inverting Schmitt-trigger for hysteresis width 0.5 V. If $8\sin\omega t$ signal is applied to the input of this Schmitt-trigger. what are input and output waveform.
 - What is resolution? Explain binary weighted DAC with diagram .
 - Explain PLL with block diagram. What are the application of PLL.
 - Why short circuit protection is necessary in op-amp and how many no of transistor performed this operation? And also discuss and give the expression for the DC analysis of input stage of 741 op-amp .
 - Explain analog multiplier with circuit-diagram. Design mono-stable multi-vibrator for 100 μsec output pulse .consider $\beta = 0.5$,and $V_{cc} = \pm 12\text{V}$.

- h) i) Draw the circuit diagram of triangular wave generation and explain it.
ii) Give CMOS implementation of a clocked SR flip-flop and explain its working.

SECTION – C

Attempt any 2 parts from the following 3 parts:

(15x2=30)

- 3 What is state variable filter .Give KHN biquaid circuit and derive the expression for V_{hp} , also derive the overall transfer function V_o/V_i , what is the condition for notch?
- 4 Explain a-stable multi-vibrator with diagram using 555 timer circuit also give the waveform. Derive the equation for time period. Design a-stable multi-vibrator for frequency 100 khz and duty cycle 50% using 555 timer circuit. What are the applications of Mono-stable multi-vibrator? What is Peak detector?
- 5 Write short notes on.
(i) Log and Anti-log amplifier.
(ii) C-MOS inverter and Slew rate.