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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)

a) 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.?

b) Why we preferred constant current bias in op-amp?

c) What is hysteresis voltage in Schmitt-trigger?

d) Which type of ADC is fastest and which type having high accuracy?

e) How the quality factor changes the frequency response of filter ?

f) How Ex-or gate work as a phase detector?

g) Show the waveform for inverting comparator output, if input signal is 5sinwt and reference voltage is 1V.

h) What is sample and hold circuit, explain with diagram?

i) If the three Mos-transistors are connected in series with different aspect ratio, calculate total aspect ratio.

j) A second order filter has its poles at s=-(1/2)±i($\sqrt{(3)/}$ 2) .The transmission is zero at w=2 rad/sec and is unity at w=0.Find the transfer function.

SECTION – B

2. Attempt any 5 parts from the following 8 parts: (10x5=50)

a) Explain Wilson current mirror and Wildar current source with circuit diagram. Design Wildar current source for output current 10 µA and reference current is 1mA and Vcc=15 V and β=100.

b) 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 KHz and f_l=1 KHz for pass-band gain 4.

c) Find truth table and CMOS implementation of following Boolean function----

(i)Y= $\overline{AB + CD}$

(ii)*Y*= A$\bar{B}$ +B$\bar{A}$

(iii)Y=A+B+C

(iv)Y=AB

d) Explain Half-wave precision rectifier with diagram. Design inverting Schmitt-trigger for hysteresis width 0.5 V. If 8sinwt signal is applied to the input of this Schmitt-trigger. what are input and output waveform.

e) i):What is resolution? Explain binary weighted DAC with diagram .
ii) Explain PLL with block diagram. What are the application of PLL.

f) 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 .

g) Explain analog multiplier with circuit-diagram. Design mono-stable multi-vibrator for 100 µsec output pulse .consider β=0.5 ,and Vcc=±12V.

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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 Vhp,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.

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