

**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  $\mu\text{sec}$  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 biquad 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.