Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, July 2015
(2008 Scheme)
08.405 : ANALOG INTEGRATED CIRCUITS (T)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. An opamp has a slew rate of 0.5 V/μ S. Determine the highest possible operating frequency for a peak value of 1V output voltage.

2. Design a circuit to perform the following summing operation $V_0 = 80V_1 + 120V_2 - 200V_3$ with a requirement that $R_{in} \geq 100$ KΩ at all external inputs.

3. Why is frequency compensation required in operational amplifier ?

4. In a circuit of inverting comparator with positive feedback, feedback factor is 2×10^{-3}. 1V peak to peak sine wave is applied to the input. Output saturation voltage of the opamp is ± 13V. Determine the threshold voltages.

5. Design a first order high-pass filter for cut-off frequency of 400 Hz and pass-band gain of 1.

6. Give the features of switched capacitor filters.

7. How many comparators are required in a 3-bit flash ADC ? For an input signal in the range of 0 to 7V, what are the reference voltages required ?

8. Show how to convert a simple emitter coupled pair into two quadrant multiplier.

9. Explain the application of PLL for AM detection.

10. Explain foldback current limiting technique in the voltage regulator IC 723.

(10×4=40 Marks)

PART – B

Answer **any two** questions from **each** Module. **Each** question carries **10** marks.

Module – I

11. Draw basic two stage CMOS opamp configuration. A two-stage CMOS operational amplifier uses $\pm$ 2.5 V. All transistors are operated at overdrive voltages of 0.3 V magnitude. The threshold voltages of the transistors are $V_{tn} = |V_{tp}| = 0.7$ V. Find the input common-mode range and output swing.   **10**

12. Derive the expression for frequency of oscillation and condition for oscillation in opamp based RC phase shift oscillator.   **10**

13. Draw the circuit of Triangular wave generator and derive the expression for frequency of the triangular wave.   **10**

Module – II

14. Design second order low pass Butterworth filter with a –3dB frequency of 10 KHz.   **10**

15. Explain second order switched capacitor Tow-Thomas filter.   **10**

16. Describe 4-bit D/A converter using an R-2R ladder network.   **10**

Module – III

17. In a Gilbert multiplier circuit, show that the differential output current $I_0 = I_E$ $(\tanh V_x/2V_T)(\tanh V_y/2V_T)$, where I_E is the constant DC biasing current, V_x and V_y are differential input voltages. Assume that all transistors are identical and base currents and output resistances are neglected.   **10**

18. a) Design a monostable multivibrator using 555 for a pulse width of 10 ms.   **5**

    b) Design IC 723 based low voltage regulator.   **5**

19. Explain the block schematic of IC LM 565 and design it as FSK demodulator.   **10**

(6×10=60 Marks)