C 26896 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, MAY 2012

AI 09 403—LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is surface mount technology ?
2. Why current mirror is used as an active load ?
3. For a peak detector, C = 0.01 μF, V_i= 2VPP square wave at 1 kHz, draw the approximate output voltage.
4. Design a square wave oscillator for f_N = 2 kHz. The op-amp supply voltage is ±15V.
5. Design a Notch filter for f_N = 50 Hz.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Derive the expression for the current I_R in Wilson current mirror.
7. For the non-inverting amplifier R_1 = 100 Ω. and R_f = 10 kΩ determine the maximum possible output offset voltage due to :

   (a) Input offset voltage V_{io} and (b) Input bias current I_B.

   The op-amp is LM307 with V_{io} = 10 mV and I_B = 300 nA. What value of compensating resistor needed to reduce the effect of input bias current I_B.

8. Design a circuit to implement the following $Y = \frac{3X_1 + X_2}{X_3} + 4X_4X_5 - X_6$ where Y is the output and $X_1, X_2 \ldots X_6$ are inputs to the circuit.
9. Design a Bandpass fitter so that f_o = 2 kHz, Q = 20 and A_o = 10.
10. Realize the following circuits with switched capacitors Fig. 1 (a), 1 (b).

(a)

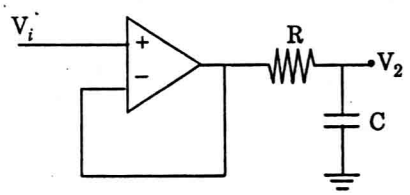

Fig. 1 (a)

(b)

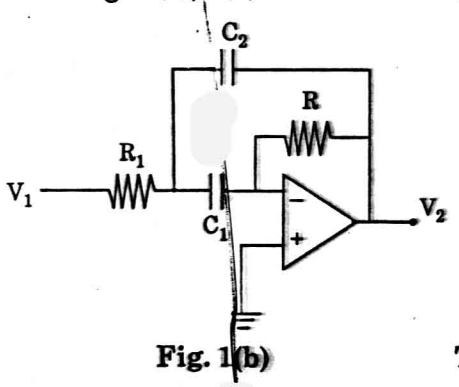

Fig. 1 (b)

Turn over

11. For the input shown in Fig. 2 below find the output of a differentiator if $R_f = 2\ k\Omega$ and $C_1 = 0.1\ \mu F$.
Fig. 2.

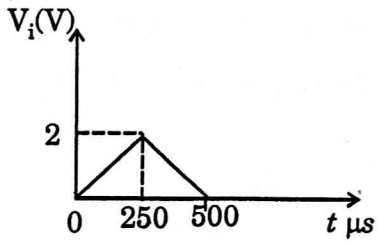

Fig. 2.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. Describe the CMOS technology of fabricating an IC. (10 marks)

Or

13. Derive the expression for the output voltage and gain of a differential amplifier. (10 marks)

14. (a) Explain the working of pole zero compensation network. (4 marks)

(b) Explain the importance of the parameters CMRR, PSRR, Slew rate and Bias current. (6 marks)

Or

15. Discuss in detail the internal circuit of 741.

16. Explain the operation of the following circuits :

(a) V to I converter. (b) Timing mark generator and,

(c) Peak detector.

Or

17. Describe the operation of Instrumentation amplifier, Logarithmic amplifier and Averaging amplifier.

18. (a) Explain the operation of Astable multivibrator with suitable output waveform. (5 marks)

(b) Design a fourth order Butterworth low pass filter having upper cut-off frequency 1kHz. (5 marks)

Or

19. (a) Derive the transfer function of a Band reject filter. (7 marks)

(b) Design a monostable multivibrator with trigger pulse shaping which will drive a LED on for 0.5 second each time it is pulsed. (3 marks)

(4 × 10 = 40 marks)