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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Fourth Semester

Electronics and Communication Engineering

EC 244 — LINEAR INTEGRATED CIRCUITS

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What does the term - linear circuits generally convey?

2. Give the circuit schematic of a simple current mirror circuit.

3. What modifications are made in OPAMP's input and output impedances when it has noninverting configuration?

4. What is the principle of a regenerative comparator?

5. List the applications of analog multipliers.

6. Write the significance of lock range of a PLL.

7. Define the terms setting time and conversion time related to DACs.

8. Draw the schematic diagram of a switch used in a DAC.

9. What is the basic principle of operation of a frequency to voltage converter?

10. How are the internal noises within ICs are classified?

PART B — (5 × 16 = 80 marks)

11. (a) (i) An integrator circuit is to be designed to convert a 100Hz, 20Vpp square wave to triangle wave. If the 3-dB frequency is set at 5Hz and R_f = 100$K\Omega$. Determine the value of Ri and C. (10)

    (ii) Write about the temperature independent biasing provided for differential amplifiers. (6)

Or

    (b) (i) Describe the cause of slew - rate limiting and its effect on the highest frequency of undistorted sinusoidal output. (8)

    (ii) Explain how the feed-forward compensation extends the BW of an OPAMP. (8)

12. (a) (i) What are the limitations of basic closed loop differential amplifier and how are they eliminated by an instrumentation amplifier. (10)

    (ii) Design a band pass filter using OPAMP to have f_L = 500 Hz and f_H = 2 KHz with pass band gain of 4. (6)

Or

    (b) (i) Using OPAMP design a monostable multivibrator of get a pulse for a duration of 10 msec each time when it is triggered. (10)

    (ii) Explain the operation of a OPAMP log amplifier. (6)

13. (a) (i) What is an analog multiplier? Draw its schematic symbol and describe its operation as balanced modulator. (10)

    (ii) Explain the working of PLL as FSK demodulator. (6)

Or

    (b) (i) Configure a multiplier as divider. (6)

    (ii) What is the function of a compander? (4)

    (iii) Name a compander IC and mention its important specifications. (6)

14. (a) (i) Explain any one application of sample and hold circuit with necessary diagrams. (12)

    (ii) Compare binary weighted DAC with R - 2R ladder network DAC. (4)

Or

(b) For a 4-bit R-2R ladder network, determine the size of each step if r = 10K, $R_F = 40\,K\Omega$ and $Vcc = \pm15V$ calculate the output voltage for $D_0 = 1$, $D_1 = 0$, $D_2 = 1$, $D_3 = 1$, if bit '1' applied as 5V and bit '0' is applied as OV.

15. (a) (i) Design an adjustable voltage regulator (5V to 15V) with a short circuit current limit of 50mA using a 723 regulator. (8)

   (ii) Write briefly about switching mode voltage regulator. (8)

Or

(b) Write short notes on :

   (i) Switched capacitor filter

   (ii) Video amplifiers.