

Sem - II 2008 pattern

Total No. of Questions—12]

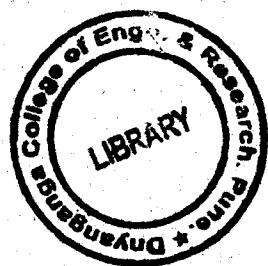
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**[4062]-157****S.E. (Electronics/E. & T.C.) (II Semester) EXAMINATION, 2011****INTEGRATED CIRCUITS AND APPLICATIONS****(2008 PATTERN)****Time : Three Hours****Maximum Marks : 100**

- N.B. :** (i) Answer any 3 questions from Section I and any 3 questions from Section II.
- (ii) Answers to the two Sections should be written in separate answer-books.
- (iii) Figures to the right indicate full marks.
- (iv) Assume suitable data, if necessary.

**SECTION I**

1. (a) Design a dual input, balanced output differential amplifier with constant current bias (using diodes) to satisfy the following requirements :  $A_d = 40$ , Supply current to constant current bias circuit = 4mA, Supply voltage is  $\pm 10V$ . [10]
- (b) Explain how to improve CMRR of differential amplifier. Draw and explain any one current source. [8]



P.T.O.

Or

2. (a) State the values for all ideal parameters of op-amp. Explain virtual short and virtual ground concept related to op-amp. [8]
- (b) Explain the current mirror circuit with necessary derivation. [10]
3. (a) State the reasons for limiting the value of slew rate. An op-amp has slew rate of  $2 \text{ V}/\mu\text{s}$ . Find the rise time for an output voltage of 10 V amplitude resulting from a rectangular pulse input if the op-amp is slew-rate limited. [8]
- (b) Explain the effect of temperature on : [8]
- (i) Input bias current
  - (ii) Input offset current
  - (iii) Input offset voltage
  - (iv) Output offset voltage.

Or

4. (a) What is the need of frequency compensation ? Explain the effect of internal frequency compensation on frequency response of op-amp. [6]
- (b) Define the following and state the typical values for op-amp LM741 and LF351. [10]

- (i) CMRR

(ii) PSRR

(iii) Slew rate

(iv) Input offset current

(v) Input offset voltage

5. (a) Design a practical integrator with input signal of 2 V<sub>pp</sub> and cut-off frequency of 5 kHz for DC voltage gain of 10. [4]

(b) Explain with circuit diagram the working of the following : [12]

(1) AC integrator circuits

(2) Summing integrator

(3) Augmenting integrator

Or

6. (a) Draw and explain the integrator working with run, set and hold modes. [8]

(b) Explain the effect of offset and bias parameters on integrator circuit. Also explain the other sources of error in integrator. [8]

## SECTION II

7. (a) Explain with neat circuit diagram working of non-inverting Schmitt trigger using op-amp. Also derive the equation for the trigger points. [8]

- (b) Draw and explain the working of the sample and hold circuit using op-amp. [8]

*Or*

8. (a) What are the requirements of instrumentation amplifier ? Draw and explain the instrumentation amplifier with active guard drive. [8]

- (b) Using IC 741 op-amp with a supply of  $\pm 12$  V, design an inverting Schmitt trigger circuit to have  $V_{UT} = 3V$ ,  $V_{LT} = -3V$ . Also find the hysteresis voltage and draw the hysteresis curve for the given design. [8]

9. (a) State the specification and errors associated with ADC. Also state the applications of ADC. [8]

- (b) Draw and explain the block diagram of IC 9400 for frequency to voltage conversion using IC 9400. [8]

*Or*

10. (a) List the various methods of DA conversion, state the advantages and disadvantages of each. [10]

- (b) Write a short note on : Sigma-delta ADC. [6]

11. (a) State the advantages of active filter. Also with the help of circuit diagram explain the operation of second order high pass filter. Also draw the characteristics. [10]

- (b) Write short notes on : [8]
- (i) Frequency synthesizer using PLL.
  - (ii) FM Demodulator using PLL.

Or

12. (a) Draw and explain pin diagram for IC 565 and explain how it works as a phase detector circuit. [8]
- (b) Explain the working of : [10]
- (i) Op-amp based audio amplifier circuit.
  - (ii) Active tone control circuit.