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Question Paper Code : 10295

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Fourth Semester

Electronics and Communication Engineering

EC 2254/147404/EC 44/10144 EC 405/EC 1254/080290022 – LINEAR
INTEGRATED CIRCUITS

(Common to PTEC 2254 Linear Integrated Circuits for B.E.(Part -Time) – Third
Semester ECE - Regulation 2009)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

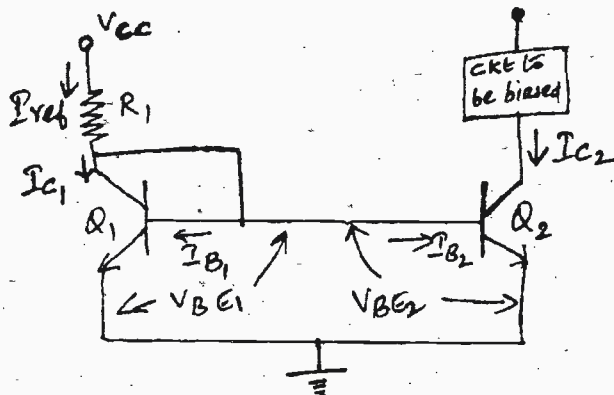
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the two requirements to be met for a good current source?
2. List the various methods of realizing high input resistance in a differential amplifier.
3. Why active guard drive is necessary for an instrumentation amplifier?
4. What is comparator?
5. What are the advantages of variable transconductance technique?
6. VCO is also called as V-f converter. Why?
7. Define settling time of D/A converter.
8. What is the main drawback of dual slope ADC?
9. What are the limitations of three terminal regulator?
10. What is a switched capacitor filter?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With neat circuit diagrams, explain the operation of
- (1) voltage reference circuit using temperature compensation
 - (2) voltage reference circuit using avalanche diode reference. (12)
- (ii) The current mirror shown below, is to provide a 1 mA current with $V_{cc}=10V$. Assume $\beta = 125$ and $V_{BE} = 0.7V$.



- (1) Determine the value of R_1 .
- (2) Also, for a collector current of 10 micro amperes, find the value of R_1 . (4)

Or

- (b) (i) List and explain the non-ideal DC characteristics of an operational amplifier. (8)
- (ii) Explain the AC characteristics of an operational amplifier. (8)
12. (a) (i) Sketch the basic circuit using op-amp to perform the mathematical operation of differentiation and explain. What are the limitations of an ordinary OP-AMP differentiator? Draw and explain the circuit of a practical differentiator that will eliminate these limitations. (8)
- (ii) Draw and explain the circuit of a voltage-to-current converter if the load is
- (1) Floating. (4)
 - (2) Grounded. (4)

Or

- (b) (i) Explain the working of OP-AMP based Schmitt trigger circuit. (8)
- (ii) Design an OP-AMP based second order active low pass filter with cut off frequency 2 kHz. (8)
13. (a) (i) List and define the various performance parameters of a Multiplier IC. (6)
- (ii) How the multiplier is used as voltage divider? (5)
- (iii) How the multiplier is used as frequency doubler? (5)

Or

- (b) Explain, with neat block diagrams, how PLL is used as
- (i) AM Detector (5)
- (ii) FM Detector (5)
- (iii) Frequency Synthesizer. (6)
14. (a) (i) Explain the following types of electronic switches used in D/A converter, with suitable diagrams:
- (1) Totem pole MOSFET switch (4)
- (2) CMOS inverter as a switch. (4)
- (ii) Explain the working of R-2R ladder DAC, by taking example of a 3-bit DAC circuit. Sketch the corresponding equivalent circuits and hence obtain the equation for output. (8)

Or

- (b) (i) With neat circuit diagram and wave form of output, explain the working of Dual slope A/D converter. (10)
- (ii) Give a table of comparison of Flash, Dual-slope and Successive-approximation ADCs, in terms of parameters like speed, accuracy, resolution, input-hold-time. (6)

15. (a) Sketch the functional block diagram of the following and explain their working principle:

(i) IC 555 Timer. (8)

(ii) General purpose voltage regulator IC 723. (8)

Or

(b) (i) With neat diagram, explain the working principle of isolation amplifier. (8)

(ii) With neat diagram, explain the principle of operation of optocouplers. (8)
