Nov-Dec 2010

Total No. of Questions—12] [Total No. of Printed Pages—4+2

[3862]-167

S.E. (E&TC) (Second Semester) EXAMINATION, 2010

INTEGRATED CIRCUITS AND APPLICATIONS

(2008 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Which are the different configurations of differential amplifiers ? Do the D.C. analysis of Dual-Input Balanced output differential amplifier to locate Q-point ? [8]

(*b*) Explain the working of current mirror circuit with neat circuit diagram and derive the expression for constant current. Justify why it is known as current mirror. [8]

P.T.O.

Or

2. (*a*) What is op-amp ? Draw its block diagram and explain the function of each block in detail. [8]

(*b*) An emitter-biased dual-input balanced-output differential amplifier has the following specifications : $|V_{CC}| = |-V_{EE}| = 10$ V, $R_{C1} = R_{C2} = 2.7$ kΩ and $R_E = 5.6$ kΩ; the transistor array is CA3086 with $\beta_{a.c.} = \beta_{d.c.} = 100$ and $V_{BE} = 0.715$ V. Calculate :

(*i*) The voltage gain

(*ii*) The input resistance

(*iii*) The output resistance. [6]

(*c*) Compare Ideal op-amp and practical op-amp. [2]

3. (*a*) In the op-amp circuit given in Fig. 1, find output offset voltage. Also find value of R_{comp} to compensate this output offset voltage. [6]

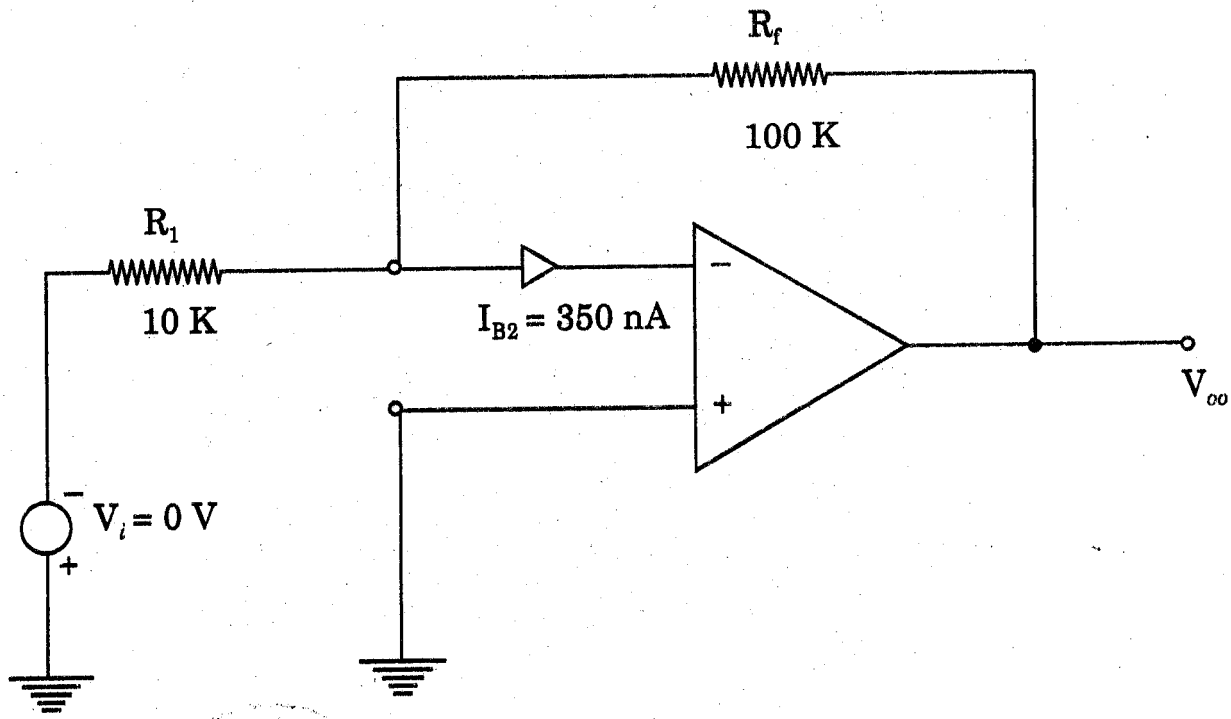

Fig. 1

(*b*) Write a short note on frequency compensation in op-amps. [6]

(*c*) What is CMRR ? Explain its significance in op-amp. [4]

Or

4. (*a*) Explain frequency dependence of loop gain using Bode plot. [8]

(*b*) Which are the different types of noises that are associated with op-amps ? Draw op-amp. noise model and give expression for output noise voltage. [8]

5. (*a*) Which are the different techniques used to achieve non-linear amplification ? Explain in detail synthesized non-linear response with neat circuit diagram. [8]

(*b*) Why basic integrator is needed to be modified ? Draw the circuit diagram of practical integrator along with frequency response and explain its operation. [6]

(*c*) Write a short note on averaging circuit. [4]

Or

6. (*a*) With neat circuit diagram explain the operation of V to I converter with grounded load and give its application. [6]

(*b*) Design a differentiator to differentiate an input signal whose frequency varies from 50 Hz to 2 kHz. [6]

(*c*) Draw the circuit diagram of two op-amp. differential amplifier and explain its operation. [6]

SECTION II

7. (*a*) What is precision rectifier ? Explain the operation of precision full wave rectifier with neat circuit diagram. [8]

(*b*) For the Inverting Schmitt Trigger given in Fig. 2, find V_{TH}, V_{TL}, ΔV_T and draw the input/output waveforms. [6]

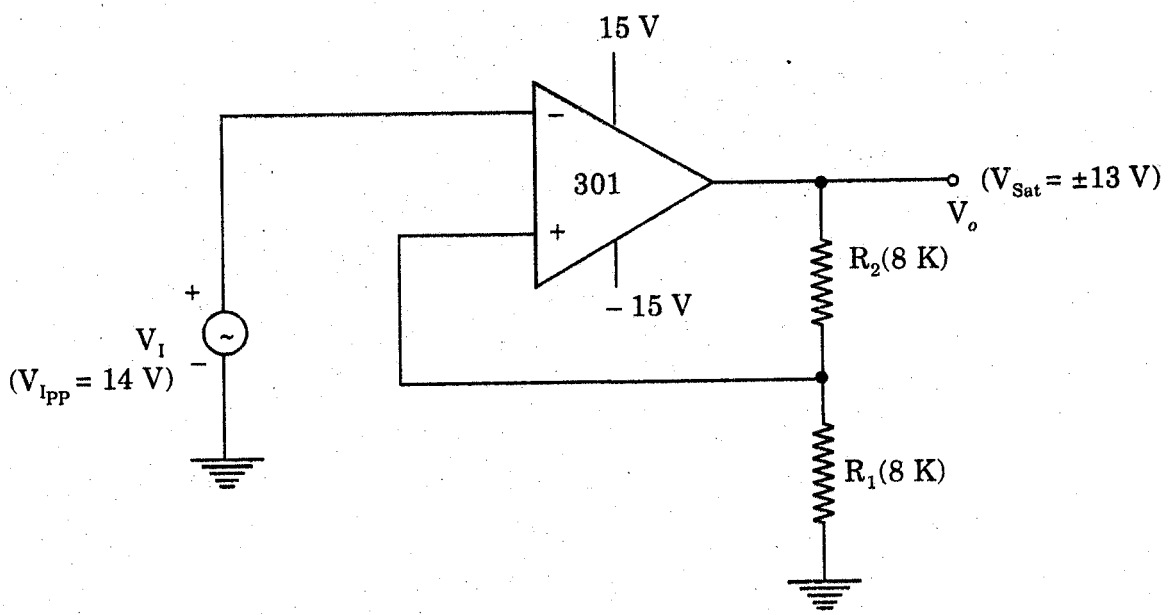

Fig. 2

(*c*) Write a short note on IC LM317. [4]

Or

8. (*a*) Draw the neat circuit diagram of Instrumentation Amplifier which amplifies output of a bridge which contains one resistive transducer. Derive the expression for output voltage. [8]

(*b*) What is sample and hold amplifier ? Explain its operation with the help of circuit diagram. [6]

(*c*) Explain operation of peak detector with the help of circuit diagram. [4]

9. (*a*) Draw the neat diagram of F to V converter and explain its operation. [8]

(*b*) Explain the operation of successive approximation type ADC with neat block diagram. [8]

Or

10. (*a*) Explain in detail specifications of ADCs. [8]

(*b*) Draw the circuit diagram of voltage mode R-2R ladder DAC and explain its working. [8]

11. (*a*) With the help of neat block diagram explain operation of PLL. Define the terms Lock range and Capture range. [8]

(*b*) Write a short note on second order active Band Pass Filter. [8]

Or

12. Write short notes on any *two* : [16]

(*a*) Graphic equalizer

(*b*) PLL as frequency synthesizer

(*c*) FM Demodulator using PLL.