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Question Paper Code : X60447

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Fourth Semester
Electronics and Communication Engineering
EC2254 – LINEAR INTEGRATED CIRCUITS
(Regulations 2008)
(Common to PTEC 2254 Linear Integrated Circuits for B.E. (Part-Time) – Third Semester – ECE – Regulations – 2009)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Name the different methods used in fabrication of integrated resistors.
2. What is the maximum undistorted amplitude, that a sine wave input of 10 kHz, can produce, at the output of an op-amp whose slew rate is 0.5 V/μs ?
3. Draw the circuit diagram of an op-amp integrator circuit.
4. How does precision rectifier differ from the conventional rectifier ?
5. With the equations, show how is a multiplier can be used for finding phase angle difference between two signals.
6. Define pull-in time as referred to PLL.
7. Mention the significance of sample and Hold circuit.
8. Define gain error and monotonicity with respect to data converters.
9. Give the formula for period of oscillations in an op-amp astable circuit.
10. Define duty cycle of a periodic pulse wave form.

PART – B **(5×16=80 Marks)**

11. a) i) Describe the following with respect to integrated circuit fabrication.
    1) Silicon water preparation **(6)**
    2) Dielectric isolation. **(6)**
    ii) Explain why inductors are difficult to fabricate in ICs. **(4)**

(OR)

b) i) Draw the circuit diagram of a basic current mirror and explain its operation. **(8)**
    ii) For the current mirror circuit shown in fig. (11 b) (ii)), determine the emitter current in transistor Q_3 if $\beta = 100$ and $V_{BE} = 0.75$ V. **(8)**

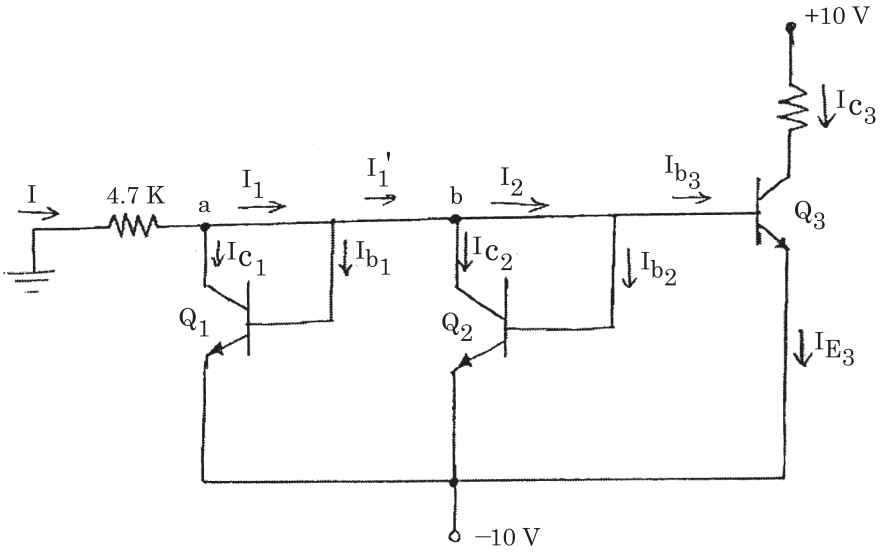

Figure 11 b) (ii)

12. a) i) What do you understand by an Instrumentation Amplifier ? **(2)**
    ii) State the requirements of a good Instrumentation Amplifier. **(4)**
    iii) Draw the circuit diagram and explain the working of instrumentation Amplifier. **(6)**
    iv) Mention the specific advantages of three op-amp Instrumentation Amplifier circuit. **(4)**

(OR)

b) i) What do you understand by an Integrator ? **(2)**
    ii) Draw and explain an ideal active op-amp Integrator ckt. **(4)**
    iii) Draw the I/O waveforms for integrator **(3×½=1½)**
    1) Step input signal
    2) Square wave input signal
    3) Sine wave input signal.

iv) Derive the expression for change in output voltage. **(3)**

v) List the applications of practical integrator. **(1½)**

vi) Design a practical integrator circuit with a dc gain of 10, to integrate a square wave of 10KHz. **(4)**

13. a) i) Explain, with-necessary equations, the basic circuits of 'Linearized transconductance multiplier' and 'Differential V-I converter'. Hence explain the 'Four quadrant variable transconductance multiplier' circuit. **(10)**

ii) Explain the working of a divider circuit using multiplier IC. **(6)**

(OR)

b) i) Draw the block diagram of VCO and explain its operation. Also derive the frequency of oscillator. **(10)**

ii) Draw the circuit of a PLL used as AM detector and explain its operation. **(6)**

14. a) Explain the following types of digital to analog converters, with suitable circuit diagrams

i) Binary weighted resistor DAC. **(6)**

ii) R-2R Ladder DAC. **(5)**

iii) Inverted R-2R Ladder DAC. **(5)**

(OR)

b) i) With a neat block diagram, explain, in detail, the successive approximation type A/D converter. **(8)**

ii) Explain the over sampling A/D converter with functional block diagram. **(8)**

15. a) i) Describe the astable mode of operation of IC 555 timer and discuss any two applications. **(10)**

ii) Explain how opto-couplers can be used in circuits for isolation. **(6)**

(OR)

b) i) Draw the function diagram for a low voltage regulator using IC 723 and explain its operation. **(8)**

ii) State the protection circuit used in voltage regulators and explain them with characteristic curve. **(8)**

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