SE417

Total No. of Printed Pages:02

S.E. (Electronics & TC / Electronics & Comm Engg) (Sem-IV)
(Revised Course 2016-2017) EXAMINATION NOV/DEC 2019
Linear Integrated Circuits

[Time: Three Hours] **[Max. Marks: 100]**

Instructions:
1) *Assume suitable data , **if necessary**.*
4) *Notations have their usual meaning.*

PART – A
Answer any two questions from the following

Q.1
a) Derive the expressions for the differential voltage gain, input resistance and output resistance and output resistance of a single input unbalanced output differential amplifier. **(8)**
b) With the help of neat circuit diagrams explain the measurement procedure of the following op-amp parameters. **(8)**
(i) Input offset voltage
(ii) Slew rate
(iii) CMRR
Also state the typical and ideal values of the above parameters.
c) Explain the use of constant current bias circuit in an op-amp. **(4)**

Q.2
a) Explain the following applications of op-amp. **(8)**
(i) Averaging Amplifier
(ii) Non inverting adder
(iii) Voltage follower
b) Draw the circuit diagram and explain the working of an instrumentation amplifier. Mention the specific advantages of three op-amp instrumentation amplifier circuit. **(8)**
c) What is log amplifier? Draw the circuit and explain the working of an op-amp based basic log amplifier. **(4)**

Q.3
a) With the help of a neat circuit diagram and necessary waveforms, give the working of op-amp based square wave generator and obtain an expression for frequency of operation. **(8)**
b) What type of feedback is used in the op-amp based Wein Bridge oscillator? Why? Explain its operation with a suitable circuit diagram. **(8)**
c) What are the advantages of active filters over the passive filters? Draw the freq. response of the Low pass, High pass and Band pass & Band reject filter. **(4)**

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PART B

Answer any two questions from the following

Q.4

a) List the advantages and disadvantages of R-2R D/A converter. Derive the expression for output voltage of R-2R D/A converter using Thevenin's theorem, considering the input data bits as 1101 (left-most bit is MSB). **(8)**

b) Explain the following specifications for Data Converters with suitable examples. **(6)**
   (i) Resolution
   (ii) Accuracy
   (iii) Quantization error

c) With the help of diagram explain how LM 7815 and LM 7915 can be used as dual tracking regulator. **(6)**

Q.5

a) Explain the basic principle of operation of a PLL with a neat diagram. **(6)**

b) With the help of neat circuit diagram and suitable waveforms, explain the operation of IC 555 as an astable multivibrator. Derive an expression for the duty cycle and frequency. **(8)**

c) With a neat functional diagram explain the working of IC 8038 as a function generator. **(6)**

Q.6

a) What are the advantages of adjustable voltage regulators over fixed voltage regulators? Design a voltage regulator using IC 317 to satisfy the following specifications: Output voltage, V_o= 5 to 12 V, output current I_o=1 A. Draw the connection diagram and indicate the values. **(8)**

b) Explain the application of IC 555 as pulse width modulator. **(6)**

c) Explain how voltage regulation is achieved in case IC 723 working as low voltage regulator. How is over current protection incorporated? **(6)**

PART – C

Answer any one question from the following

Q.7

a) What are the limitations of Opamps as comparators? How are they overcome? Explain briefly with waveforms the application of comparator as zero crossing detector. **(6)**

b) Design and explain triangular wave generator using Schmitt trigger and integrator circuit. Derive an expression for the output frequency. **(8)**

c) Explain with a neat diagram and waveform, the working of an op-amp based sample and hold circuit. **(6)**

Q.8

a) Explain how the PLL can be used as a FM detector. **(5)**

b) Explain the working of ADC using successive approximation method. **(5)**

c) With the help of the internal diagram of IC 555 and added external components, explain the working of IC 555 monostable multivibrator. Derive an expression for the output pulse width. **(10)**

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