Question Paper

Exam Date & Time: 24-Apr-2019 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.Sc. (Applied Sciences) - in Engg **END SEMESTER THEORY EXAMINATION APRIL/MAY 2019**

IC SYSTEMS [IEC 241 - S2]

Marks: 100

2)

Duration: 180 mins.

Answer ANY FIVE full Questions. Missing data, if any, may be suitably assumed.

- 1) Explain with circuit diagram and expressions how CMRR can be improved (10)by using current mirror circuit and constant current bias circuit. A) B) Mention any four characteristics of ideal OP-AMP. Draw the internal block (10)diagram of OP-AMP and explain each block.
 - (10)Explain the methods to measure the following OP-AMP parameters. Open loop differential gain i) A)
 - Input resistance ii)
 - Output resistance iii)
 - Input OFFSET voltage iv)
 - B) (10)Draw the circuit of an emitter coupled differential amplifier. Derive an expression for CMRR.
- (10)3) i) For the circuit shown in Fig. Q3A (i), (a) find the output voltage if $V_{f} = -$
 - 0.5V and V₂ = 0.5V. For the OP-AMPS, \pm V_{SAT} = \pm 12V (b) State the function A) of each amplifier in the circuit.

ii) Analyze and determine the expression of the output voltage for the circuit shown in

Fig. Q3A(ii) & Q3A(iii).



Fig. Q3A (i)



- ^{B)} Draw the circuit diagrams of V to I converter with Floating and Grounded (10) load using OP-AMP. Derive the expressions for load current.
- ⁴⁾ Draw the circuit diagram of OP-AMP based triangular wave generator. (10)
 ^{A)} Explain its working principle with neat waveform and necessary
 ^{A)} expressions.
 - ^{B)} Write the necessary conditions to realize Band Reject Filter using Low Pass ⁽¹⁰⁾ Filter and High Pass Filter. Design a wide band reject filter using first order high pass filter and low pass filter having $f_H = 200$ Hz and $f_L = 1$ kHz. Pass band gain must be 2. Assume capacitors are 0.01μ F. Find central frequency and plot the frequency response with correct labelling.
- ⁵⁾ Draw the circuit diagram of precision full wave rectifier. Explain its working (10) principle with neat waveform and necessary expressions.
 - ^{B)} Draw the circuit diagram of 4-bit binary weighted resistor DAC and explain (10) its operation. Convert the following input into equivalent analog output. i) 0001 ii) 0011 iii) 1111. Use R=10k Ω , RF = 1k Ω . List the names of other
 - DACs.
- Draw the functional diagram of 555 timer and explain its operation. Explain (10) the function of following pin no's 4, 5, 6 and 7.
 - ^{B)} What is PLL? Give the applications of PLL. Draw the block diagram of (10)
 IC565 & explain the working of each block.
- ⁷⁾ Draw the circuit diagram of Anti-Log amplifier using OP-AMP. Derive the ⁽¹⁰⁾ output voltage expression. With neat circuit diagram and waveforms explain the operation of Non-inverting comparator.
 - ^{B)} Draw the circuit diagram of OP-AMP based series voltage regulator and (10) adjustable regulator. Explain its operation and derive the output voltage expression.
- ⁸⁾ Explain the following with circuit diagram, waveforms and expressions: (20)
 A. Precision Half wave rectifier
 B. All-Pass Filter
 - C. Monostable Multivibrator using IC 555

(5+5+10)

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