Question Paper

Exam Date & Time: 06-Jun-2019 (09:30 AM - 12:30 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]

Marks: 100   **Duration: 180 mins.**

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

1)

A)   Draw the circuit of an emitter coupled differential amplifier. Derive an expression for CMRR.   (10)

B)   Explain with circuit diagram and expressions how CMRR can be improved by using current mirror circuit and constant current bias circuit.   (10)

2)

A)   Analyze and determine the expression of the output voltage for the circuit shown in Fig. Q2A(i) & Q2A(ii). State the function of each circuit.   (10)
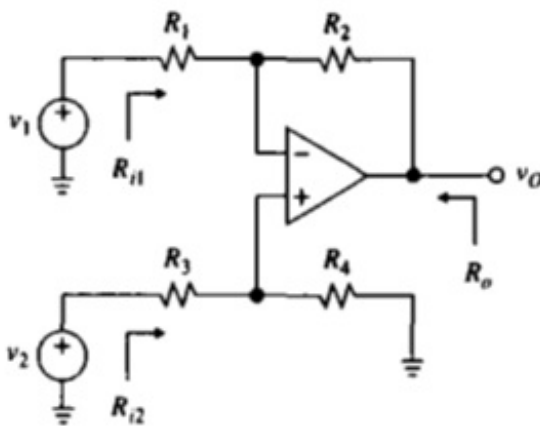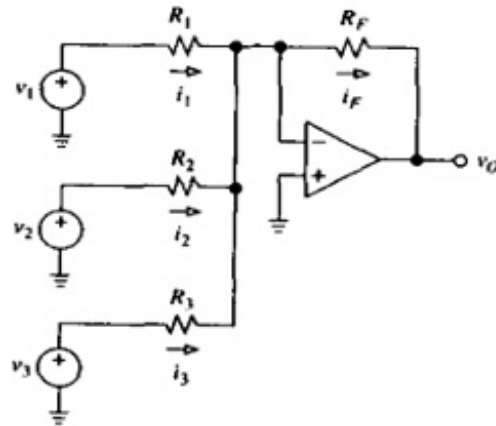

Fig. Q2A (i)   Fig. Q2A (ii)

B)   Draw an inverting amplifier circuit using OP-AMP. Derive the expression for the output voltage assuming ideal conditions. Design the circuit to obtain voltage gain of 10. Draw the output waveform for the input signal (i) $V_i = 0.5$ sin(3140 t) (ii) $V_i = 4$ sin(3140 t) Use supply voltage ±11V. Assume gain of OP-AMP is 10.   (10)

3)

A)   Draw the internal block diagram of OP-AMP and explain each block.   (6)

B)   Draw the circuit diagram to measure the input resistance of an OP-AMP and derive the expression for R_i.   (4)

C)   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 second order Butterworth active filter and derive   (10)
     the expression for Transfer Function. Also derive the expression for transfer
A)   function of second order Butterworth active Low pass filter.

B)   Draw the circuit diagram of precision full wave rectifier. Explain its working   (10)
     principle with neat waveform and necessary expressions.

5)   Draw the circuit diagram of OP-AMP based square wave generator. Explain   (10)
     its working principle with neat waveform and necessary expressions.
A)

B)   Draw the circuit diagram of dual slope ADC. Explain its working principle   (10)
     with neat waveform and necessary expressions.

6)   Draw the circuit diagram of Monostable Multivibrator using IC 555 and   (10)
     explain its operation with neat waveform and expression.
A)

B)   Draw the functional diagram of VCO (IC 566) and explain its operation.   (10)
     Derive the expressions for frequency of oscillation.

7)   Design a second order Butterworth high pass filter with a cutoff frequency of   (5)
     1 kHz and pass band gain of 10. Assume R=15.9kΩ.
A)

B)   Draw the circuit diagram of an OP-AMP based bridge amplifier and derive   (5)
     the necessary expressions.

C)   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. Log amplifier   C. Inverting Schmitt trigger
     B. All-Pass Filter   D. Analog Divider
     (5+5+5+5)

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