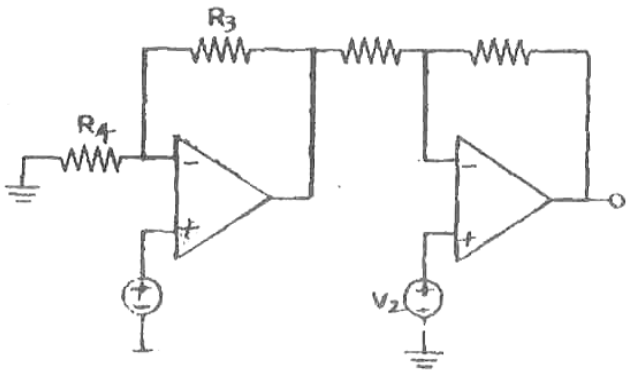
U23ECT42 LINEAR INTEGRATED CIRCUITS
PART B

UNIT 1

1. List and explain the function of all the basic building blocks of an op Amp.[APR/MAY 2022]
2. Explain the DC and AC performance characteristics of op amp. .[APR/MAY 2019]
3. Analyze the operation of basic BJT current mirror and thus explain its volt ampere characteristics .[NOV/DEC 2020]
4. Analyze the small signal model of BJT differential amplifier using h parameter and deduce the expression for differential and common mode gains for differential output . [NOV/DEC 2019]
5. Describe about BJT differential amplifier using active loads with neat sketch.[APR/MAY 2022]
6. Explain about the various stages of a general op amp circuit.[APR/MAY 2019]
7. i. Draw the transfer characteristics of an operational amplifier and explain its linear and non linear operation.
   ii. Discuss the operation of BJT differential amplifier with active loads.[NOV/DEC 2018]
8. i. Present the inverting and non inverting amplifier circuits of an op amp in closed loop configuration. Derive the expressions for the closed loop gain in these circuits.
   ii. Define slew rate. In what way does it possess impact on the performance of an op amp circuit? [NOV/DEC 2018]
9. Discuss about the principle of operation differential amplifier using BJT. [APR/MAY 2018]
10. Explain about ideal op amp in detail with suitable diagrams.[APR/MAY 2018]

UNIT 2

1. Explain the operation of
   i. Schmitt trigger
   ii.Precision rectifier. [APR/MAY 2022]
2. Find Vo. verify that if R3/R4=R1/R2, the circuit is an instrumentation amplifier with gain A=1+R2/R1.



3.

4. i. Explain the function of instrumentation amplifier and derive the expression for gain.
   ii. Explain the function of full wave rectifier using op amp and diodes. [NOV/DEC 2023]
5. i. Draw the circuit of temperature independent logarithmic amplifier and explain its operation. Also deduce the expression for output voltage.
   ii. Explain the function of positive clipper circuit with its input and output waveforms.[NOV/DEC 2019]
6. i. Describe the details of voltage follower circuit.
   ii. Outline the details about voltage to current converter.[APR/MAY 2019]
7. Describe in detail about the Schmitt trigger with suitable circuit and waveforms.[APR/MAY 2019]
8. i. With a suitable circuit diagram, explain the operation principle of an instrumentation amplifier and derive its gain.
   ii. Design a second order butterworth low pass filter having upper cut off frequency of 2.1961KHZ.[NOV/DEC 2018]
9. i. Design a clipper circuit for a clipping level +0.83v, given an input sine wave signal of 0.3v peak, Assume the gain of the amplifier is 9 and its has an input resistance of 2.2 Kohm connected.
   ii. Draw the operational diagram and explain the working principle of antilogarithmic amplifier and Schmitt trigger. [NOV/DEC 2018]
10. i. Describe about voltage follower circuit.
    ii. Write short notes on subtractor circuit.[APR/MAY 2018]
10. With a neat diagram explain about voltage to current converter. [APR/MAY 2018]

UNIT 3

1. Explain PLL characteristics and derive the lock range and capture range equations.[APR/MAY 2022]
2. Explain any two applications of PLL[APR/MAY 2019]

3. i. Draw and explain the block diagram of voltage controlled oscillator and show the output frequency is directly proportional to the applied control voltage.

   ii. Show that the lock in range of PLL is directly proportional to the free running frequency of voltage controlled oscillator.[NOV/DEC 2019]
4. i. Explain the function of gilbert multiplier cell and obtain the output differential current in terms of hyperbolic function.

   ii. Show that PLL ic can be used as AM demodulator.[NOV/DEC 2019]
5. Explain the internal configuration of the multiplier IC and explain.[APR/MAY 2021]
6. Describe in detail about the voltage controlled oscillator with a suitable block diagram.[APR/MAY 2019]
7. i. Explain in detail on the operation of a basic phase locked loop.

   ii. How are PLLs applied for frequency synthesizing and FM detection? [NOV/DEC 2018]
8. i. Obtain the expression for free running frequency of voltage controlled oscillator.

   ii. Design an analog multiplier employing an emitter coupled transistor pair. [NOV/DEC 2018]
9. Discuss briefly about analog multiplier ICs [APR/MAY 2018]
10. Explain the operation of the basis PLL with a block schematic [APR/MAY 2018]

UNIT 4

1. i. Assume the following values for the ADC clock frequency=1MHZ; DAC has f.s output =10.23v and a 10 bit input. Determine the following values.
   - The digital equivalent obtained for the input voltage VA=3.728v
   - The conversion time
   - The resolution of this converter in percentage [9]

   ii. A 10 bit DAC has a step size of 10mv.Determine the full scale output voltage and the percentage resolution. [4] [APR/MAY 2022]
2. Explain the working of R-2R ladder DAC with a circuit schematic. List converter characteristics. [APR/MAY 2019]
3. i. Describe the function of R-2R ladder Digital to Analog converter with suitable diagrams.

   ii. Estimate the value of LSB, MSB and full scale output for an 8 bit DAC for the 0 to 10v range. [NOV/DEC 2019]
4. i. Draw the basic circuit of flash type A/D converter and elucidate its function with the help of truth table.

ii. Sketch the functional block diagram of successive approximation A/D converter and describe its function for a typical analog input.[NOV/DEC 2019]

5. Draw the current mode R-2R ladder DAC and explain in detail .[APR/MAY 2019]
6. Draw the block schematic of a single slope type ADC and explain the same in detail. [APR/MAY 2019]
7. i. Describe the operational features of R-2R ladder type D/A converter

   ii. Discuss the various switches employed for D/A converters. [NOV/DEC 2018]
8. i. With a neat block diagram, explain the operation of flash and successive approximation type A/D converter.

   ii. What is oversampling? Give examples for oversampling converter.[NOV/DEC 2018]
9. Enumerate the specifications of D/A converter.[APR/MAY 2018]
10. Describe in detail about the single slope type ADC with neat sketch.[APR/MAY 2018]

UNIT 5

1. Explain the working principles of triangular wave generator circuit using op amp and mention its application.[APR/MAY 2022]
2. Explain the following ICs function and applications.
   - Audio power amplifier
   - Video amplifier.[APR/MAY 2019]
3. i. Draw the circuit of wien bridge oscillator and explain its function. Derive the expression for frequency of oscillation.

   ii. Design a phase shift oscillator using operational amplifier to oscillate at 1000HZ with c=0.1μf. [NOV/DEC 2019]
4. With suitable functional block diagram, explain the function of low voltage regulator using IC 723. Discuss the current fold back technique in 723 voltage regulator. [NOV/DEC 2019]
5. Draw the internal circuit diagram of an IC 723 regulator and explain.[APR/MAY 2019]
6. Draw the frequency of oscillation of a saw tooth waveform generator using an op amp and explain.[APR/MAY 2019]
7. i. Explain the operation of an astable and monostable multivibrator with necessary diagram.

   ii. State the significant difference between fixed and adjustable voltage regulators.[NOV/DEC 2018]
8. Explain the working principle and salient features of triangular wave generator and saw tooth wave generator.[NOV/DEC 2018]
9. Explain about saw tooth wave generator with neat sketch.[APR/MAY 2018]
10. Discuss briefly about opto couplers. [APR/MAY 2018]