**Code: 15A04503** **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June 2018

**LINEAR INTEGRATED CIRCUITS & APPLICATIONS**

(Common to ECE and EIE)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) List the characteristics of an ideal op-amp.
(b) Sketch the equivalent circuit of an op-amp.
(c) Define slew rate.
(d) List the need for compensating networks.
(e) Sketch an adder circuit using op-amp to obtain the sum of three inputs.
(f) Sketch the op-amp differentiator circuit and write the output equation.
(g) Mention the applications of a Schmitt trigger circuit.
(h) List the basic building blocks of the PLL.
(i) Compare weighted resistor and R-2R ladder DAC.
(j) Give the principle of operation of flash ADCs.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 (a) Draw the circuit of basic current mirror and explain its operation.
(b) With block diagram, explain the general stages of an Op-Amp IC.

**OR**

3 Describe with diagrams, the open loop configurations of an op-amp.

**UNIT – II**

4 Explain in detail the voltage series, voltage shunt feedback circuits using op-amps.

**OR**

5 (a) Explain the open loop frequency response characteristics of an op-amp.
(b) Explain the frequency response characteristics of internally compensated op-amp.

**UNIT – III**

6 (a) Describe the circuit of a current to voltage converter circuit.
(b) Explain the circuit diagram of an integrator and derive its output equation.

**OR**

7 Describe with diagram, the working principle of an instrumentation amplifier.

**UNIT – IV**

8 With circuit diagram, describe the working of a Wien bridge oscillator circuit using op-amp.

**OR**

9 Draw the circuit of a monostable multivibrator using 555 IC and explain its operation.

**UNIT – V**

10 (a) Draw the circuit and explain the working of dual slope A/D converter.
(b) For a particular dual slope ADC, $t_1$ is 1ms and the reference voltage is -1V. Calculate $t_2$ if $V_1$ is 5 V and RC time constant is 1 msec.

**OR**

11 Describe the operation of high speed sample and hold circuits.



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**Code: 13A04503** **R13**

B.Tech III Year I Semester (R13) Supplementary Examinations June 2017

**LINEAR IC APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

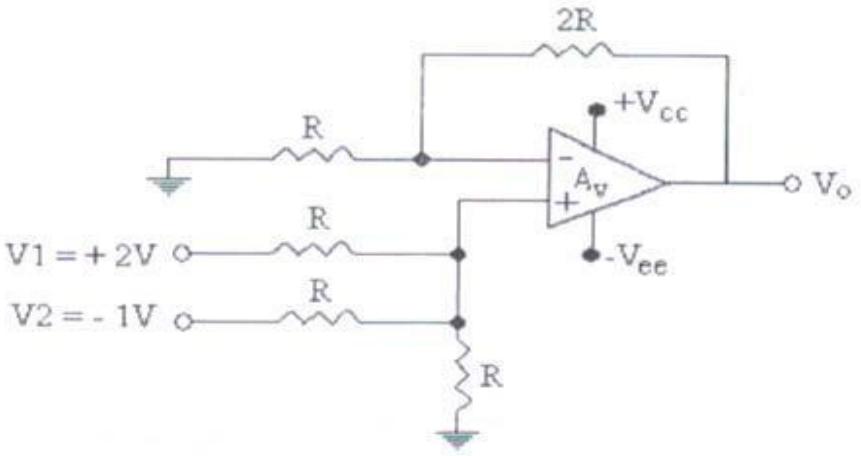
(a) Draw the ideal voltage transfer curve of op amp.

(b) What are the ideal characteristics of op amp?

(c) Derive the expression for the gain for inverting amplifier with feedback.

(d) Define slew rate.

(e) Calculate the output voltage $V_0$ for the following non-inverting op amp summer.




(f) List out the advantages of active filter.

(g) Draw the output wave form for non-inverting comparator with negative reference.

(h) List out the applications of analog multiplier.

(i) Define resolution and accuracy.

(j) Compare successive approximation, dual slope and flash type ADC's.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 (a) Draw the JFET input operational amplifier using dual Op-amp and explain its operation.

(b) Draw and describe the various functional blocks of an operational amplifier IC. Explain each block.

**OR**

3 (a) Write the small signal analysis of differential amplifier.

(b) Derive CMRR from the above analysis.

Contd. in page 2

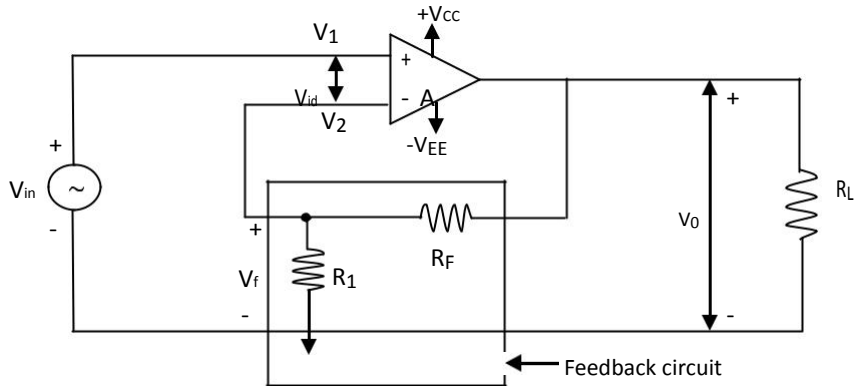
**UNIT – II**

4 (a) List out the four negative feedback configurations. How does negative feedback effect on the performance of inverting amplifier? Explain.

(b) Explain internally compensated op amp with the help of frequency response.

**OR**

5 (a) The 741C Op-amp having the following parameters is connected as a non inverting amplifier show in figure below, with $R_1$ = 1 kΩ, $R_F$ = 10 kΩ, A = 2000, $R_i$ = 1 MΩ, $R_0$ = 75 kΩ, $f_0$ = 5 Hz. Compute the values of $A_F$, $R_{iF}$, $R_{0F}$, $f_F$.




(b) Define stability? Explain clearly about the stability of an Op-amp

**UNIT – III**

6 (a) Draw and explain the circuit diagram of instrumentation amplifier and derive the expression for gain.

(b) Design an Op-amp differentiator that will differentiate an input signal with $f_{max}$ = 100 Hz.

**OR**

7 (a) Design a second order low pass filter at high cutoff frequency of 1 kHz.

(b) Draw the frequency response of the network in part (a).

**UNIT – IV**

8 (a) Draw the circuit diagram of Wein Bridge oscillator. Derive the expression for its gain and frequency of oscillations.

(b) A 555 timer Astable multi vibrator uses $R_A$ = 6.8 kΩ, $R_B$ = 3.3 kΩ and C = 0.1 $\mu F$. Calculate the free running frequency of oscillations.

**OR**

9 (a) Draw the block diagram of PLL. Explain one of the applications of PLL.

(b) Derive the Equation for the gate width of 555 monostable multivibrator with neat sketches.

**UNIT – V**

10 (a) Draw & explain the circuit diagram of successive approximation ADC. Write down its limitations.

(b) Calculate the values of the LSB, MSB and full scale output for an 8 bit DAC for the 0 to 10 V range.

11 (a) Draw the circuit diagram of inverted R-2R ladder DAC network. Explain its working. List out the advantages over R-2R ladder network.

(b) Discuss about the over sampling in A/D converters.

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**Code: 13A04503** **R13**

B.Tech III Year I Semester (R13) Regular Examinations December 2015

**LINEAR IC APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Draw the ideal voltage transfer curve of Op amp.

(b) Determine the output voltage for the inverting amplifier if the gain and the input voltage of the Op amp is 1000 and 20 mV dc respectively.

(c) List out the properties of practical Op amp.

(d) Draw the frequency responses (Gain Vs frequency) of open loop and closed loop operational amplifier.

(e) Design a first order low pass filter at a higher cut off frequency of 1 kHz with a pass band gain of 2?

(f) Draw the circuit diagram of non-inverting Summing amplifier.

(g) Draw the circuit diagram and waveforms of zero crossing detector.

(h) List out the applications of MPY634.

(i) Define resolution and settling time.

(j) What are the main advantages of integrated type ADC?

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 (a) Compare different configurations of differential amplifier.

(b) Draw the circuit of basic current mirror and explain its operation.

**OR**

3 (a) Draw the various functional blocks of an operational amplifier IC. Explain each block.

(b) Draw the equivalent circuit diagram of Op amp and derive the expression for gain of non-inverting amplifier.

**UNIT – II**

4 Explain in detail about external frequency compensation techniques with neat sketches.

**OR**

5 (a) Define slew rate and derive the expression for it.

(b) Derive the input resistance and output resistance for a voltage shunt feedback amplifier.

**UNIT – III**

6 (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz.

(b) Write short notes on V-I and I-V converters using op-amps.

7 Draw the circuit diagram of Instrumentation Amplifier and derive the expression for gain.

**UNIT – IV**

8 (a) Design a 555 Astable Multivibrator to operate at 10 kHz with 40% duty cycle.

(b) Draw the block diagram of PLL and explain its operation.

9 Draw the circuit diagram of RC phase shift oscillator and derive the expression for its frequency of oscillations.

**UNIT – V**

10 Draw the circuit diagram of Dual Slope ADC and explain its working with neat sketches.

**OR**



11 (a) Explain the operation of Weighted Resistor DAC with the help of circuit diagram .

(b) The basic step of a 9 bit DAC is 10.3 mV. If “000000000” represents 0 V. What output is produced if the input is “101101111”?

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**Code: 13A04503**

**R13**

B.Tech III Year I Semester (R13) Regular Examinations December 2015

**LINEAR IC APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

*****

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**PART – B**

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3 (a) Draw the various functional blocks of an operational amplifier IC. Explain each block.

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**Code: 13A04503** **R13**

B.Tech III Year I Semester (R13) Supplementary Examinations June 2016

**LINEAR IC APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define differential amplifier.
(b) Draw the op-amp equivalent circuit.
(c) Write the properties of ideal op-amp.
(d) What is the compensating network?
(e) Draw the op-amp integrator circuit.
(f) Write about the first order and second order filter.
(g) How the name implies 555 timers.
(h) Write the applications of PLL.
(i) Write the disadvantage of weighted resistor DAC.
(j) List out the ADC techniques.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 (a) List and compare the different configurations of differential amplifier.
(b) What is level translator? Explain the necessity of level translator stage in cascading differential amplifiers.

**OR**

3 (a) Explain the term slew rate and write the importance in op-amp circuits.
(b) For the given dual-input, balanced-output differential amplifier $R_C$ = 2.2 kΩ, $R_E$ = 4.7 kΩ, $R_{in1}$ = $R_{in2}$ = 50 Ω, $V_{CC}$ = +10 V, $V_{EE}$ = -10 V, $\beta_{DC}$ = $\beta_{AC}$ = 100 and $V_{BE}$ = 0.71 V, determine $I_{CQ}$, $V_{CEQ}$, $r_e$, voltage gain, input and output resistances.

**UNIT – II**

4 (a) Compare voltage series and voltage shunt feedback circuits.
(b) Derive the expression for closed-loop gain.

**OR**

5 (a) Write the difference between compensating and uncompensating networks.
(b) The op-amp non-inverting amplifier has the following parameters $R_1$= 1 kΩ, $R_f$ = 10 kΩ, A = 2,00,000, $R_i$ = 2 MΩ, $R_o$ = 75 Ω, supply voltages $V_{CC}$ = +15 V, $V_{EE}$ = -15 V. Determine $A_f$, $R_{if}$ & $R_{of}$.

**UNIT – III**

6 (a) Derive the expression for 3 input summing amplifier with circuit diagram.
(b) What is the need of Current to Voltage Converter?

**OR**

7 (a) The op-amp non-inverting summing circuit has the following parameters $V_{CC}$ = +15 V, $V_{EE}$ = -15 V, R = $R_1$ = 1 kΩ, $R_f$ = 2 kΩ, $V_1$ = +2 V, $V_2$ = -3 V, $V_3$ = +4 V. Determine the output voltage $V_o$.
(b) Write the design steps of the second order low pass filter and draw its circuit.

**UNIT – IV**

8 Draw and explain the operation of Wein bridge oscillator and write its frequency expression

**OR**

9 (a) How to design the function generator
(b) The monostable circuit used as divide by 2 network. The input frequency of trigger signal is 2 kHz, if C = 0.01μF, calculate the value of $R_A$.

**UNIT – V**



10 Draw and explain the successive approximation ADC.

**OR**

11 Draw and explain in detail about R-2R DAC.

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