**Code: 15A04503**

**R15**

B.Tech III Year I Semester (R15) Regular Examinations November/December 2017

**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) What is a voltage transfer curve of an Op-amp?
(b) List the electrical characteristics of an Ideal Op-amp.
(c) Give two reasons why open loop Op-amp is unsuitable for linear applications.
(d) Define break frequency & bandwidth.
(e) What determines the peak frequency $f_p$ in the peaking amplifier?
(f) Define a filter. How are filters classified?
(g) List the important characteristics of basic comparator.
(h) Define capture range, lock in range.
(i) List the various A/D Conversion techniques & identify the fastest ADC.
(j) Describe the various types of SPDT electronic switches used in D/A converter.

**PART – B**

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

**UNIT – I**

2 (a) A dual input unbalanced-output differential amplifier has the following specification: $|V_{cc}|$ = 10 V, $|-V_{EE}|$ = 10 V, $R_{c1} = R_{c2}$ = 2.7 kΩ, $R_{in}$ = 50 Ω and $R_E$ = 3.9 kΩ and the transistor is CA3086 with $\beta_{ac} = \beta_{dc}$ = 100 and $V_{BE}$ = 0.715 V. Calculate: (i) $I_{CQ}$ and $V_{CEQ}$ values. (ii) Voltage gain. (iii) Input and output resistances.

(b) Define current mirror circuit. Explain the working of current mirror circuit with necessary equations.

**OR**

3 (a) What is an Op-amp? Briefly explain each stages of a typical Op-amp.

(b) List and explain briefly open loop Op-amp configuration.

**UNIT – II**

4 (a) Derive an expression for closed loop voltage gain of an voltage series feedback amplifier for Ideal case.

(b) Design a compensating network for the LM307 Op-amp. The Op-amp uses ±10 V supply voltages.

**OR**

5 (a) Write the differences between Slew rate and Transient response.

(b) Write short notes on circuit stability.

**UNIT – III**

6 (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 KHz. If a sine wave of 1 V peak at 1000 Hz is applied to the differentiator of above part, draw its output waveforms.

(b) Derive an expression for inverting summing amplifier using three inputs.

**OR**

7 What is an instrumentation amplifier? With a neat circuit diagram, explain the working of instrumentation amplifier using Transducer bridge.

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**UNIT – IV**

8 (a) Explain the working of Wein bridge oscillator using Op-amp.

(b) For Schmitt trigger using Op-amp with $R_1$ = 100 Ω, $R_2$ = 56 kΩ, $V_{in}$ = 1 Vpp and supply = 15 V. Determine: (i) UTP. (ii) LTP.

**OR**

9 (a) Draw the functional diagram of 555 IC, for astable operation and explain the working.

(b) Write a short notes on voltage controlled oscillator.

**UNIT – V**

10 (a) With a neat diagram, explain working of weighted resistor DAC.

(b) What output voltage would be produced by a DAC controller whose o/p range is 0 to 10 V and whose input binary number is: (i) 0110 (4 bit DAC). (ii) 10111100 (8 bit DAC).

**OR**

11 (a) Explain the working of ADC converter using successive approximation method.

(b) A dual slope ADC uses a 16 bit counter and a 4 MHZ clock rate the maximum input voltage is +10 V. The maximum integration o/p voltage should be -8 V when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1μF. Find the value of the resistor R of the integrator.

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