

Con. 5316-09.

(REVISED COURSE)

23020530.
SP-8543

(3 Hours)

[Total Marks : 100

(Lib) **Linear Integrated Circuits & Design**

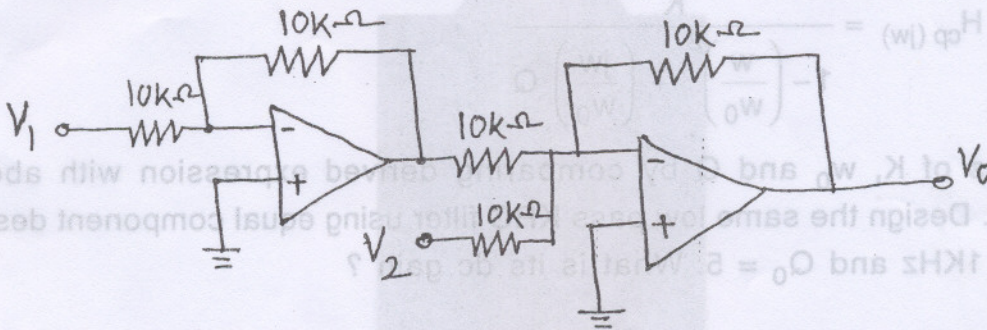
N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any four questions out of remaining six questions.

(3) Assume suitable data if required and state it clearly.

(4) Figures to the right indicate full marks.

1. (a) Calculate V_0 for the circuit for $V_1 = 5V$ and $V_2 = 2V$. 5



(b) A 741C op-amp is used as an inverting amplifier with a gain of 50. The voltage gain V_s frequency curve of 741C is flat upto 20 KHz. What maximum peak to peak input signal can be applied without distorting the output? Slew rate for 741C is $0.5 V/\mu s$. 5

(c) Define following terms pertaining to Phase Lock Loop (PLL) : 5
 (i) Free running frequency
 (ii) Capture range
 (iii) Lock range.

(d) Explain the current boosting achieved in 723 IC. 5

2. (a) Prove with proper expression that, what produces more offset voltage at the output; input offset current or input bias current? Discuss various compensating techniques for input offset voltage. 10

(b) With the help of op-amp model explain the slew rate limitation? Also explain various method of increasing slew rate? 10

3. (a) In the Astable multivibrator using IC 555, $R_A = 2.2 K\Omega$, $R_B = 6.9 K\Omega$ and $C = 0.01 \mu F$. Calculate t_{high} , t_{low} , free running frequency and duty cycle. Derive the relation used. 10

(b) What is the difference between normal rectifier and precision rectifier? With proper derivation and circuits explain the working of full wave precision rectifier. 10

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4. (a) Compare different types of ADCs based on their working principle. Explain working of any one type of Analog to Digital Converter. 10
- (b) In a free running multivibrator using op-amp derive the expression of free running frequency. State that how maximum operating frequency is determine. 10
5. Draw circuit diagram of low pass KRC filter. Derive expression for transfer function and convert it into the following form. 20

$$H_{cp}(j\omega) = \frac{K}{1 - \left(\frac{\omega}{\omega_0}\right)^2 + \left(\frac{j\omega}{\omega_0}\right) Q}$$

Find values of K , ω_0 and Q by comparing derived expression with above expression. Design the same low pass KRC filter using equal component design using $f_0 = 1\text{KHz}$ and $Q_0 = 5$. What is its dc gain ?

6. (a) What is an Instrumentation Amplifier ? Derive the output gain of Instrumentation Amplifier using three op-amp. State its characteristics. 10
- (b) Using IC 7805 regulator. Design a 1amp current source. 10
7. Write short notes on any **three** :- 20
- Sample and Hold Circuit
 - Peak Detector
 - Switched Capacitor Filter
 - V-F Converter Using Op-amp
 - State Variable Filter.