

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
Electronics and Communication Engineering Department

End Semester Examination

EC-017 (Linear Integrated Circuits & Applications) BE (ECE) Third Year

Max Marks: 36 Instructor: Dr. Harish Singla Time allowed: 3Hrs

Note: Attempt any four questions Section-A and Section-B. Assume suitable data if required. All notations/characters carry their usual meanings. All parts of a question should be attempted at one place.

Section-A (Attempt any four)

1. I. What is a resistance translator? Draw its circuit diagram, explain its advantage and working.
- II. An inverting amplifier with gain of 2 is driven by ± 10 V peak-to-peak triangular wave. Sketch the voltages available at output and non-inverting terminal of the Op-amp.
- III. Distinguish between Slew Rate and Rise time.
- IV. What is PLL? Explain its working with the help of a block diagram.
- V. Design a 60 Hz twin-T notch filter. 2X4=8

Section-B (Attempt any four)

2. (a) List and explain the parameters of an operational amplifier that should be considered for ac applications.
- (b) An 741 Op-amp working in inverting mode has $R_1 = 10$ K Ω , $R_F = 20$ K Ω and $V_{in} = 3$ V drives a load resistance of 2 K Ω . If $I_Q = 0.5$ mA, then find I_{CC} , I_{EE} and the output current. (4,3)
3. (a) Why we use feedback. Derive for voltage gain, input resistance & output resistance for Voltage shunt feedback amplifier.
- (b) The circuit shown Figure-1 employs 741 Op-amp and $R = 10$ K Ω and $V_{in} = 5$ V. If Op-amp is having saturation voltages of ± 13 V. Find the output current and voltage compliance. (4,3)

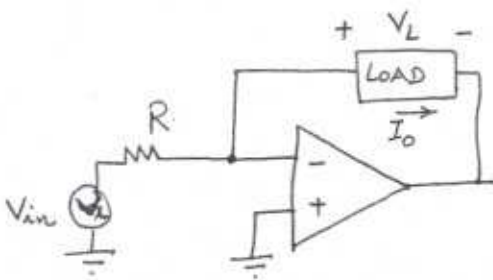


Figure-1

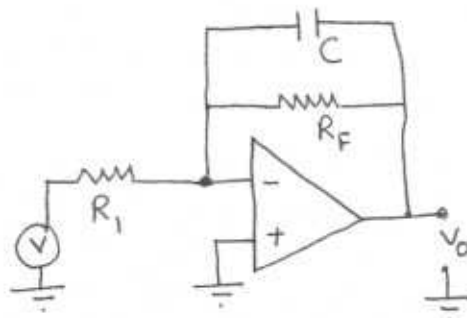


Figure-2

P. T. O.

4. (a) How an open loop op-amp can be used as a comparator. List and explain its limitations and how these can be overcome.
- (b) The circuit shown Figure-2 employs 741 Op-amp specify suitable component values to achieve a corner frequency of 1 KHz and a gain of 20 dB with input impedance of 10 K Ω . At what frequency does the gain drops to unity. (4,3)
5. (a) What is a voltage regulator. How its performance is evaluated. Explain adjustable voltage regulators.
- (b) An 741 Op-amp is having $R_1 = 22 \text{ K}\Omega$, $R_F = 2.2 \text{ M}\Omega$. If it is having a base current of 80 nA and input offset current of 20 nA. Find the output error voltage in the presence and absence of R_{OM} . (4,3)
6. (a) What is Instrumentation Amplifier. List it's at least two applications.
- (b) Using 741 Op-amp's and other components, design a 60 dB audio amplifier and sketch the magnitude plots of the final circuit. (4,3)