EN/ET/EC 501 - Linear Electronic Circuits / Linear Integrated Circuits

P. Pages : 2

GUG/W/18/1621

Time : Three Hours

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1275

Max. Marks : 80

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Notes :   1.   Questions carry marks as indicated.
          2.   Assume suitable data wherever necessary.

1.   a)   Draw and explain the block diagram of operational amplifier.   **8**

   b)   Explain Dominant - pole frequency compensation technique for op-amp.   **8**

OR

2.   a)   Draw and explain current mirror circuit used as constant current source.   **8**

   b)   Derive the equation for differential gain $\left(A_{DM}\right)$ using hybrid π model for transistorized differential amplifier when differential input signal is applied.   **8**

3.   a)   Explain following op-amp parameters.   **8**

   i)   Input offset voltage.   ii)   CMRR

   iii)   Slew rate.   iv)   Input bias current.

   b)   Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to about 1KHz. If a sine wave of 1V peak at 1000Hz is applied to this differentiator, draw its input-output waveforms.   **8**

OR

4.   a)   Derive the output equation for integrator circuit.   **8**

   b)   i)   For non-inverting amplifier circuit if $R_F = 12k, \quad R_1 = 1k, \pm V = \pm 15V.$ Find the output voltage for $V_{in} = 250mV$ and $V_{in} = 3V.$ **4**

   ii)   For inverting amplifier circuit if $R_F = 5k, \ R_1 = 1k, \pm V = \pm 15V.$ Find the output voltage for $V_{in} = 0.5V$ and $V_{in} = 7V.$ **4**

5.   a)   Draw and explain working of precision full wave rectifier circuit.   **8**

   b)   Draw and explain inverting Schmitt Trigger with neat circuit diagram. Also draw input output waveforms and voltage transfer curve for it.   **8**

OR

6. a) Draw and explain square wave generator using op-amp. **8**

b) Draw and explain working of any negative voltage limiter circuit. **8**

7. a) Draw circuit diagram of R-2R ladder DAC and write its output equation. **8**

b) Design second order Butterworth low pass filter having upper cut-off frequency of 1kHz. **8**

<div align="center">OR</div>

8. a) Draw circuit diagram of binary weighted DAC and write its output equation. **8**

b) Explain wide Band reject filter using op-amp. **8**

9. a) Draw and explain Astable multivibrator operation using IC 555 with help of neat circuit diagram and waveforms. **8**

b) Draw and explain frequency multiplier using PLL. **8**

<div align="center">OR</div>

10. a) If fig. shown, Let $V_{EB(ON)} = 1V$ and $\beta = 15$. Calculate the output current coming from 1C7805 and I_C coming from transistor Q_1 for loads $100\Omega, 5\Omega$ and 1Ω **8**
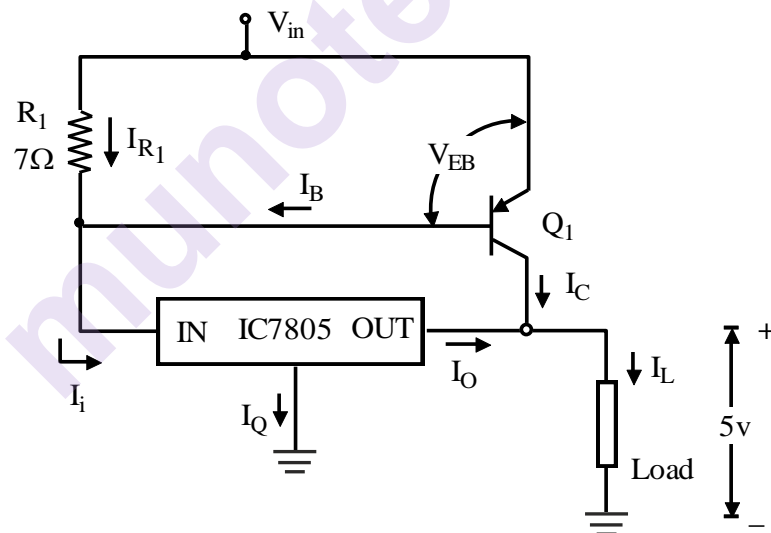
b) Calculate output frequency f_0, lock range Δf_L and capture range Δf_C of a IC565 PLL if $R_T = 10k\Omega, C_T = 0.01\mu F$ and $C = 10\mu F$. **8**

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