B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING

Term-End Examination

June, 2012

BIEL-011 : LINEAR INTEGRATED CIRCUITS

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt any seven questions. Each question carries ten marks. Q-10 is compulsory. Assume suitable data, wherever required. Use of Scientific calculator is permitted.*

1. Draw a Cascode Amplifier circuit using BJT. Show **10** the derivation for its DC analysis.

2. For the circuit shown in FIG. (2), **10**

   prove that $AF = \left[\dfrac{A(R_1+R_F)}{R_1+R_F+AR_1} \right]$.

   Also prove that $AF = \dfrac{1+R_F}{R_1}$, for $AR_1 \gg (R_1 + R_F)$

Fig. (2)
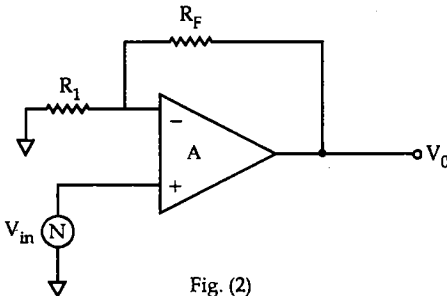
3. In the circuit of FIG (3). If $R_1 = R_2 = 1k\Omega$, **10**
$R_F = R_3 = 10K\Omega$, $V_d = 5mV$, sinewave at 1kHZ and
$V_{ni} = 2mV$.at 60 Hz. Calculate

(a) The output voltage at 1 kHz

(b) The amplitude of the induced 60Hz noise
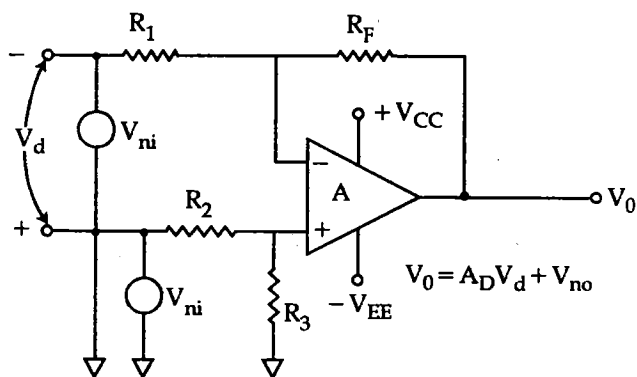at the output.

Assume CMRR = 90 db for IC 741

Figure (3)

4. Obtain the expression for the open loop voltage **10**
gain as a function of frequency. What are the
observations made ?

5. (a) Design a differentiator to differentiate an **10**
input signal that varies frequency from
10Hz to 20 kHz. Assume suitable value for
the design if required.

(b) If the sine wave of 1V peak at 1000Hz is
applied to the circuit in part (a), find the
output of the circuit.

6. Prove that for a Wein - Bridge oscillator, the **10**
   frequency of oscillations is fo $= \dfrac{1}{2\pi RC}$. Also
   derive the condition of oscillations. Draw the
   relevant circuit using IC-741.

7. What is a Precision Rectifier ? Draw the circuit **10**
   for a small signal half - wave rectifier and its output
   waveform. Explain its operation.

8. Draw the circuit of a summing Amplifier using **10**
   three resistances, operating in inverting mode.
   How will you convert it to a summing, scaling
   and averaging amplifier ? Derive the expressions
   for each.

9. Draw circuits for Schmitt Trigger and a zero **10**
   crossing detector. Draw their relevant wave forms
   and explain their operation.

10. Write short notes on *any two* : **2x5=10**
    (a) A current mirror
    (b) A level translator
    (c) Sample and hold circuit