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BIEL-038

DIPLOMA – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (DECVI)

Term-End Examination

December, 2015

BIEL-038 : LINEAR INTEGRATED CIRCUITS

Time : 2 hours *Maximum Marks : 70*

Note : *First question is* ***compulsory*** *and attempt any* ***four*** *from the rest. All questions carry equal marks. Use of scientific calculator is permitted. Missing data, if any, should be assumed.*

1. Choose the correct alternative. *7×2=14*

(a) The ratio of change in input offset voltage when variation in supply voltage is made is called

(i) PSRR

(ii) CMRR

(iii) Transient response

(iv) Input offset voltage stability

(b) The order of input resistance of IC-741C OP-AMP is

(i) $10^4\,\Omega$

(ii) $10^3\,\Omega$

(iii) $10^5\,\Omega$

(iv) $10^6\,\Omega$

(c) A triangle-wave oscillator consists of an OP-AMP comparator followed by a/an

(i) Differentiator

(ii) Amplifier

(iii) Integrator

(iv) Multivibrator

(d) Slew rate of an ideal OP-AMP is

(i) 1

(ii) 0

(iii) ∞ (infinity)

(iv) None of these

(e) IC-555 can be used as a/an

(i) Differentiator

(ii) Integrator

(iii) Ramp-generator

(iv) Multivibrator

(f) A notch filter is a

(i) Wide BPF

(ii) Narrow BPF

(iii) Wide band reject filter

(iv) Narrow band reject filter

(g) The output of an OP-AMP integrator is

(i) $-R_f C_1 \frac{dV_i}{dt}$

(ii) $R_1 C_F \int V_i(t)\, dt$

(iii) $\frac{1}{R_1 C_F} \int V_i(t)\, dt$

(iv) $\frac{R_1}{C_F} \int V_i(t)\, dt$

2. (a) Draw and explain the schematic block diagram of an OP-AMP. 7

(b) What is a practical OP-AMP ? Draw its equivalent circuit diagram. Why is R_E replaced by a constant current bias circuit in a differential OP-AMP ? 7

3. (a) What is the difference between open-loop gain and closed-loop gain of an OP-AMP ? Draw an OP-AMP circuit whose output is $V_1 + V_2 - V_3 + V_4$ and explain its operation. 7

(b) Draw and explain the operation of a practical integrator with necessary waveforms and derivation. 7

4. (a) For the non-inverting amplifier of the given figure 1, $R_1 = 1\ k\Omega$ and $R_f = 10\ k\Omega$. Calculate the close-loop voltage gain of the amplifier and the feedback factor β. 7

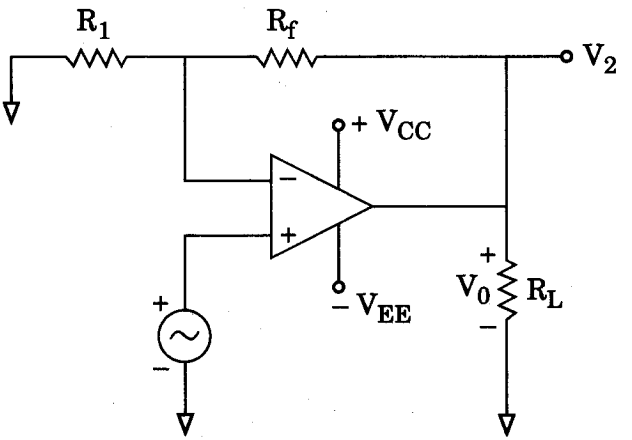

Figure 1

(b) Draw the circuit of a voltage-to-current converter if the load is (i) Floating, and (ii) Grounded. 7

5. (a) Explain how a sawtooth waveform is generated by using a sinusoidal waveform in the OP-AMP circuitry with necessary diagrams and waveforms. 7

(b) How can Q-factor of an active filter be improved ? Draw and explain the transfer characteristics of an all pass filter. 7

6. (a) Draw and explain the operation of a second order Butterworth low pass active filter. 7

(b) In an astable multivibrator, $R_A = 6{\cdot}8\ k\Omega$, $R_B = 3{\cdot}3\ k\Omega$ and $C = 0{\cdot}1\ \mu F$. Calculate (i) t_{HIGH}, (ii) t_{LOW}, (iii) Free running frequency, and (iv) Duty cycle. 7

7. (a) The differential input OP-AMP shown in figure 2 consists of a base amplifier of infinite gain. Show that

$$V_{out} = \frac{R_2}{R_1}(V_2 - V_1).$$ 7

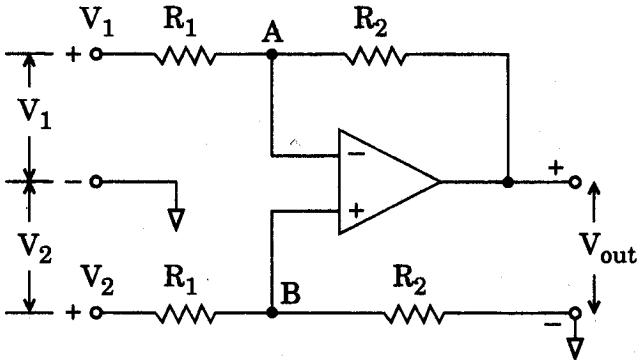

Figure 2

(b) Write down the various applications of IC-565 (PLL). Explain any one of these. 7

8. Explain any ***two*** of the following : *2×7=14*

(a) Bistable Multivibrator

(b) Timer IC-555

(c) Sample and Hold Circuit