

**B.Tech. – VIEP – ELECTRONICS AND
COMMUNICATION ENGINEERING
(BTECVI)**

Term-End Examination

December, 2014

00120

BIEL-011 : LINEAR INTEGRATED CIRCUITS

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks. Assume suitable data, wherever required. Use of scientific calculator is permitted.

1. Give the circuit diagram of a dual-input balanced-output differential amplifier with swamping resistor. What is the need for using swamping resistors ? Derive the expression for its differential gain (A_d), Input Resistance (R_i) and Output Resistance (R_o). 10

2. (a) What is a level translator ? Give the circuit diagram of a level translator using emitter follower with current mirror and explain its operation with necessary mathematical steps. 7

- (b) Differentiate between constant-current bias and current-mirror-circuits by a suitable example. 3

3. Define any *five* of the following terms associated with op-amps : 5×2=10

- (a) Input Offset Voltage
- (b) Input Offset Current
- (c) Input Bias Current
- (d) Common-Mode Rejection Ratio (CMRR)
- (e) Supply-Voltage Rejection Ratio (SVRR)
- (f) Total Output Offset Voltage

4. Derive the expression for open loop voltage gain as a function of frequency using high-frequency model of an op-amp with single break frequency. Draw its frequency and phase response curve. 10

5. Give the circuit diagram of a logarithmic amplifier using two op-amps only. Explain its operation and derive the expression for the output voltage. How can the given circuit be used as a temperature compensating network ? 10

6. (a) For the circuit shown in Figure 1, prove that V_o is given as $V_o(t) = \frac{2}{RC} \int V_i(t) dt.$ 5

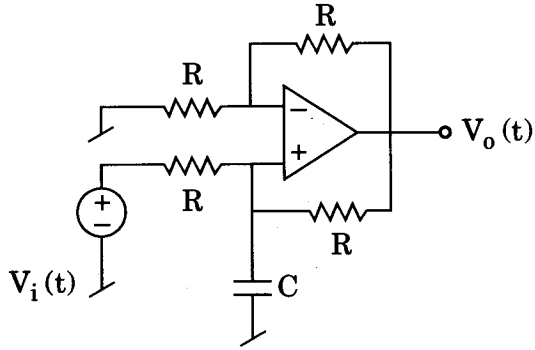


Figure 1

- (b) Find the gain in dB of a non-ideal integrator if $R_F = 10 \text{ k}\Omega$, $R_1 = 1 \text{ k}\Omega$, $C_F = 0.01 \text{ }\mu\text{F}$ when 5
- (i) $\omega = 0$
- (ii) $\omega = 10,000 \text{ rad/sec}$
7. Draw the circuit diagram of a second-order active lowpass filter. Obtain the expression for its transfer function and find the various filter parameters. 10
8. Explain the basic principle of operation of oscillators. Draw the circuit diagram of a quadrature oscillator and find the 5+5
- (i) Condition of oscillation
- (ii) Frequency of oscillation

9. Define a comparator and draw the ideal and practical voltage transfer characteristics of a comparator. What are the various applications of a comparator ? Explain any one of the applications.

10

10. Explain the operation of any *two* of the following :

2×5=10

- (i) Sample and hold circuit
- (ii) Clippers and Clampers
- (iii) Full-wave rectifiers
