Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	**: EE & ECE**	**Semester**	**: 5th**
Title of the Course	**: IC Applications**	**Course Code**	**: ECB 304**

Time: 3 Hours **Maximum Marks: 50**

Note : 1. Do not write anything on the question paper except Roll number

2. Assume any data suitably if found missing

Section A: Answer all 10 questions. Each question carries 01 mark. [10×1=10]

A1. Draw the schematic symbol of OP-AMP with three terminals and block diagram of an OP-AMP.

A2. Classify IC (Integrated Circuits) according to number of components on the same chip.

A3. Define CMMR (common mode rejection ratio).

A4. Define input offset current and total offset voltage.

A5. For a summing amplifier in non-inverting configuration, supply voltages (V_{cc}=+15V&V_{cc}=-15V) V_a= +2 V, V_b= -3 V, V_c= +4 V, R=R_1=1 kΩ, R_f= 2 kΩ. Determine the voltage at the non-inverting terminal V_1 and output voltage V_o. Assume op-amp is initially nulled.

A6. Explain current to voltage converter. Write its applications.

A7. What are the advantages of active filters over passive filters.

A8. Differentiate between triangular and sawtooth wave generators.

A9. Define an oscillator? Draw the circuit diagram of phase shift oscillator.

A10. Draw the circuit diagram of quadrature generator.

Section B: Answer any 4 questions. Each question carries 5 marks. [4×5=20]

B1. Differentiate between Inverting amplifier and Non-inverting amplifier.

B2. Derive the expression for the gain of a differential amplifier.

B3. Explain the operation of a Differentiator.

B4. Draw the frequency response of high pass, band pass and band stop active filters. Design a first order high-pass Butterworth filter, which has a cutoff frequency of 1 kHz, R_1=10 kΩ and a passband of gain 2.

B5. Explain the zero-crossing detector and draw its waveform.

Section C: Answer any 2 questions. Each question carries 10 marks. **[2×10=20]**

C1. 1. Discuss the operation of a square wave generator.

2. Explain in Inverting configuration: Summing amplifier, Scaling/Weighted amplifier and averaging amplifier.

C2. 1. What is an integrator circuit? Explain its operation.

2. Derive the expression for gain magnitude and phase angle for first order low-pass Butterworth filter and draw its frequency response.

C3. Discuss in detail:

1. Wein bridge oscillators
2. Basic comparator and its characteristics