

# University of Mumbai

Examinations Commencing from 17<sup>th</sup> May 2022

Program: SEM IV

Curriculum Scheme: CBCGS R-2016

Examination: SE Semester IV

Course Code: ECC403 and Course Name: Linear Integrated Circuits

Time: 2-hour 30 minutes

Max. Marks: 80

<b>Q1. (2 Marks Each)</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Input offset current in Op-Amp is basically defined as the _____ the base currents of two transistors.
Option A:	sum of
Option B:	difference between
Option C:	product of
Option D:	division of
2.	The gain of second order low pass filter decreases at the rate of
Option A:	20 dB/decade
Option B:	40 dB/decade
Option C:	60 dB/decade
Option D:	80 dB/decade
3.	In an inverting ideal integrator, which component exhibits the feedback path connection?
Option A:	R
Option B:	C
Option C:	L
Option D:	Diode
4.	A square waveform having ON time greater than its OFF time is fed as input to an integrator. The resulting output of the integrator is called
Option A:	Triangular waveform
Option B:	Sawtooth waveform
Option C:	Inverted Square waveform
Option D:	Sine waveform
5.	For a non inverting comparator, input signal and reference voltage are given to
Option A:	inverting terminal of the op-amp through separate resistors
Option B:	non-inverting terminal of the op-amp through separate resistors
Option C:	inverting terminal and non-inverting terminal of the op-amp respectively
Option D:	non-inverting terminal and inverting terminal of the op-amp respectively
6.	In a dual slope ADC
Option A:	The input signal and the reference are integrated by two different integrators for a fixed interval of time
Option B:	The input signal is integrated for a fixed time and then the reference is integrated the same integrator for a variable interval of time

Option C:	The input signal is integrated for a fixed time and then the reference is integrated the same integrator for the same interval of time
Option D:	The input signal and the reference are integrated by two different integrators for variable intervals of time
7.	The output of a 4-bit DAC is exactly half of its full-scale voltage when its input is
Option A:	1111
Option B:	0011
Option C:	1000
Option D:	1100
8.	An astable multivibrator using 555 timer has _____ number of stable states.
Option A:	0
Option B:	1
Option C:	2
Option D:	3
9.	IC XR 2206 is a
Option A:	Voltage Controlled Oscillator
Option B:	Waveform generator
Option C:	Phase Locked Loop
Option D:	Timer
10.	For high voltage, low current voltage regulator using IC 723, output voltage and output currents respectively have the following correct values.
Option A:	Less than 7 V, greater than 150mA
Option B:	Less than 7 V, less than 150mA
Option C:	7 to 37V, greater than 150mA
Option D:	7 to 37V, less than 150mA

<b>Q2 (10 Marks Each)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Draw a neat circuit diagram for the Widlar Current Source and obtain the expression for the output current.	
B	Draw a neat diagram of an ideal integrator using op amp. Derive the expression for its output voltage. What are the limitations of an ideal integrator? Draw the circuit diagram of a practical integrator and explain how it overcomes the limitations.	
C	What is an instrumentation amplifier? Draw a neat circuit of an instrumentation amplifier using three op-amps. Derive its output voltage equation. What are its advantages over a difference amplifier using single op-amp?	

<b>Q3 (10 Marks Each)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Draw the diagram of current to voltage converter and derive the expression for its output voltage.	
B	With the help of a neat circuit diagram, input / output waveforms and transfer characteristics, explain the working of zero crossing detector.	
C	Draw the circuit diagram for an inverted R – 2R ladder type DAC. Derive the expression for its output voltage. What is the advantage of this DAC over normal R – 2R ladder type DAC?	

<b>Q4 (10 Marks Each)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Draw and explain functional diagram of IC 555 and explain its operation in astable mode.	
B	With the help of neat circuit diagram explain FSK generator using XR 2206	
C	Design a voltage regulator using IC 723 to give output voltage of 12 V and output current of 1.5 A	