University of Mumbai
Examination 2020
Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021
Program: Electronics Engineering
Curriculum Scheme: Rev 2016
Examination: TE Semester V

Course Code: ELX 504   and Course Name: Design with Linear Integrated Circuits

Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	An ideal op-amp requires infinite bandwidth because
Option A:	Signals can be amplified without attenuation
Option B:	Output common-mode noise voltage is zero
Option C:	Output voltage occurs simultaneously with input voltage changes
Option D:	Output can drive infinite number of devices
2.	With zero volts on both inputs, an op-amp ideally should have an output voltage
Option A:	equal to the positive supply voltage
Option B:	equal to the negative supply voltage
Option C:	equal to zero
Option D:	equal to CMRR
3.	Find the output voltage Vo of an ideal op-amp. If V_1 and V_2 are the two input voltages applied to the non-inverting and inverting terminals respectively and A is the open loop gain of the op-amp.
Option A:	$V_O = V_1 - V_2$
Option B:	$V_O = A \times (V_1 - V_2)$
Option C:	$V_O = A \times (V_1 + V_2)$
Option D:	$V_O = V_1 \times V_2$
4.	The common-mode voltage gain for a practical op-amp is
Option A:	Smaller than differential-mode voltage gain
Option B:	Equal to differential-mode voltage gain
Option C:	Greater than differential-mode voltage gain
Option D:	Exactly twice the differential-mode voltage gain
5.	In a differential amplifier when inputs are applied to the base of both the transistors and the output is taken across the collectors of both the transistors the configuration is called as
Option A:	Single Input Balanced Output differential amplifier
Option B:	Single Input Unbalanced Output differential amplifier
Option C:	Dual Input Balanced Output differential amplifier
Option D:	Dual Input Unbalanced Output differential amplifier
6.	An instrumentation amplifier using three op-amps is characterized by

Option A:	Variable voltage gain, low input impedance, high output impedance and high CMRR.
Option B:	Fixed voltage gain, low input impedance, low output impedance and low CMRR.
Option C:	Variable voltage gain, high input impedance, low output impedance and high CMRR.
Option D:	Fixed voltage gain, high input impedance, high output impedance and high CMRR.
7.	The roll off rate of a second order low pass filter is
Option A:	10 dB/decade
Option B:	20 dB/decade
Option C:	30 dB/decade
Option D:	40 dB/decade
8.	An ideal second order active band pass filter has two cut off frequencies f_L and f_H where $f_L < f_H$
Option A:	It passes frequencies above f_L and rejects frequencies below f_H
Option B:	It passes frequencies above f_H and rejects frequencies below f_L
Option C:	It passes frequencies above f_H and below f_L
Option D:	It rejects frequencies above f_H and below f_L
9.	In the Wein bridge oscillator, the frequency of oscillation and gain of the amplifier block are
Option A:	$f_O = 1 / (2\pi RC)$ and $\lvert A_V \rvert = 29$
Option B:	$f_O = 1 / (2\pi\ RC\ \sqrt{6})$ and $\lvert A_V \rvert = 29$
Option C:	$f_O = 1 / (2\pi\ RC\ \sqrt{6})$ and $\lvert A_V \rvert = 3$
Option D:	$f_O = 1 / (2\pi RC)$ and $\lvert A_V \rvert = 3$
10.	How is the square wave output generated in op-amp?
Option A:	Op-amp is forced to operate only in the positive saturation region
Option B:	Op-amp is forced to operate only in the negative saturation region
Option C:	Op-amp is forced to operate alternately in the positive saturation and negative saturation regions
Option D:	Op-amp is forced to operate only in the linear region
11.	A symmetrical triangular waveform has
Option A:	Rise time < fall time
Option B:	Rise time = fall time
Option C:	Rise time = zero
Option D:	Rise time > fall time
12.	A rectangular 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:	Square waveform
Option D:	Sine waveform
13.	Which of these circuits converts a sinusoidal waveform to a square waveform?
Option A:	Schmitt trigger

Option B:	Voltage limiter
Option C:	Regulator
Option D:	Peak detector
14.	A monolithic timer IC which can be used as Astable and Monostable multivibrator is
Option A:	IC 565
Option B:	IC 566
Option C:	IC 555
Option D:	IC 723
15.	The reference voltage of lower and upper comparator used in functional block diagram of IC 555 is
Option A:	$1/3\ V_{CC}$ and $2/3\ V_{CC}$
Option B:	$1/3\ V_{CC}$ and $1/4\ V_{CC}$
Option C:	$2/3\ V_{CC}$ and $1/4\ V_{CC}$
Option D:	$1/5\ V_{CC}$ and $2/5\ V_{CC}$
16.	The output frequency of IC 555 configured to run in astable mode with R1=R2= 4 kilo Ohms and C =0.01 micro Farads is
Option A:	12 kHZ
Option B:	10 kHZ
Option C:	20 kHZ
Option D:	5 kHZ
17.	For a Phase Locked Loop which of the following is true?
Option A:	Lock in range > Capture range
Option B:	Lock in range < Capture range
Option C:	Lock in range = Capture range
Option D:	Lock in range = half of Capture range
18.	7808 IC is a fixed voltage regulator of
Option A:	7 V
Option B:	8 V
Option C:	9 V
Option D:	10 V
19.	The basic difference between a series regulator and shunt regulator is
Option A:	The amount of current that can be handled
Option B:	The position of the control element
Option C:	The type of sample circuit
Option D:	The type of error detector
20.	Output voltage of LM337 can be adjusted from
Option A:	-1.2 V to 37 V
Option B:	-1.2 V to -37 V
Option C:	1.2 V to 37 V
Option D:	1.2 V to -37 V

Q2	Solve any Four out of Six	5 marks each
A	Draw the voltage follower using op-amp and show that its gain is unity.	
B	Draw the functional block diagram of op-amp and explain each block.	
C	Compare comparator and Schmitt trigger	
D	Draw and explain Full wave precision rectifier using op-amp	
E	Explain Voltage controlled oscillators (VCO) with block diagram	

F	Define following terms for D/A converters:
	    i) Resolution,
	    ii) Accurecy	

Q3.	Solve any Two Questions out of Three	10 marks each
A	Discuss classification of active filters and explain the frequency response of each type.	
B	Explain the functional block diagram of IC 723 and state its important features.	
C	Draw neat circuit diagram and explain the operation of successive approximation type analog to digital converter. What are its advantages and disadvantages	