University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: Electronics & Telecommunication

Curriculum Scheme: R2019

Examination: SE Semester IV

Course Code: ECC 403 and Course Name: Linear Integrated Circuit

Time: 2 hours Max. Marks: 80

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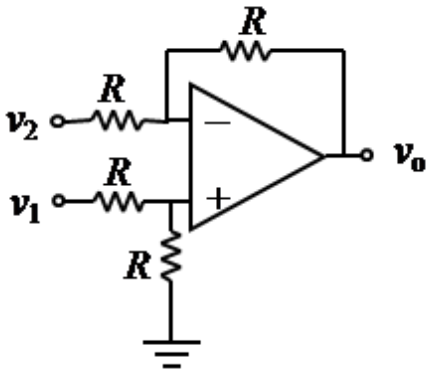
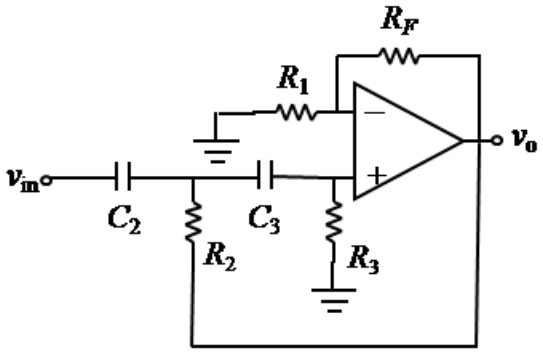
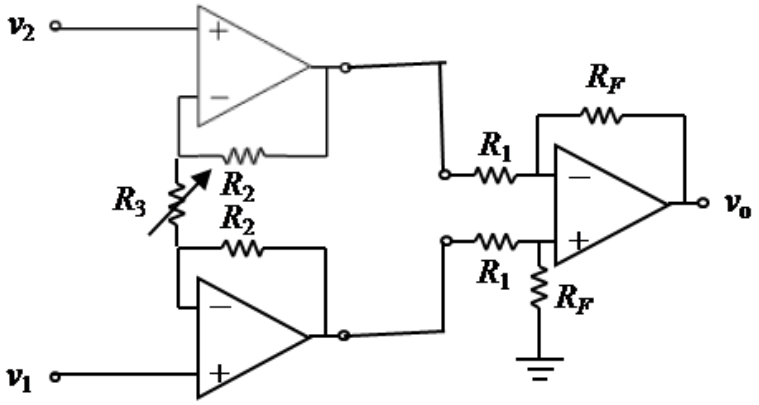
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	An ideal op-amp requires infinite bandwidth because
Option A:	Signals can be amplified without attenuation
Option B:	Output common-mode noise voltage is zero
Option C:	Output voltage occurs simultaneously with input voltage changes
Option D:	Output can drive infinite number of devices
2.	In an inverting amplifier using op-amp
Option A:	The input is connected to the non-inverting terminal via resistor and inverting terminal is kept floating
Option B:	The input is connected to the non-inverting terminal via resistor and inverting terminal is grounded
Option C:	The input is connected to the inverting terminal via resistor and non- inverting terminal is kept floating
Option D:	The input is connected to the inverting terminal via resistor and non- inverting terminal is grounded
3.	**For the difference amplifier shown below, the output voltage is given by** 
Option A:	$v_o = v_1 + v_2$
Option B:	$v_o = v_1 - v_2$
Option C:	$v_o = -v_1 + v_2$
Option D:	$v_o = -(v_1 + v_2)$

4.	**A current to voltage converter converts**
Option A:	**Input current to proportional output voltage.**
Option B:	**Input current to proportional output current.**
Option C:	**Input voltage to proportional output voltage.**
Option D:	**Input voltage to proportional output current.**
5.	**The filter shown below has R_1 = 27 kΩ, R_F = 15.8 kΩ, R_2 = R_3 = 33 kΩ, C_2 = C_3 = 0.0047 µF is a** 
Option A:	High Pass filter with cut off frequency ≈ 1 kHz
Option B:	High Pass filter with cut off frequency ≈ 10 kHz
Option C:	Low Pass filter with cut off frequency ≈ 1 kHz
Option D:	Low Pass filter with cut off frequency ≈ 10 kHz
6.	For a Wein Bridge oscillator, the RC networks in the feedback circuit have values of their resistances R = 3.3 kΩ and capacitances C = 0.047 µF,
Option A:	Its frequency of oscillation is ≈ 1 kHz
Option B:	Its frequency of oscillation is ≈ 3.030 kHz
Option C:	Its frequency of oscillation is ≈ 3.3 kHz
Option D:	Its frequency of oscillation is ≈ 480 Hz
7.	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
8.	An Inverting Schmitt trigger employs
Option A:	Only Negative feedback
Option B:	Only Positive feedback
Option C:	Both Negative and Positive feedback
Option D:	No feedback
9.	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

10.	The reference voltage of upper comparator used in functional block diagram of IC 555 is
Option A:	1/5 V_{CC}
Option B:	1/3 V_{CC}
Option C:	2/3 V_{CC}
Option D:	2/5 V_{CC}
11.	The output pulse width of a monostable multivibrator using 555 where R and C are the external components is
Option A:	RC
Option B:	1.1 RC
Option C:	(2/3) RC
Option D:	(1/3) RC
12.	In an Astable multivibrator if R_A=25KΩ, R_B=33kΩ, C=0.5µF, calculate discharging time of capacitor waveform
Option A:	11.43 ms
Option B:	20 ms
Option C:	12.5 ms
Option D:	10 ms
13.	In IC7805 the output voltage is
Option A:	5 V
Option B:	0 V
Option C:	8 V
Option D:	7 V
14.	For High voltage, High current voltage regulator using IC 723, output voltage and output currents respectively have one of the following correct values.
Option A:	Less than 7 V, greater than 150 mA
Option B:	Less than 7 V, less than 150 mA
Option C:	7 to 37 V, greater than 150 mA
Option D:	7 to 37 V, less than 150 mA
15.	Output voltage of LM317 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
16.	Which one of these ICs is a Voltage Controlled Oscillator?
Option A:	IC 565
Option B:	IC 566
Option C:	IC 555
Option D:	IC 723
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.	An integrator circuit
Option A:	uses a resistor in its feedback circuit.
Option B:	uses an inductor in its feedback circuit.
Option C:	uses a capacitor in its feedback circuit.
Option D:	uses a diode in its feedback circuit.
19.	**The instrumentation amplifier shown in diagram has $R_1 = R_F = 25\ k\Omega$, $R_2 = 10\ k\Omega$, and R_3 varying from 100 Ω to 1 kΩ, the voltage gain of the amplifier varies from** 
Option A:	**10 to 100**
Option B:	**21 to 201**
Option C:	**1 to 101**
Option D:	**2 to 202**
20.	Which of these circuits clips one half cycle of a sinusoidal waveform?
Option A:	Comparator
Option B:	Schmitt Trigger
Option C:	Half Wave Precision Rectifier
Option D:	Peak detector

Q2	**Solve any Two Questions out of Three (10 marks each)**
A	Design a second order low pass Butterworth filter for cut off frequency of 10 kHz.
B	With the help of a functional block diagram explain the working of PLL IC 565.
C	Design an astable multivibrator using IC 555 for frequency 1 kHz & duty cycle 50%. Assume C = 0.1µF.
Q3	**Solve any Two Questions out of Three (10 marks each)**
A	Design a voltage regulator using 723 to deliver an output voltage of 15 V and load current upto 50 mA.
B	With help of a neat circuit diagram and voltage transfer characteristics explain the working of a non- inverting Schmitt trigger.

C	Design a circuit to perform Vo = $3V_2$ - $6V_1$. Explain the working of the circuit.

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Question Number	Correct Option
Q1.	A
Q2.	D
Q3.	B
Q4	A
Q5	A
Q6	A
Q7	D
Q8.	B
Q9.	B
Q10.	C
Q11.	B
Q12.	A
Q13.	A
Q14.	C
Q15.	C
Q16.	B
Q17.	A
Q18.	C
Q19.	B
Q20.	C