Reg. No.	R	A	2	0	1	1	0	0	4	0	1	0	2	2	6

B.Tech. DEGREE EXAMINATION, JULY 2022

Fourth Semester

18ECC202J – LINEAR INTEGRATED CIRCUITS

(For the candidates admitted from the academic year 2020-2021 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours — Max. Marks: 75

PART – A (25 × 1 = 25 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
1. The operating temperature range of a military grade op-amp is (A) –55°C to + 125°C (B) –20°C to + 85°C (C) –55°C to + 225°C (D) 0°C to + 70°C	1	1	1	2
2. Output stage of an op-amp is designed to provide (A) Low output impedance (B) High output impedance (C) Very high output impedance (D) Low input impedance	1	1	1	2
3. An ideal op-amp has (A) Infinite voltage gain (B) Finite voltage gain (C) Finite current gain (D) Infinite current gain	1	1	1	2
4. If the gain-bandwidth product of an op-amp is 2MHz, what is its bandwidth when it is connected as a voltage follower? (A) 1 MHz (B) 2 MHz (C) 3 MHz (D) 4 MHz	1	2	1	1
5. In an operational amplifier, which of the following component is responsible for gain roll-off at higher frequencies (A) Resistance (B) Capacitance (C) Inductance (D) Diode	1	1	1	1
6. Input voltages 2V, 6V, 8V are applied to the inverting terminal of an averaging amplifier, find the output voltage? (A) –5.33 V (B) –8.34 V (C) 6.8 V (D) –6.6 V	1	2	2	2
7. Find the scaling factor of an inverting amplifier if R_F = 3MΩ and $R_1 = 3k\Omega$. (A) 1000 (B) –1000 (C) 10^{-3} (D) -10^{-3}	1	2	2	3
8. If $V_0 = V_i$ both in magnitude and phase, then the circuit is called (A) Summer (B) Differential amplifier (C) Subtractor (D) Voltage follower	1	1	2	2

9. Which one of the following is not the features of instrumentation amplifier? 1 2 2 2

(A) High gain (B) Low dc offset
(C) Low output impedance (D) Low CMRR

10. The clamper is also known as 1 1 2 2

(A) DC inserter (B) DC clipper
(C) DC leveller (D) DC detector

11. The phase shift provided by the feedback network of a RC phase shift oscillator is 1 2 3 3

(A) 60° (B) 120°
(C) 180° (D) 360° or 0°

12. If a resistor of a monostable circuit is replaced by a constant source then circuit will act as a 1 2 3 2

(A) Frequency divider (B) Pulse width modulator
(C) Pulse position modulator (D) Linear Ramp generator

13. IC 555 Timer can drive a load up to 1 1 3 2

(A) 100 mA (B) 150 mA
(C) 200 mA (D) 300 mA

14. The frequency range that a Phase Locks Loop (PLL) maintains lock is called 1 1 3 2

(A) Lock in range (B) Capture range
(C) Pull in time (D) Pull out time

15. Which of the following is not correct? 1 1 3 2

(A) The output frequency of the VCO can be changed by R_T
(B) The output frequency of the VCO can be changed by C_T
(C) The output frequency of the VCO can be changed by the voltage Vc, at the modulating input terminal.
(D) The output frequency of the VCO can be changed by V_{CC}.

16. The filter that allows the range of frequency between f_h and f_l, and attenuates the signals outside the band is 1 1 4 3

(A) Band pass filter (B) Band reject filter
(C) Low pass filter (D) High pass filter

17. What is damping coefficient value for second order Bessel filter? 1 2 4 2

(A) 1.414 (B) 0.765
(C) 1.73 (D) 1.932

18. In a low pass n^{th} order filter, roll-off rate will be 1 2 4 2

(A) $-n \times 20$ dB/decade (B) $n \times 20$ dB/decade
(C) $-n \times 40$ dB/decade (D) $n \times 40$ dB/decade

19. What is the drop out voltage in a three terminal IC regulator? 1 2 4 2

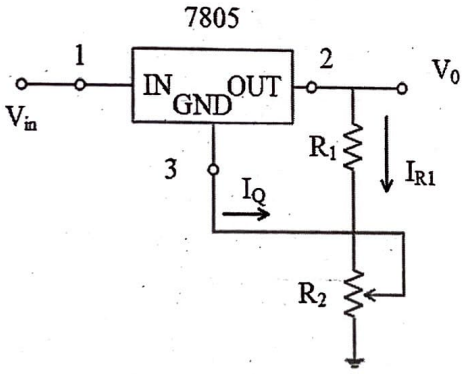
(A) $|V_{in}| \geq |V_0| + 2V$ (B) $|V_{in}| < |V_0| - 2V$
(C) $|V_{in}| = |V_0|$ (D) $|V_{in}| \leq |V_0|$

20.	Which among the following can act as a switch in switching regulator? (A) Rectifiers (B) Diode (C) Transistors (D) Relays	1	1	4	2
21.	The maximum deviation between actual and ideal converter output after gain and offset error have been removed is (A) Absolute accuracy (B) Relative accuracy (C) Monotonicity (D) Linearity	1	2	5	2
22.	A monotonic DAC is one whose analog output increases for (A) decrease in digital input (B) increase in analog input (C) increase in digital input (D) decrease in analog input	1	1	5	2
23.	Number of comparators that are required in flash type ADC (A) Triples for each bit added (B) Remains the same (C) Doubles itself for each bit added (D) Decreases twice for each bit added	1	2	5	3
24.	Which of the following ADC has fixed conversion time? (A) Flash (B) Successive approximation (C) Dual slope (D) Monolithic	1	1	5	2
25.	If successive approximation type ADC exhibits non monotonic characteristics it leads to (A) Change in output code (B) Change in input code (C) Missing codes (D) Inaccurate output	1	1	5	2

PART – B (5 × 10 = 50 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
26. a.i.	List the DC characteristics of the op-amp. Explain any one.	8	3	1	2
ii.	A non-inverting amplifier with a gain of 200 is nulled at 25°C. What will happen to the output voltage if the temperature rises to 60°C for an offset voltage drift of 0.15 mV/°C?	2	4	1	3
	(OR)				
b.i.	List the types of frequency compensation techniques. Explain any one.	8	3	1	2
ii.	A square wave of peak to peak amplitude of 500 mV has to be amplified to a peak-to-peak amplitude of 4 volts, with a rise time of 5 μsec. Can a 741 be used? Justify your answer.	2	4	1	3
27. a.i.	What are the limitations of an ordinary op-amp differentiator? Draw the circuit of a practical differentiator that will eliminate these limitations and explain.	8	3	2	2
ii.	Design an op-amp differentiator that will differentiate an input signal with $f_{max} = 100Hz$. Assume $C_1 = 0.1\mu F$.	2	4	2	3
	(OR)				

b.i.	Draw the circuit for log amplifier and explain.	8	2	2	2
ii.	In an integrator, the voltage V_c across capacitor is zero at t = 0, input voltage $V_1 = -1V$ is applied at t =0. Determine the time constant required to reach output voltage +10 V at t =1 msec. Assume $C = 0.01\mu F$. Find R.	2	4	2	3
28. a.i.	With a neat diagram, explain the operation of triangular wave generator.	8	3	3	2
ii.	Design a RC phase shift oscillator to oscillate at 200 Hz.	2	4	3	3
	(OR)				
b.i.	Explain the operation of an Astable multivibrator using IC555 timer with neat diagram.	8	2	3	2
ii.	In the monostable multivibrator $R = 50K\Omega$ and the time delay T=50 msec. Calculate the value of C.	2	3	3	3
29. a.i.	Design a second order Butterworth low-pass filter having upper cut-off frequency of 2 kHz. Draw the diagram.	4	4	4	3
ii.	With neat diagram explain All-pass filter.	6	2	4	2
	(OR)				
b.i.	Specify suitable component values to get $V_0 = 7.5V$ in the give circuit using a 7805 regulator $I_Q = 4.2mA$, $I_{R1} = 25mA$.	4	4	4	3



ii.	Draw the functional diagram of 723 regulator and explain its operation.	6	3	4	2
30. a.i.	The basic step of a 9-bit DAC is 10.3 mV. If 000000000 represents 0V, what output is produced if the input is 110010011?	2	4	5	3
ii.	Why is an inverted R-2R ladder network DAC better than R-2R ladder DAC? Explain R-2R ladder DAC.	8	3	5	2
	(OR)				
b.i.	Calculate the values of LSB and MSB for an 8-bit DAC of 0 to 20V range.	2	4	5	3
ii.	Explain the operation of dual-slope ADC with a neat diagram.	8	2	5	2

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