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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (R, S) / S3 PT Examination November 2025 (2019 Scheme)

Course Code: ECT301

Course Name: LINEAR INTEGRATED CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1	Sketch the transfer characteristics of a dual input balanced output differential amplifier showing linear and limiting regions. Comment on the same.	3
2	Define Slew Rate and CMRR. Give the typical value of slew rate & CMRR for a 741C op-amp.	3
3	Draw the circuit diagram of an ideal opamp integrator. Obtain an expression for output voltage. How will the integrator respond to a dc input.	3
4	A person was experimenting with an inverting amplifier after designing it for a gain of 1. But during setup he accidentally interchanged connections to inverting pin and non inverting pins. In such a case, plot the transfer characteristic of the wrongly wired circuit.	3
5	Explain Barkhausen criteria for sustained oscillations.	3
6	Design a narrow band pass filter with two feedback paths with a centre frequency of 1.5 KHz, Q=7, and pass band gain of 15.	3
7	Explain how a PLL can be used as a frequency multiplier.	3
8	With the help of a diagram, explain the internal schematic of 555 IC.	3
9	Explain simple current limiting mechanism in IC 723. Mention its disadvantages.	3
10	Mention any three types of ADCs.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Draw the circuit diagram of a Wilson current mirror circuit using BJT. Prove that output current is same as reference current for the circuit.	7
	b)	Prove that the common mode gain of a Dual input balanced output Differential Amplifier decreases with increase in Emitter Resistance.	7
12	a)	A differential amplifier has a differential gain of 80dB and CMRR of 95 dB. If V_1= 2μV and V_2= 1.6μV, calculate the differential voltage and common mode voltage.	7
	b)	Derive the expression for the differential input resistance & output resistance for a dual input balanced output differential amplifier using BJT.	7

Module -2

13	a)	Draw the circuit diagram of a basic logarithmic amplifier using Diode. Derive an expression for output voltage in terms of input voltage.	7
	b)	Explain the working of a precision full wave rectifier using op-amp.	7
14	a)	Explain the features of an instrumentation amplifier. Design an instrumentation amplifier for a gain of 1000.	8
	b)	Draw the circuit diagram of a voltage to current convertor with grounded load and obtain an expression for load current.	6

Module -3

15	a)	Design a second order low-pass Butterworth filter having upper cut-off frequency of 1 KHz. Plot its frequency response.	7
	b)	Design an astable multivibrator circuit using op-amp to generate a frequency of 1KHz.	7
16	a)	Design a narrow band reject filter to eliminate 120 Hz frequency.	7
	b)	Draw the circuit diagram of an op-amp based RC phase shift oscillator and design it for a frequency of 500 Hz.	7

Module -4

17	a)	Design a circuit using 555 IC which will turn on a heater immediately after	7

pressing a push button and should make the heater in ON state for 5 seconds.

b) With the help of a block diagram explain the internal schematic of VCO IC. 7

18 a) With the help of a block diagram explain the internal schematic of PLL. 7

b) Design a 555 IC based circuit to generate an output signal with frequency of 1 KHz and duty cycle of 75%. 7

Module -5

19 a) Explain the working of a low voltage regulator using LM723C IC. 6

b) Draw the circuit diagram of a 4-input binary weighted resistor DAC and derive an expression for output voltage. 8

20 a) Explain how current boosting and current limit protection is implemented in a LM723C IC. 7

b) Explain the working of a 3-bit Flash Type ADC. 7

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