Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U4B04

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Biomedical Engineering

21UBM404 - ANALOG INTEGRATED CIRCUITS

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

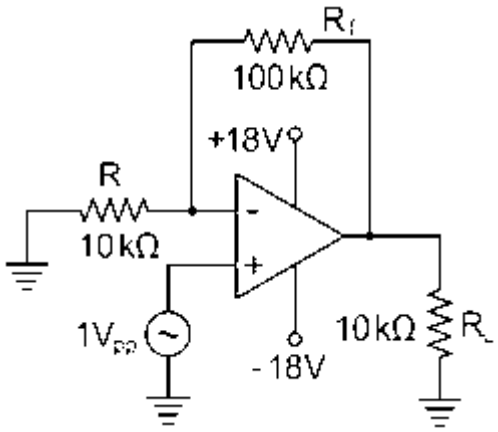
Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Write the principle of operation ofOPAMP differential amplifier?	CO1-U
2.	A differential amplifier has a differential voltage gain of 2000 and common mode gain of 0.2. Determine CMRR in db.	CO2-App
3.	Give one application of voltage follower, Schmitt Trigger, Clamper and Peak Detector	CO1-U
4.	Compare the performance of inverting and non-inverting operational amplifier configurations.	CO1-U
5.	Define quantization error.	CO1-U
6.	Write down the drawback of weighted Resistor type D/A converter.	CO1-U
7.	Identify the purpose of having input and output capacitors in three terminal IC regulators?	CO1-U
8.	Draw the functional diagram of 723 regulators?	CO1-U
9.	Describe the term Voltage to Frequency conversion factor.	CO1-U
10.	Mention the advantages of opto-couplers.	CO1-U

PART – B (5 x 16= 80 Marks)

11.	(a)	Derive the expression of Non inverting amplifier with neat diagram and also For a given non-inverting amplifier shown in figure below. Find closed loop gain.	CO2-App	(16)



Or

	(b)	Design an inverting amplifier with a voltage gain of -10. Assume an ideal operational amplifier and resistors with values you choose. The input signal has amplitude of 0.1 V and a frequency of 1 kHz. The op-amp's supply voltage is ±15 V. i. Calculate the resistor values required for the feedback and input resistors. ii. Design the circuit. iii. Calculate the input and output impedances of the amplifier. Analyze the effect of changing the input signal frequency on the output signal.	CO2- App	(16)
12.	(a)	(i) Draw an instrumentation amplifier whose gain is controlled by adjustable gain and explain its working concept.	CO1-U	(8)
		(ii) Explain about positive and negative clipper.	CO1-U	(8)
		Or		
	(b	(i) Explain some nonlinear application of Opamp such as Precision Rectifier and Peak Detector with neat diagram?	CO1-U	(8)
		(ii) Explain the working of an op-amp differentiator and derive its output equation	CO1-U	(8)
13.	(a)	(i) Explain the working of R-2R ladder DAC? Design a 4 bit R-2R ladder DAC and compute the analog equivalent of the binary input 1011.	CO2-App	(06)
		(ii) State the limitations of weighted resistor type D/A converters	CO1-U	(10)
		Or		

	(b)	(i) A dual slope ADC uses a 16 bit counter and a 4 MHz clock rate. The Maximum input voltage is =10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1μF. Find the value of the resistor R of the integrator. If the analog signal is = 4. 129 V, find the corresponding binary number.	CO2-App	(12)
		(ii) State the limitations of R-2Rladder type D/A converters	CO1-U	(4)
14.	(a)	Create a second order Butterworth LPF having upper cut-off frequency 1 kHz. Determine the frequency response? Design an adjustable positive voltage regulator using LM317 for the output voltage V0 varying from 4V to 12 V and the output current of 1 mA.	CO3-App	(16)
		Or		
	(b)	Design a non-inverting second order Low Pass filter which will have the following filter characteristics: Q = 1, and fc = 79.5Hz.	CO3-App	(16)
15.	(a)	A PLL IC565 connected as an FM demodulator has R1=10KΩ, C1= 0.01μF and C2= 0.04μF.The supply voltage is +12 V. Determine the (i) Free running frequency (ii) Lock in range (iii) Capture range	CO1-U	(16)
		Or		
	(b)	For a VCO circuit, assume R2=2.2KΩ, R1=R3 = 15K and C1= 0.001μF.Assume Vcc=12V. Determine i) output frequency ii) the change in output frequency if modulating input Vc is varied from 7 to 8V.	CO1-U	(16)