Exam Date & Time: 20-Jul-2022 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FURTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JULY-AUG 2022 INTEGRATED CIRCUIT SYSTEMS [BME 2254]

Marks: 50

Duration: 180 mins.

	Α				
An	swer all t	he questions.			
Ins	tructions t	o Candidates: Answer ALL questions Missing data may be suitably assumed			
1)		Design and explain direct-coupled non-inverting amplifier with a circuit diagram			
			(3)		
	A)				
	B)	Design a capacitor coupled voltage follower using IC 741 opamp. The lower cutoff frequency for the circuit is to be 100 Hz and the load resistance is 4 7kO. (Assume Vpc			
		$= 0.7 v \text{ and } I_{\text{Bmax}} = 500 \text{nA})$	(4)		
	C)	Design and explain the operation of a differential amplifier with a circuit	(2)		
			(5)		
2)		Design an inverting amplifier using opamp 741 with a voltage gain of 60 and output voltage required is $3v$ (Assume $I_{Bmax} = 500nA$)	(5)		
	A)				
	B)	Design a circuit to make the output 180° out of phase to the input with same magnitude	(2)		
	C)	Illustrate a condition where an OPAMP can be used as an inverting summer	(2)		
			(3)		
3)		Design a full-wave rectifier circuit using operational amplifier.			
			(3)		
	A)				
	B)	Explain the drawback of an ideal integrator circuit. Design an opamp circuit to overcome the disadvantage.	(3)		
	C) A th de	A clinician needs help from a biomedical engineer to measure a clean ECG waves. But			
		the waves contain unnecessary frequency components especially 100 Hz. Suggest and design a solution:	(4)		
			(.)		

i. Which first order active filter would you choose to denoise?

4)	Design a type of comparator to pass only T peaks in the recorded electrocardiographic waves	(3)
A)		
B)	Explain the schematic of the Phase locked loop with the capture transient graph.	(4)
C)	Explain the operation of R-2R ladder type Digital to Analog converter	(3)
5)	Design a circuit to build a voltage to current converter with ground load	
		(4)
A)		

ii. Design the selected filter and explain its frequency response.

- B) The voltage follower in the circuit has a 1v signal and a $20k\Omega$ load voltage. Calculate the load voltage.
 - i. When the load is directly connected to source
 - ii. When the voltage follower is between the load and source



C) Explain with a neat circuit on how to use a three terminal voltage regulator as a current source (3)

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