Exam Date & Time: 11-Jun-2022 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, JUNE 2022 INTEGRATED CIRCUIT SYSTEMS [BME 2254]

Marks: 50

Duration: 180 mins.

A

Answer all the questions.

Instructions to Candidates:

Answer ALL questions Missing data may be suitably assumed. Draw circuit diagrams for design questions/problems

1) Design and explain direct-coupled inverting amplifier with a circuit diagram

(3)

- A)
- B) Show that a part of signal is lost when a load is directly connected to the source as shown in the figure. Design a circuit using OPAMP to overcome such problem



(3)

- C) Design a capacitor coupled voltage follower using 741 OPAMP. The lower cut-off frequency for the circuit is to be 50 Hz and the load resistance is $R_L = 3.9 \text{ k} \Omega$ (Assume $V_{BE} = 0.7 \text{ v}$ and $I_{Bmax} = 500 \text{ nA}$) (4)
- 2) Two signals which each range from 0.1 v to 1 v are to be summed. Using a 741 OPAMP, design a suitable inverting summing circuit (5)

A)

B) Design an inverting OPAMP to block the input respiratory signal superimposed with ECG signals and allow only the latter signals (3)

BME 2254

about:srcdoc

	C)	Illustrate a condition where an OPAMP can be used as a scale changer	(2)
3)	A)	 A clinician needs help from a biomedical engineer to record/measure a clean EEG waves. But the waves contain unnecessary frequency components especially 50 Hz and its harmonics. Suggest and design a solution: i. Which first order active filter would you choose to denoise? ii. Design the selected filter and explain its frequency response. 	(4)
	B)	Design a type of comparator to pass only the R peaks in the recorded electrocardiographic waves.	(3)
	C)	Explain the operation of Precision Full Wave Rectifier with a neat circuit diagram	(3)
4)		Explain the block schematic of the Phase Locked Loop along with its low pass filter characteristics	(4)
	A) B)	Explain the operation of counter type Analog to Digital converter	(3)
	C)	Determine the output voltage produced by a D/A converter whose output range is 0 to 10 v and whose input binary number is:	
		i. 11 (2 bit D/A converter)	
		ii. 1010 (4 bit D/A converter)	(3)
		iii. 11000111 (8 bit D/A converter)	
5)		Design a circuit to build an improved instrumentation amplifier using 3 OPAMPs	(4)
	A)		
	B)	Design an inverting amplifier using a 741 OPAMP. The voltage gain is to be 50 and the output voltage amplitude is $2.5 v$	(3)
	C)	Explain with a neat circuit how to use a three terminal voltage regulator as a current source	(3)

-----End-----