Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023

Semester : Semester IV - 2021 | **Date :** 12-APR-2023
Course Code : EEE2004 | **Time :** 9.30AM - 11.00AM
Course Name : Sem IV - EEE2004 - Opamps and Linear Integrated Circuits | **Max Marks :** 50
Program : B.Tech. Electrical and Electronics Engineering | **Weightage :** 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(5 X 2 = 10M)**

1. Voltage follower can be defined as when the output of the op-amp circuit follows the input of the op-amp directly. Voltage follower is also called as

a) Inverting amplifier (CO1) [Knowledge]
b) Non-inverting amplifier
c) Normal buffer
d) Difference amplifier

2. An *operational amplifier* (*op amp*) is an analog circuit block that takes a differential voltage input and produces a single-ended voltage output. Which of the following are the characteristics of In-Amp.

a) Low DC offset (CO1) [Knowledge]
b) Low drift
c) High open-loop gain
d) All the above

3. An “ideal” or perfect operational amplifier is a device with certain special characteristics. The electrical characteristics which is not exhibited by an ideal op-amp is

a) Infinite voltage gain (CO1) [Knowledge]
b) Infinite bandwidth
c) Infinite output resistance
d) Infinite slew rate

4. A low-pass filter is a filter that passes signals with a frequency lower than a selected cutoff frequency and attenuates signals with frequencies higher than the cutoff frequency. The gain of the first order low pass filter at stop band

a) Increases at the rate 20dB/decade (CO2) [Knowledge]
b) Increases at the rate 40dB/decade
c) Decreases at the rate 20dB/decade
d) Decreases at the rate 40dB/decade

5. Active filters use active components such as op-amp and transistor along with passive components. A Butterworth Filter is a type of Active Filter, where the frequency response across its pass band is relatively flat. The pass band voltage gain of a first order low pass Butterworth filter is

a) 0.586 (CO2) [Knowledge]

b) 8.32

c) 0.707

d) *1.586*

PART B

ANSWER ALL THE QUESTIONS (2 X 10 = 20M)

6. An op amp is designed to be a general purpose signal conditioning block in any measurement or process control system. The op amp configuration and performance in the circuit will be governed by the electrical character of the sensor and its output.The electrical nature of the sensor output differs from one sensor to the other. In most cases, the principle of operation of the sensor determines the nature of sensor output. Explain the circuit configurations which are used In order to sense the sensor ouput signal is phase shifted or not.

(CO1) [Comprehension]

7. If you have ever had any kind of electronic equipment hooked up to take readings from you at a hospital, you have been connected to sensors run by an op amplifier. Those op-amp circuits find widespread use in nearly every medical device and industrial automation, where many systems use current flow to relay measurements and control remote installations. Draw and explain the circuit that is suitable for the above-mentioned applications.

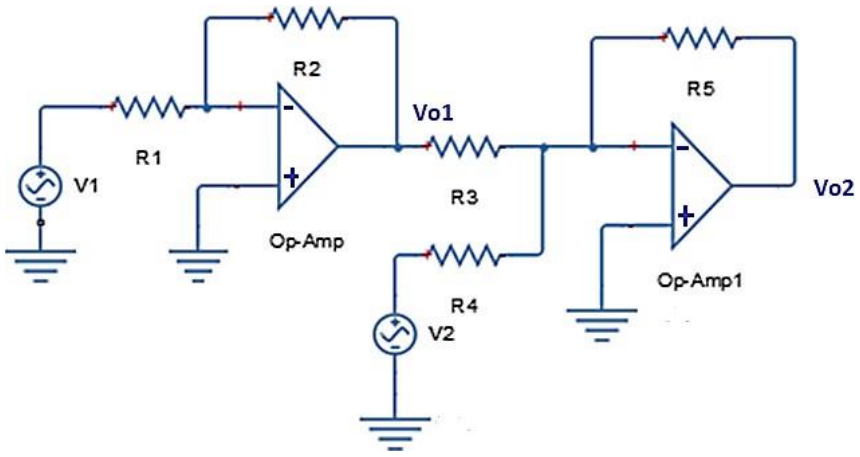
(CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION (1 X 20 = 20M)

8. **a**) A type of active filter is used in audio amplifiers, equalisers, or speaker systems to direct the lower-frequency bass signals to the larger bass speakers or to reduce any high-frequency noise or "hiss" type distortion. Name the filter circuit which is suitable for the above applications. Aslo show how the circuit is used to reduce the hiss.

b) Op amp circuits are modules or building blocks for designing complex circuits. It is often necessary in practical applications to connect op amp circuits in cascade to achieve a large overall gain. In general, two circuits are cascaded when they are connected in tandem, one behind another in a single file is desired. In a certain electronic device, two op- amp amplifier configurations are cascaded as shown in figure. Identify the configuration in each stage and determine the corresponding output voltages. R1= 250kΩ, R2=500 kΩ,R3=100 kΩ, R4 =50 kΩ, R5=500 kΩ
V1=V2=700mV.



(CO2) [Application]