

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech- 4<sup>th</sup> Semester (ECE)

COURSE CODE (CREDITS): 18B11EC411(3)

MAX.MARKS: 25

COURSE NAME: Analog Integrated Circuits

COURSE INSTRUCTORS: Lt. Pragya Gupta

MAX. TIME: 1 Hr 30 Minutes

**Note:** (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

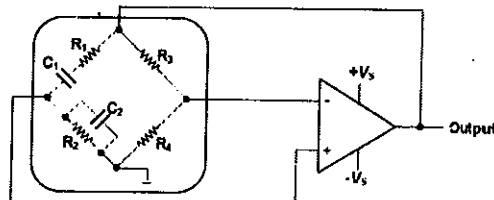
(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

**Q1. (a)** What is the difference between Active and Passive filters? List out the advantages of Active filters over Passive filters. [2.5] (CO-4)

**(b)** Design a Low Pass filter at a Cut-off frequency of 1KHz and pass band gain of 2. Using a Frequency scaling technique convert the 1KHz cut-off frequency of Low Pass filter to a Cut-off frequency of 1.6KHz. [2+2] CO-4)

**Q2.** Draw the circuit diagram of First order Butterworth High Pass Filter and Derive the expression of Voltage gain. Also draw the frequency response curve for First, second and higher order High Pass Filters and explain it. [4.5](CO-2)

**Q3.** What is Barkhausen criterion for oscillation? For the given Wein bridge oscillator prove that cut-off frequency is  $f = \frac{1}{2\pi RC}$  and feedback factor  $\beta = \frac{1}{3}$  when  $R_1 = R_2 = R$  and  $C_1 = C_2 = C$  [1+3](CO-2)



**Q4.** Draw the Circuit Diagram of 3-stage RC Phase shift Oscillator and explain how the feedback circuit in RC phase shift oscillator provides the desired phase shift of 180 degree required for oscillations. [4] (CO-2)

**Q5. (a)** Mathematically show that how the output voltage of an Instrumentation amplifier changes with the change in the physical energy. [3] (CO-1)

**(b)** For the circuit shown below, taking the Op-Amp as ideal, find the output voltage  $V_{out}$  in terms of input voltages  $V_1$ ,  $V_2$  and  $V_3$ . [3] (CO-1)

