JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 18B11EC411 (03) MAX. MARKS: 25

COURSE NAME: ANALOG INTEGRATED CIRCUITS

COURSE INSTRUCTORS: Dr. Shruti Jain MAX. TIME: 1 Hour 30 Min

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

SHORT ANSWERS

1.

a) Frequency response is the manner in which the _____ and _____between the input and output respond to different frequencies.

b) In internally _____op-amps, the compensating network is designed into the circuit. On the other hand, a compensating network is added externally in____ _____op-amps.

c) The _____ is formed using a high pass, low pass filter and a summing amplifier.

d) The output of an operational amplifier is forced to swing repetitively between positive and negative saturation. Which wave output shows this pattern?

e) A differentiator has R = 100kΩ and C = 0.1μF. Given that v_i =5t V, determine the output v_o . **[5, CO2, CO4, CO5]**

LONG ANSWERS

2. a) Shyam wants to design a circuit used in analog computers. The designed circuit can also used as signal wave-shaping. Explain the designed circuit with the frequency response. Also, prove the operation of the circuit.

b) If a sine wave of 3V, 200 Hz is applied to the differentiator, design the basic circuit diagram. **[3 + 2, CO5]**

3. a) Angel wants to design any three mathematical circuits using operational amplifier. Help her in designing the circuits.

b) Two voltages, +0.6 V and -1.4 V, are applied to the two input resistors of a summation amplifier. The respective input resistors are 400 kΩ and 100 kΩ, and the feedback resistor is 200 kΩ. Determine the output voltage. **[3 + 2, CO2]**

4. a) Design a circuit at a cut off frequency of 1 kHz which results in voltage gain magnitude expressed by Eq. (1).

$$\left|\frac{v_o}{v_{in}}\right| = \frac{A_F}{\sqrt{1+\left(\frac{f_L}{f}\right)^4}} \qquad (1)$$

where A_F is the pass-band gain, f is the frequency of the input signal, f_L low cut off frequency.

(b) Determine v_0 in the op-amp circuit shown in Fig 1.

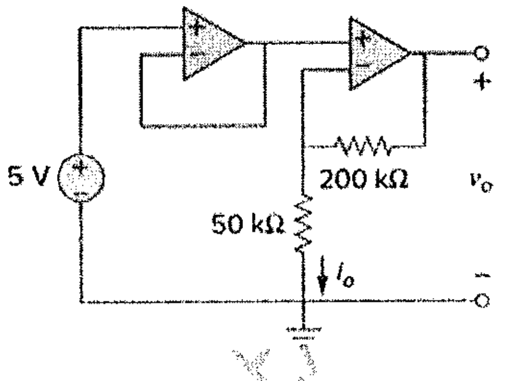

Fig 1

[3 + 2, CO2, CO4]

5. Ananya knows how to draw differential amplifier circuit, Transducer Bridge and indicating meter. She wants to use all three in one circuit so that she can use it in daily life application. Which circuit she will draw. Explain. **[5, CO2]**