## EE 2212 QUIZ 2 S. G. Burns

**4 October 2021**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Problem 1** (30 Points, 3 Points Each) I Am Sure You Expected This! Fill in the following Table. The data sheet posted on the EE 2212 Course WEB page could be very very useful.

|  |  |  |
| --- | --- | --- |
| SPECIFICATION | IDEAL OP AMP | μA 741 |
| Input Resistance **(Typical)** |  |  |
| Output Resistance **(Typical)** |  |  |
| Voltage Gain **(Typical)** |  |  |
| Bandwidth **(Typical)** |  |  |
| Maximum power supply voltages | XXXXXXXXXXXXXX |  |
| Maximum short circuit current | XXXXXXXXXXXXXX |  |

**Problem 2** (30 Points) Cascaded Op Amp System

Assume ideal operational amplifiers therefore you can use summing point constraints. Write time-domain

equations for v3(t), v4(t), and v5(t) in terms of the circuit elements. Observe, no calculations are required.



**v1(t)** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**v2(t)** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**v3(t)** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**v4**(t) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**v5**(t) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Problem 3** (40 Points) Design a three channel audio equalizer/mixer circuit using a μA741 operational amplifier. Apply the following input signals. The electric guitar amplifier design in Problem Set 2 should be helpful.

Input Signals and Voltage Gain Design Criteria:

v1(t) must have a voltage gain of 26 dB

v2(t) must have a voltage gain of 12 dB

v3(t) must have a voltage gain of 20 dB

Your design must include:

1. (25 Points) Detailed and well-labeled circuit diagram. Including a set of self-consistent values for all four resistors with design justification. Resistor values must be compatible with a μA741 (Refer to your answer in Problem 1, last line)
2. (10 Points) An equation for the resultant output voltage, vo(t). Phase is important!
3. (5 Points) The three input frequencies are 500, 5000, and 50,000 radians/second. Are these three signals within the normal human hearing range of someone in the 20 something age range? Explain.