INDIAN INSTITUTE OF TECHNOLOGY DHARWAD
Dharwad, 580 011

Wednesday 18th Nov. 2021	**EE 202: Introduction to Analog Circuits** Endsem - Part A	Time: 0900 to 0940 Marks: 25

Make suitable assumptions where you deem necessary and state them in the answerbook.

Write the question number clearly before every answer and show the intermediate steps to demonstrate your thought process.

Write page numbers on all your answer sheets.

You should stop writing at 0930. Take pictures of your answer sheet with the page numbers visible and submit it on Moodle before 0940 Hrs. Your submission could be a zip file of all images or a single PDF file. Please note that Moodle submission link will automatically get disabled at 0940. I will not accept any email submissions.

Please double check if you have uploaded the correct file for your submission.

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1. Consider the following 2 amplifiers shown in Figure 1, which are constructed using μA741 opamp. The first circuit is an inverting amplifier with a gain of -10 and the second circuit is a non-inverting amplifier with a gain of 10. [10]

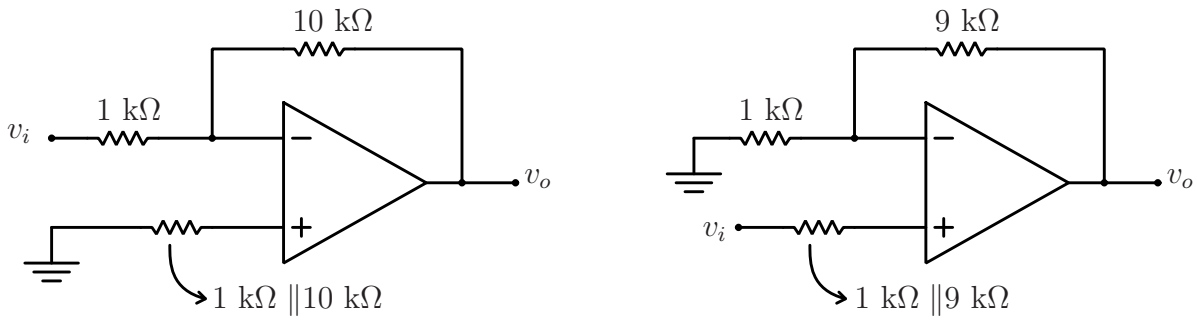

Figure 1: Circuit for Question 1.

   (a) Find the output voltage for each of these amplifiers due to input offset current. Given that input bias current I_{bias} = 200 nA and input offset current I_{offset} = 75 nA.

   (b) Find the output voltage for each of these amplifiers due to input offset voltage. Given V_{io} = 3 mV.

2. Consider the circuit of an opamp based subtractor circuit as shown in Figure 2. This circuit is used to find the difference of two voltages v_1 and v_2. The sources of v_1 and v_2 have output impedances of 150 Ω and 100 Ω respectively. Find the exact output voltage from this circuit. [10]

   (a) Can you come up with a circuit configuration that will generate an output voltage that is proportional to the exact difference $(v_1 - v_2)$?

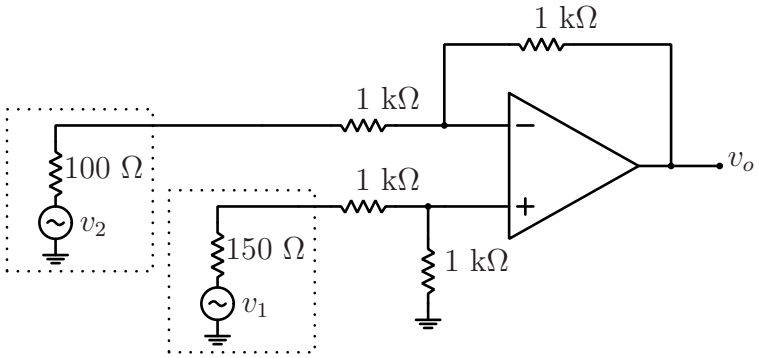

Figure 2: Circuit for Question 2.

3. For the circuit shown in Figure 3 find the transfer function from input to output, and identify what type of filter it is. [5]

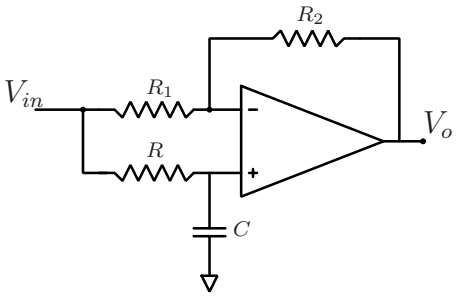

Figure 3: Circuit for Question 3