Monday	**EE 202: Introduction**	Time: 1830 to 1900
18$^{\text{th}}$ Oct. 2021	**to Analog Circuits**	Marks: 20
	Quiz 1 - Part B	

Unless specified otherwise, use the opamp parameters of μA741 opamp, the datasheet of which is sent to you along with the paper in your email.

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.

Wrong answers will fetch NEGATIVE MARKS of up to -50%. (For example, if 2 marks are awarded for a correct answer, a wrong answer will fetch -1.

Write page numbers on all your answer sheets.

You must stop writing at 1850. Take pictures of your answer sheet with the page numbers visible and submit it on Moodle before 1900 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 1900. I will not accept any email submissions.

1. A non inverting amplifier is constructed with R_F=10 kΩ and R_1=100 Ω (Figure 1). $\boxed{6}$
   Determine the maximum output offset voltage if the input referred offset is V_{io}=4.5 mV and input bias current I_{bias}=(20*X) nA,

   where $X = 2 +$ last digit of your roll number.

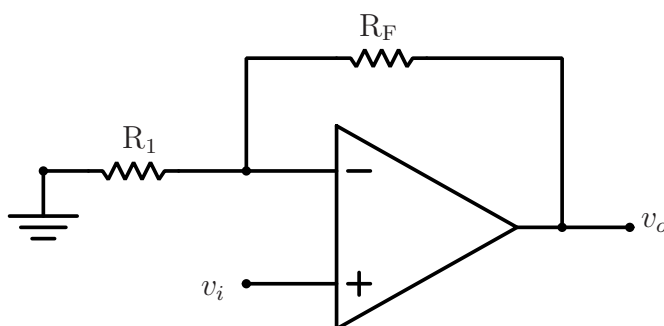   (Assume input offset current I_{offset}=0).

Figure 1: Circuit for question 1.

2. Design an amplifier with a gain of -XY (where XY are the last 2 digits of your roll $\boxed{9}$
   number) using an Opamp.

   (a) Calculate the input and output impedance and bandwidth of your design if the opamp used is μA741.

   (b) Calculate the input impedance of the amplifier at a frequency of 1 KHz.

3. Your friend Shashank has designed a non-inverting amplifier with a gain of 25. He tested it on a breadboard and confirmed its working to his satisfaction. He then soldered the circuit on a PCB (printed circuit board). However, due to formation of a dry solder joint, the connection of R_1 to ground was not formed (as shown in Figure 2).
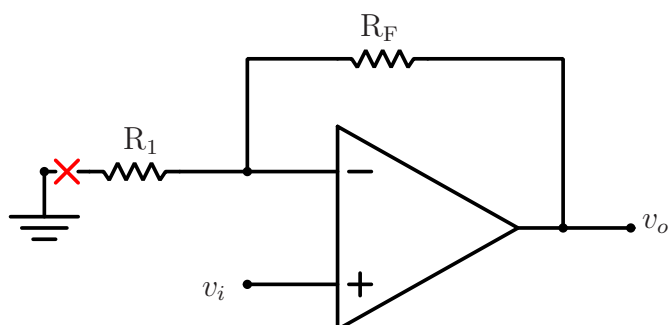

Figure 2: Circuit for question 3.

Can you predict what will be the output of the circuit, and help Shashank understand how the negative feedback changes due to this broken connection?