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ASSIGNMENT 1 SEMESTER 2 2020

SUBJECT: ELECTRONICS II

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PAPER DESCRIPTION: OPEN BOOK

DURATION: 48 HOURS

DUE DATE : 02 FEBRUARY 2021

SUBMIT TO : electronicstut@gmail.com

FILE NAME MUST BE A STUDENT NUMBER.

INSTRUCTIONS TO CANDIDATES:

Answer all questions. Type answers in the spaces provided on the question paper.

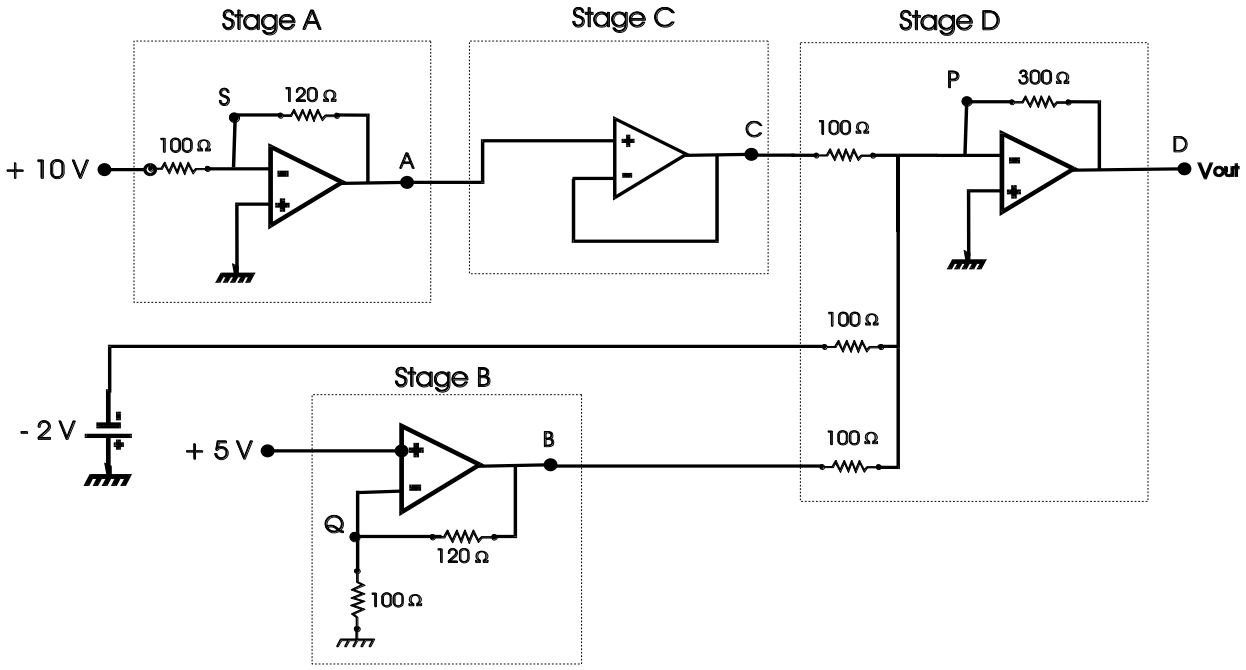
All answers must be given in correct units.

Answers must be accurate to the first three significant figures.

EXAMINER: MR T D MATSHIBA

MODERATOR: MR MXSD MANKAZANA

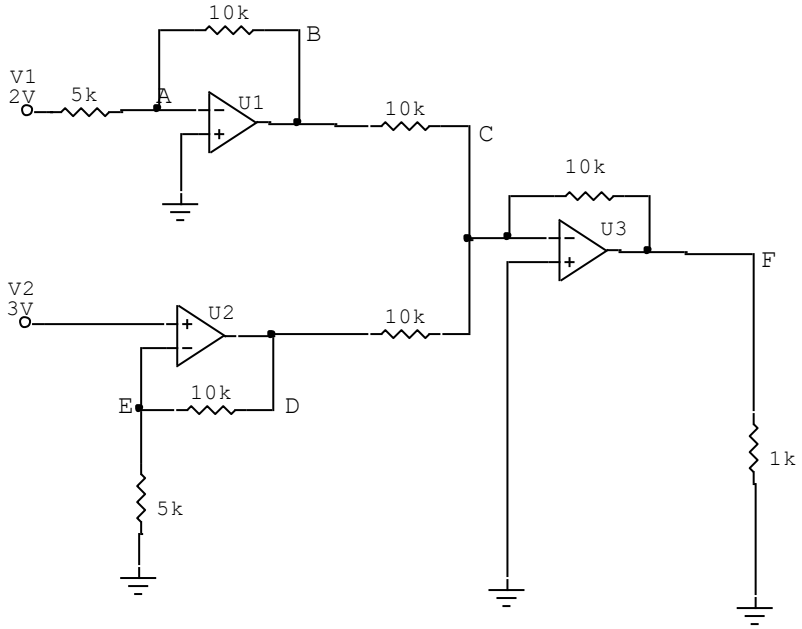
QUESTION 1 (9)



The above circuit represents a multi-stage operational amplifier. Fill in the following table:

What configuration is stage **D**?	summing
Determine the output voltage at ...	**A -12V**
	B 11V
	C -12V
	D 9V
The voltage at **Q** in stage B	5V
The current at S in stage A	-100mA
The current at **P** in stage D	30mA
In what configuration is stage B?	Non-inverting amp

QUESTION 2 (8)

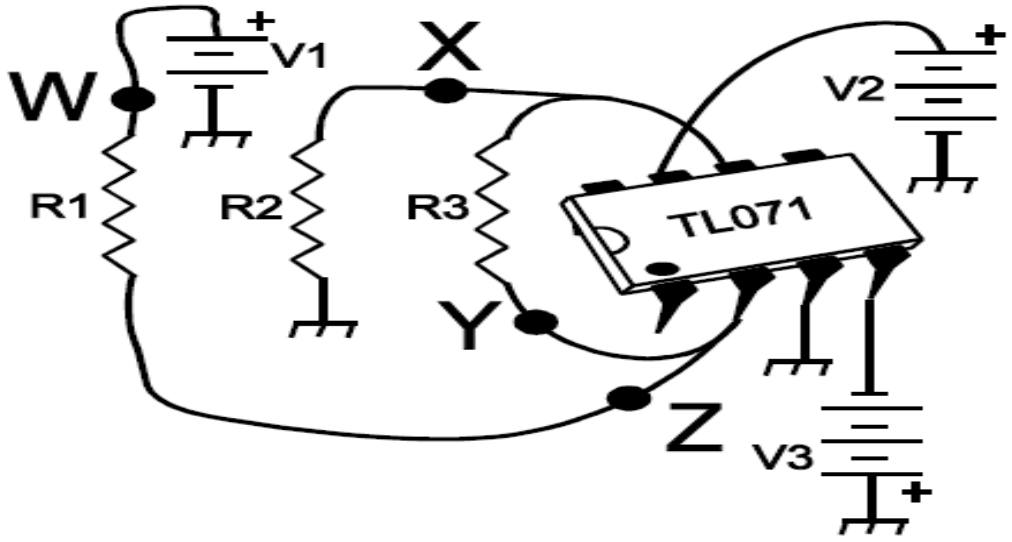


Analyze the circuit diagram above and complete the following table.

Voltage at A: 0V	1	Voltage at B: -4V	1
Voltage at C: -4V	1	Voltage at D: 9V	1
Voltage at E: 3V	1	Voltage at F: -5V	1
Current at A: 0.4A	1	Current at D: 0.9 mA	1

QUESTION 3 (6)

For circuit below, R1 = 1500 Ω; R2 = 2200 Ω; R3 = 2700 Ω; V1 = 4 V; V2 = V3 = 18 V; pin2 is inverting input; pin3 is non-inverting input; pin6 is output.

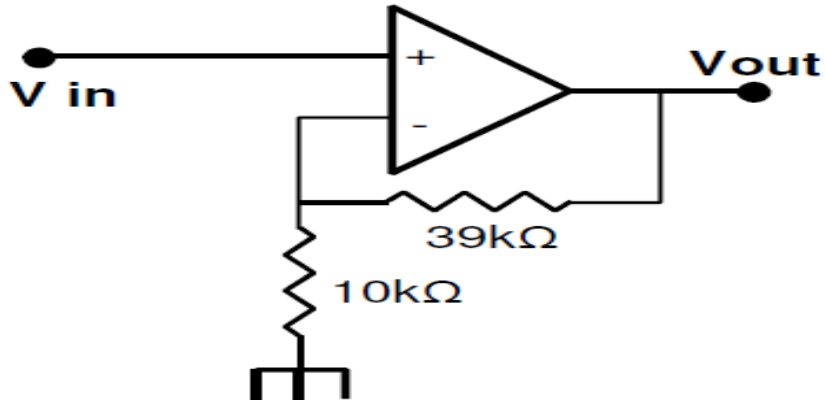


Complete the table below, making use of circuit above:

In what configuration is the operational amplifier connected? Inverting amp	
What is the voltage gain of the amplifier? **1.8**	
What are the voltages / currents at the following points in the circuit?	
Voltage at point X: -7.2V	Current at point X: -3.27mA
Current at point W: 2.667mA	Current at point Y: -2.667mA

QUESTION 5 (6)

The following circuit is built with a TL071 operational amplifier:



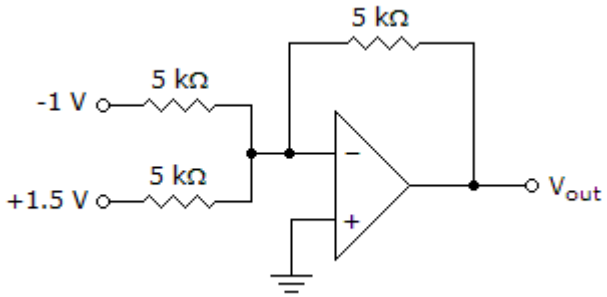
The supply voltages are +15V and -15V on pin 7 and 4 respectively. Vin is a sine wave with amplitude (from zero to peak) of 0.8V at 2400 Hz.

Complete the table below:

Av: 1+R2/R1 1+39x10^3/10x10^3 = 4.9	
Amplitude of Vout: Av*Vin=4.9x0.8 = 3.92V	Period of the wave at Vout: 1/F 1/2400 = 0.417ms
RMS value of Vout: Vpk/squareroot(2) = 2.77V	In what configuration is the operational amplifier connected? Non-inverting amplifier
What is the maximum RMS value of the voltage at Vin if the output wave should remain undistorted, assuming the output swing can reach the supply voltage?	

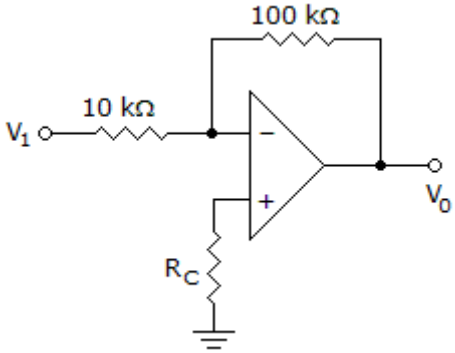
QUESTION 6 (3)

1. Refer to the given circuit. Calculate the ouput voltage



Answer: -5k/5k(-1+1.5) = -(0.5) = -0.5V

2. Calculate the input voltage for this circuit if V_0 = -11V.

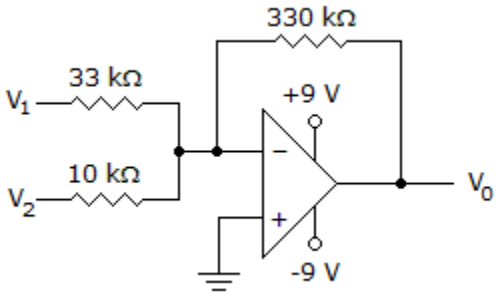


Answer: Vout = -100k/10k(Vin)

-11 = -10Vin

Vin = 1.1V

3. Calculate the output voltage if V_1 = 33mV and V_2 = 2mV.



Answer: Vo = -330k(33x10^-3 / 33x10^3 + -2x10^-3 / 10x10^3)

= -0.264V

= -264mV

QUESTION 7 (15)

True or false

1. A typical op amp is made up of three types of amplifier circuits being a differential amplifier, voltage amplifier and a push pull amplifier.

   Answer: True

2. The positive input of the op amp is also known as the inverting input.

   Answer: False

3. The op amp amplifiers current.

   Answer: False

4. Feedback is used in an open-loop operational amplifier circuit.

   Answer: True

5. If the two inputs to a differential amplifier are exactly the same, then the output is the signal multiplied by two

   Answer: False

6. If an input signal is applied to the inverting input of an op-amp with the non-inverting input grounded, the output signal would be opposite in polarity with the input.

   Answer: True

7. Whenever a signal is applied to the input of an op amp the current flows through the terminals into the output.

   Answer: False

8. The ideal output impedance for an operational amplifier is 0Ω.

   Answer: True

9. The voltage-follower amplifier circuit has a fixed voltage gain of approximately 10.

   Answer: False

10. A voltage-follower op-amp has the output connected directly to the inverting input.

    Answer: True

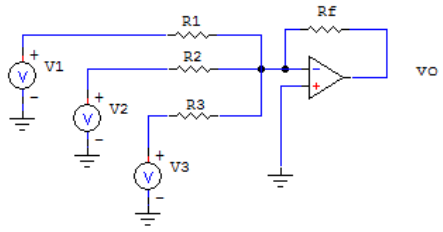
11. It is possible to get a double ended output in an operational amplifier

    Answer: True

12. An inverting amplifier has a phase shift of 180° from input to output.

    Answer: True

13. This circuit is a differentiator.

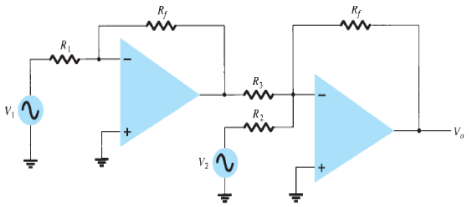


    Answer: False

14. Practically operational amplifiers are restricted by the source voltage thus limiting the output regardless of the gain.

    Answer: False

15. This is a voltage subtracting circuit.



Answer: False