

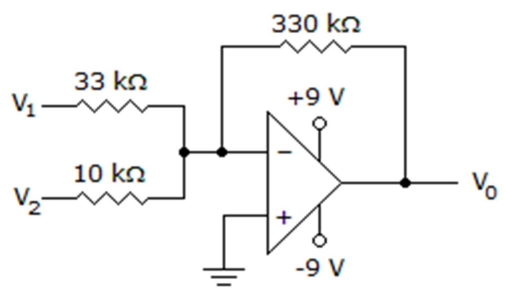
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**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2022**

<b>Programme Name: B.Tech ECE</b> <b>Course Name: Analog Electronics II</b> <b>Course Code: ECEG 2014</b> <b>Nos. of page(s): 3</b>	<b>Semester: IV</b> <b>Time: 03 hrs</b> <b>Max. Marks: 100</b>
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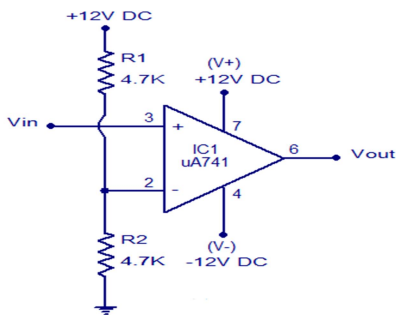
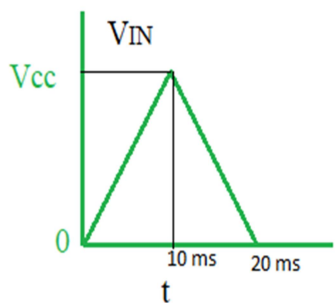
S. No.	<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>	Marks	CO
1	Draw the hysteresis loop for Schmitt trigger with proper definition of Transition voltages.	4	CO1
2	The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied, the gain is reduced to 17.5. Find the fraction of the output that is feedback to the input (feedback gain).	4	CO2
3	Define the “Barkhausen criterion” for sustained oscillations?	4	CO1
4	Define the Slew rate for op-amp. Compute the maximum input frequency if $V_o = 100m\sin 2\pi ft$ for $SR = 10V/\mu s$ ?	4	CO2
5	Evaluate the expression of the output voltage $V_o$ for the given op-amp circuit shown in Figure 1?	4	CO3



**Figure 1**

**SECTION B**  
**(4Qx10M= 40 Marks)**

6	Prove that duty cycle of the A-stable schmitt trigger is 50 %. Compute the expression for Charging and discharging time of the capacitor by using proper waveforms.	10	CO2
7	Consider the given op-amp network as shown in Figure. 2 and sketch the $V_{OUT}$ waveform with proper explanation and working?	10	CO3

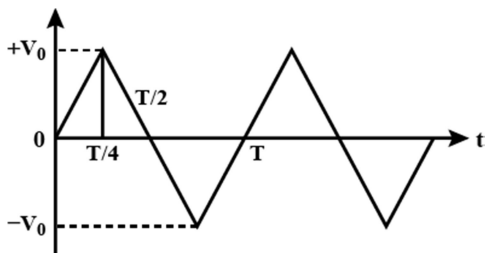


**Figure. 2**

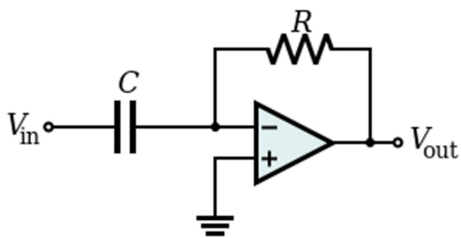
8 a. Sketch the voltage transfer characteristics of the Schmitt trigger of op-amp?  
 b. Obtain the output  $V_o = 4V_1 - 6V_2$  by op-amp implementation.

9

Compute the output volatege  $V_o$  for the given op-amp for based schematic in Figure 3.b?. Consider  $V_{in}$  as a square waveform shown in figure 3.a ( $R = 10\text{ k}\Omega$ ,  $C = 0.1\text{ }\mu\text{F}$ )



**Figure. 3.a**



**Figure. 3.b**

**OR**

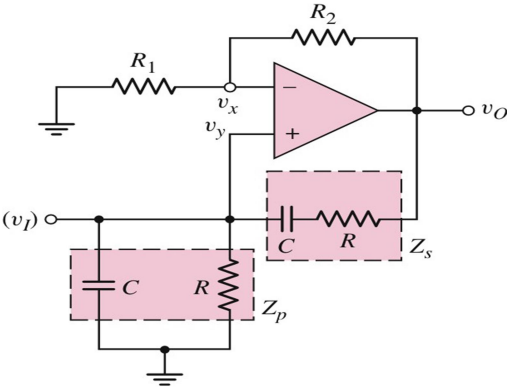
a. Explain the DAC and ADC convertors. Why these covertors are required for applications based on micro-controllers?  
 b. Describe the class A and class B power amplifeirs with suitable examples

**SECTION-C**  
**(2Qx20M=40 Marks)**

10 Design a network of 8 LEDs (common cathode type) by employing a 555 timer IC of following specifications:  
 a. Ist 4 LED blink in ON state for 30 ms and OFF state for 10 ms.  
 b. Remaining 4 LED blink in ON state for 100 ms and OFF state for 50 ms.  
 c. Draw schematic and the sketch for Output volate waveform in both the cases (case a and case b)  
 (Choose the appropriate values of the passive components, number of 555 ICs etc)

11 Design and draw the schematic for op-amp Band pass filter for the Bandwidth = 25 KHz,  $f_L = 25.5\text{ KHz}$  and Net voltage Gain = 300 (pass band gain). Sketch the Frequency spectrum of the filter?. Choose appropriate values of active and passive components. Gain for high pass filer is 20.  
**OR**  
 Derive the relation for frequency of sustained oscillations to design the Wien bridge

oscillator for figure 4. Illustrate the nature of oscillations if  $R_2 = 6R_1$  and  $R_2 = 0.25 R_1$ . Draw neat sketch of the waveform for all the cases.



**Figure 4.**