Name: **Enrolment No:**	UPES

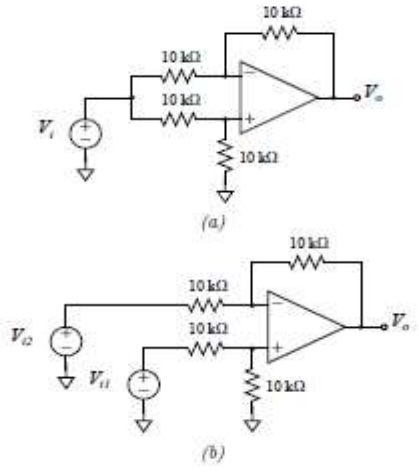
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

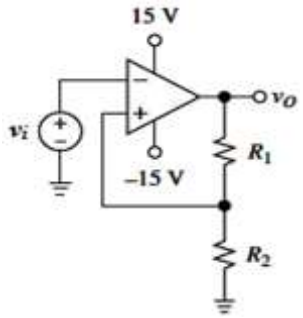
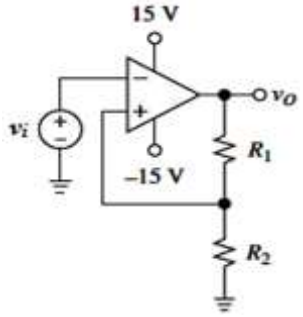
Programme Name: BT-E&CE **Semester : IV**
Course Name : Analog Electronics II **Time : 02 hrs**
Course Code : ECEG 2014 **Max. Marks: 100**
Nos. of page(s) : 02

Instructions:

- Attempt all questions.
- Assume any data if required and indicate the same clearly. Otherwise indicated symbols and notations have their usual meanings.
- Strike off all unused blank pages.

SECTION A

S. No.		Marks	CO
Q1.	Write short notes on virtual ground concept.	**5**	**CO1**
Q2.	Discuss why astable multivibrator is also known as free running oscillator.	**5**	**CO2**
Q3.	Determine V_{out} for the two connections shown in below **Figure 1**. Assume V_1 = 3V, V_a = 2V and V_b = 3V.  **Figure 1**	**5**	**CO3**

Q4.	With neat block diagram, explain the operation of 8-bit successive approximation register type ADC. What is the maximum conversion time for this type of ADC.	**5**	**CO2**
	SECTION B		
Q5.	A regenerative comparator (Schmitt Trigger) circuit is shown in **Figure 3** Derive expressions for upper threshold and lower threshold voltages, V_{UT} and V_{LT} respectively and hence the value of hysteresis voltage V_H. Calculate V_{UT}, V_{LT}, V_H for the given values of $R_1 = 27\ k\Omega$ and $R_2 = 1\ k\Omega$.  **Figure 3**	**10**	**CO3**
Q6.	A sine wave with 2 V peak-to-peak amplitude and 1 kHz frequency is applied at the input of the circuit. Plot the input and output waveforms. Vcc = + 15 V  **Figure 4**	**10**	**CO3**
Q7.	Show that the Low pass RC network performs filtering and op-amp provides amplification?	**10**	**CO3**
Q8.	Design a circuit using op-amp to produce a square wave output whose output does not have any stable state and the Output has two Quasi-Stable states where output keeps on changing its own from 1state to another state and Vice Versa.	**10**	**CO4**
	SECTION-C		
Q 9	Design an astable multivibrator for an output frequency of 1 kHz but a variable duty cycle of 30% to 70%. Assume Vcc=12V.	**20**	**CO4**
Q 10	Design a timer, which should turn ON heater immediately after pressing a push button and should hold heater in 'ON-state' for 5 seconds.	**20**	**CO4**

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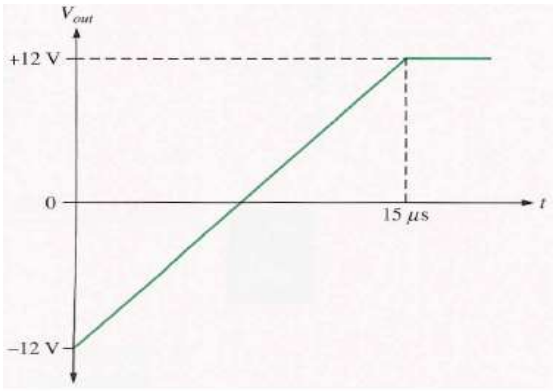
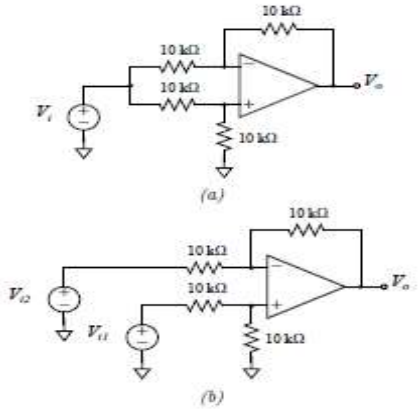
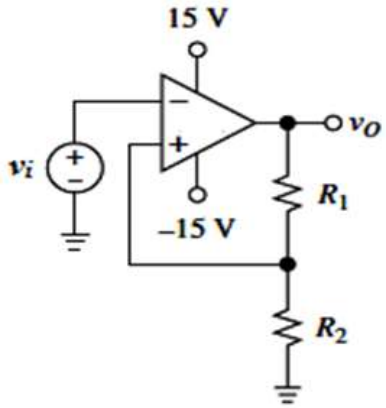
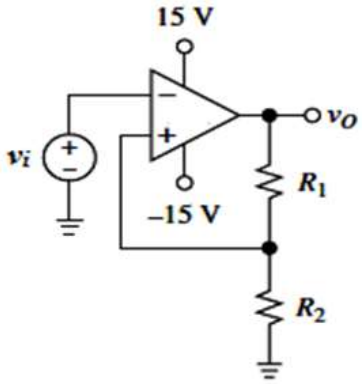
SECTION A

S. No.		Marks	CO
Q1.	Figure 1 shows the output voltage of an op-amp in response to the step input. Find the slew rate.  **Figure 1**	**5**	**CO2**
Q2.	With neat block diagram, explain the operation of 8-bit successive approximation register type ADC.	**5**	**CO1**
Q3.	Discuss why astable multivibrator is also known as free running oscillator.	**5**	**CO2**
Q4.	Determine V_{out} for the two connections shown in below **Figure 2**. Assume V_1 = 3V, V_a = 2V and V_b = 3V.	**5**	**CO3**

	 **Figure 2**		
SECTION B			
Q5.	Design a circuit using op-amp to produce a square wave output whose output does not have any stable state and the Output has two Quasi-Stable states where output keeps on changing its own from 1state to another state and Vice Versa.	**10**	**CO4**
Q6.	Show that the Low pass RC network performs filtering and op-amp provides amplification?	**10**	**CO3**
Q7.	A sine wave with 2 V peak-to-peak amplitude and 1 kHz frequency is applied at the input of the circuit. Plot the input and output waveforms. Vcc = + 15 V  **Figure 3**	**10**	**CO3**

Q8.	A regenerative comparator (Schmitt Trigger) circuit is shown in **Figure 4** Derive expressions for upper threshold and lower threshold voltages, V_{UT} and V_{LT} respectively and hence the value of hysteresis voltage V_H. Calculate V_{UT}, V_{LT}, V_H for the given values of $R_1 = 27\ k\Omega$ and $R_2 = 1\ k\Omega$.  	**10**	**CO3**
SECTION-C			
Q 9	Design an astable multivibrator which will flash the electric bulb such that its ON time will be 3 seconds and off time will be 1 seconds.	**20**	**CO4**
Q 10	Design a timer, which should turn ON heater immediately after pressing a push button and should hold heater in 'ON-state' for 5 seconds.	**20**	**CO4**