Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2022

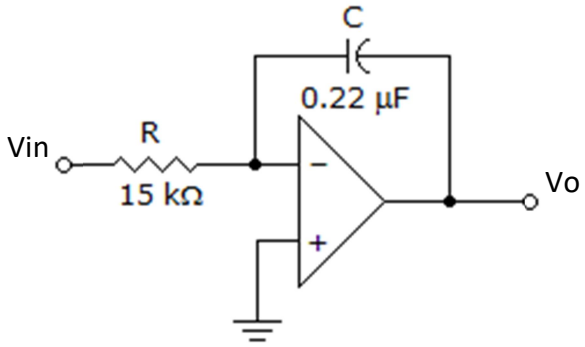
Programme Name: B.Tech Mechatronics | **Semester: IV**

Course Name: Analog & Digital Electronics | **Time: 03 hrs**

Course Code: ECEG 2030 | **Max. Marks: 100**

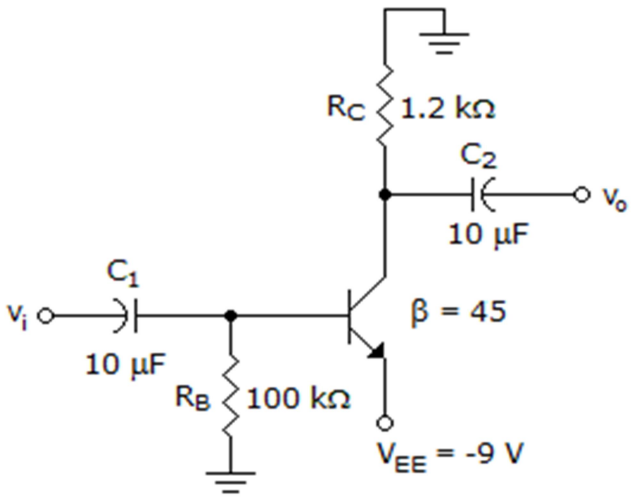
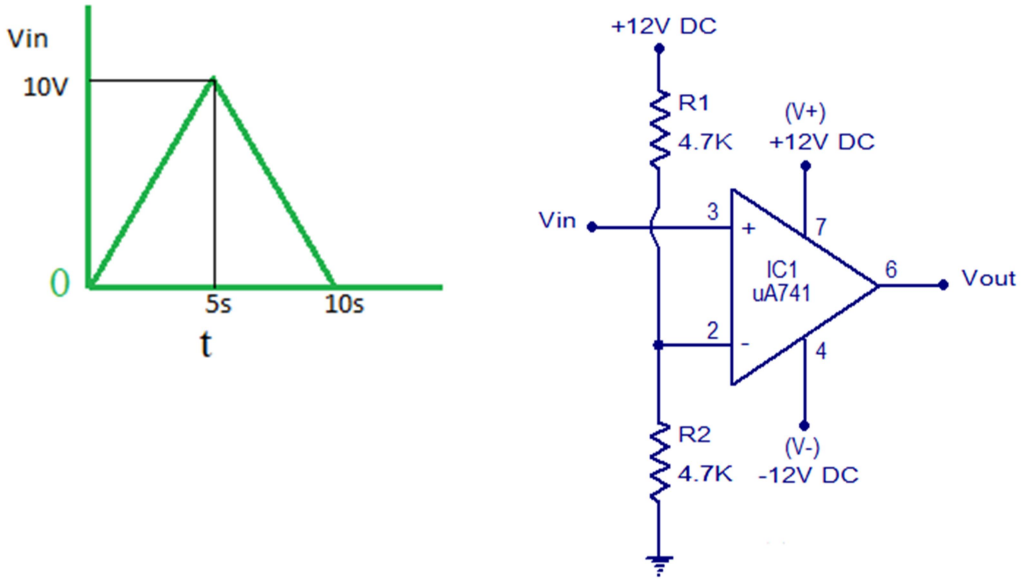
Nos. of page(s): 3

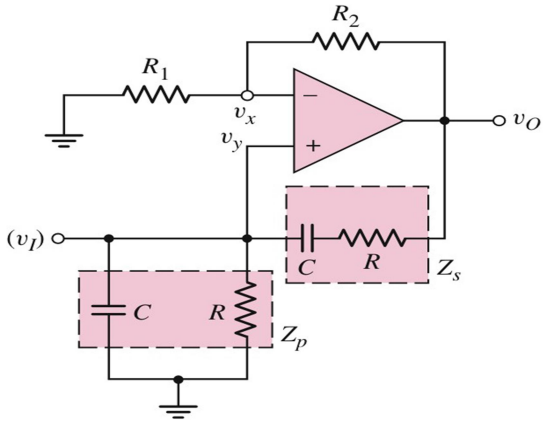
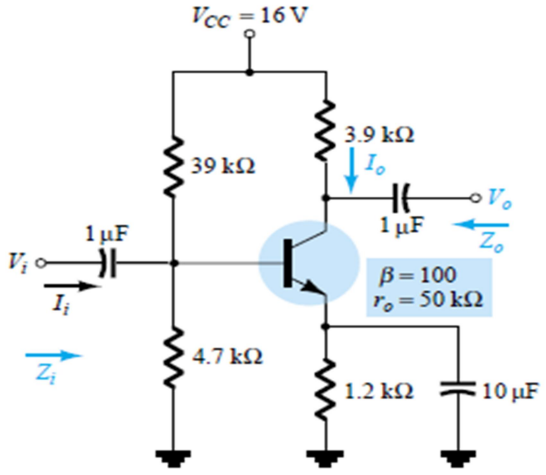
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
1	Evaluat the expression of the output voltage Vo for the given OPAMP circuit shown in Figure 1?  **Figure 1**	4	CO3
2	Convert the following numbers into the corresponding number system . A. $(88)_{10} = (?)_{16}$ B. $(1101.101100)_2 = (?)_{16}$ C. $(162)_8 = 10$	4	CO1
3	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 fedback to the input (feedback gain).	4	CO1
4	Illustrate the applications of the oscillators?	4	CO2
5	Define the "Barkhausen criterion" for sustained oscillations?	4	CO2

SECTION B
(4Qx10M= 40 Marks)

6	For the given CE BJT configuration as shown in Figure 2, evaluate the DC operating Points (I_{CQ}, V_{CEQ}) and also comment on its operating region?	10	CO1

	 **Figure. 2**		
7	Consider the given OPAMP network as shown in Figure. 3 and sketch the V_{OUT} waveform with proper explanation and working?  **Figure. 3**	**10**	**CO2**
8	Implement the 16X1 MUX by using 2X1 MUX.	**10**	**CO3**
9	Implement the 4 bit up counter by using T flip flop for number of states =16. **OR** Develop a full adder using two half adders. Support your combinational circuit with the help of a truth table?	**10**	**CO2**
	SECTION-C **(2Qx20M=40 Marks)**		

10	Implement the following Boolean function: F (A, B, C) = A'B'C + AB+ AB'C by using only one MUX with suitable number of inputs.	**20**	**CO4**
11	Derive the relation for frequency of sustained oscillations to design the Wien bridge oscillator for figure 6.. Illustrate the nature of oscillations if $R_2 = 4R_1$ and $R_2 = 0.5 R_1$. Draw neat sketch of the waveform for all the cases.  **Figure. 4** **OR** Evaluate the following for the given schematic below (Figure .5) (assume hie = 20k) (a) Calculate Zi and Zo. (b) Find Av and Ai. (c) For Vi = 500mV.sin250t plot the output voltage waveform Vo?  **Figure. 5**	**20**	**CO3**