Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2021

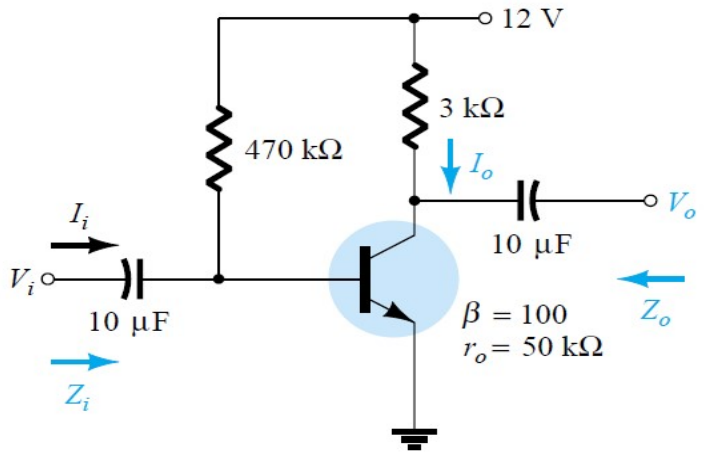
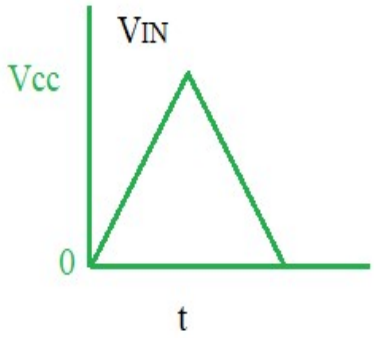
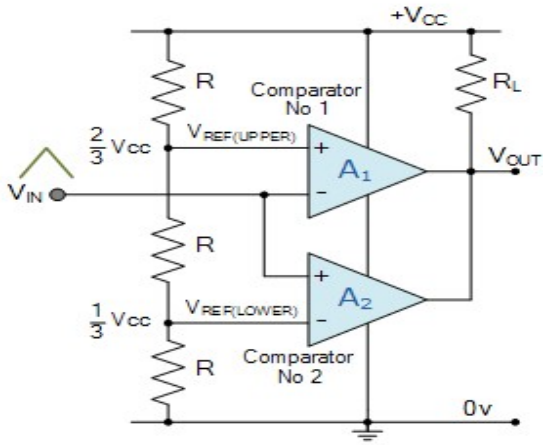
Programme Name: B.Tech Mechatronics **Semester: IV**
Course Name: Analog & Digital Electronics **Time: 03 hrs**
Course Code: ECEG 2030 **Max. Marks: 100**
Nos. of page(s): 2

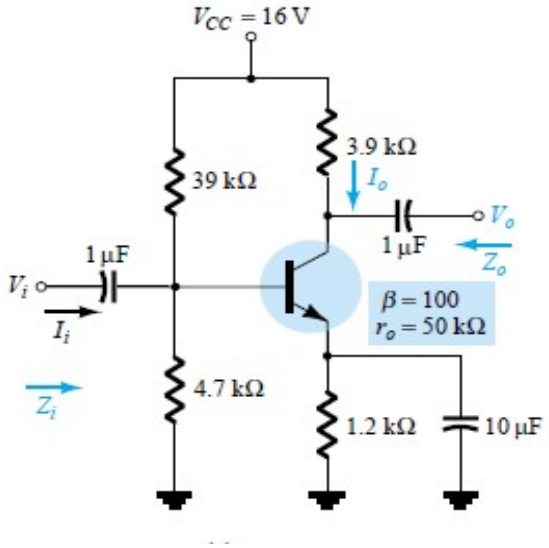
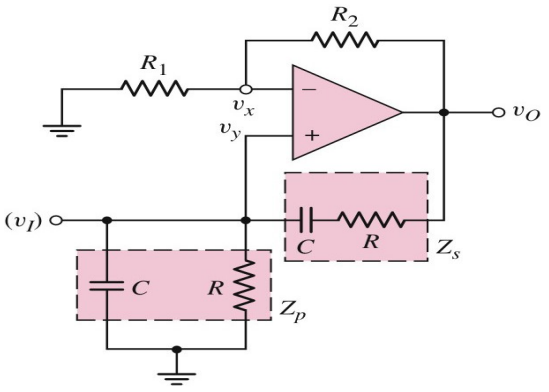
SECTION A (6X5) : Attempt all the questions

S. No.		Marks	CO
1	Choose the correct answer (MCQ type): 1.1 How many Half adder (HA) and OR gates are required to implement 4 bit parallel Full adder? A. 6 HA + 2 OR gate B. 8 HA + 2 OR gate C. 8HA + 4 OR gate D. 4 HA + 4 OR gate	**5**	**CO3**
2	Fill in the Blanks 2.1 …….. criterion is required for sustained oscillations. 2.2 The operating point of the BJT must lies in……..region to perform the operation of amplifier. 2.3 To implement 16x1 MUX, …… 4x1 MUX are required. 2.4 …… are used to count the sequence.	**5**	**CO1**
3	True/false 3.1 To design amplifiers positive feedback network is employed? (T/F) 3.2 Microphone kept in front of the speaker is an example of negative feedback system. (T/F) 3.3 Common emitter configured BJT amplifier produced 180 degree phase shift across input and output nodes. (T/F) 3.4 IC 741 belongs to operational amplifier (OPAMP) (T/F)	**5**	**CO1**
4	Illustrate the necessity of feedback system for the amplifiers?	**5**	**CO2**
5	Explain the design criteria for the oscillators?	**5**	**CO2**
6	Convert the following numbers into corresponding number system (2.5 marks each) A. $(60)_{10} = (?)_{16}$ B. $(001010110010100)_2 = (?)_{16}$ C. $(171)_8 = (?)_2$ D. $(1A4)_{16} = (?)_2$	**5**	**CO3**

SECTION B (5X10): Attempt all the questions

7	For the given CE BJT configuration as shown in Fig.1, evaluate the DC operating Points (I_{CQ}, V_{CEQ}) and also comment on its operating region?	**10**	**CO1**

	 **Fig.1**		
8	Consider the given OPAMP network as shown in Fig. 2 and sketch the V_{OUT} waveform with proper explanation and working?   **Fig.2**	**10**	**CO2**
9	Implement the following Boolean function with the suitable decoder (use only one decoder) **(8 M)** 9.1 $F_1(x,y,z)=\sum m(1,5,7)$ 9.2 $F_2(x,y,z)=\sum m(0,3)$ 9.3 $F_3(x,y,z)=\sum m(2,4,5)$	**10**	**CO3**
10	Develop a full adder using two half adders. Support your circuit with the help of a truth table? OR Implement the 4 bit down counter bu using JK flip flop for number of states =10.	**10**	**CO3**

11	Evaluate the following for the given schematic below (Fig.4) (assume hie = 20k) (a) Calculate Zi and Zo. (b) Find Av and Ai. (c) For Vi = 500mV sin250t plot the output waveform Vo ?  **Fig. 3**	**10**	**CO2**
	Section C (1X20)		
12	Evaluate the components (R,C,R_1,R_2) the given figure below (Fig.4) and derive the relation for frequency of sustained oscillations to design the wien bridge oscillator. Comment on 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. **(12 M)**  **Fig. 4**	**20**	**CO4**