Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

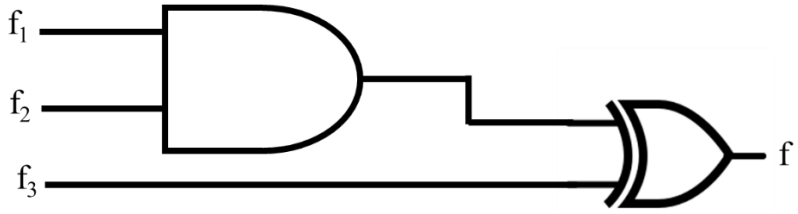
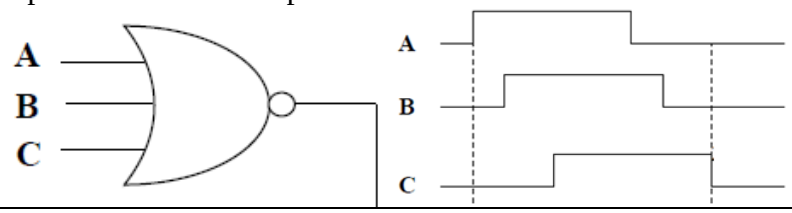
Course: Digital Electronics **Semester: I**

Program: BSc Computer Science **Time: 03 hrs.**

Course Code: ECEG1010 **Max. Marks: 100**

Instructions: Attempt all the questions.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Consider three 4-variable functions f_1, f_2 and f_3, which are expressed in sum-of-min terms as $f_1 = \sum(0, 2, 5, 8, 14)$, $f_2 = \sum(2, 3, 6, 8, 14, 15)$, $f_3 = \sum(2, 7, 11, 14)$. For the following circuit with one AND gate and one XOR gate, the output function f can be expressed as? 	**4**	**CO1**
Q 2	Convert each of the following binary numbers to octal, decimal, and hexadecimal formats. (a) $(111011101)_2$ (b) $(10101010111)_2$	**4**	**CO1**
Q 3	Sketch the output waveform for the 3-input NOR gate, showing the proper relation to the input. 	**4**	**CO2**
Q 4	Design a full-subtractor using suitable logic gates.	**4**	**CO2**
Q 5	Design a 16:1 multiplexer using 4:1 multiplexers.	**4**	**CO3**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Simplify the following expressions using K-map (a) $f(W,X,Y,Z) = \sum m(1,3,4,6,9,11,12,14)$ (b) $f(A,B,C) = \sum m(0,1,6,7) + \sum d\,(3,4,5)$	**10**	**CO1**
Q 7	Design a three-bit DOWN Asynchronous counter and draw the output waveforms.	**10**	**CO2**
Q 8	Draw the logic circuit of (a) J-K flip-flop using D flip-flop (b) T flip-flop using S-R flip-flop	**10**	**CO3**
Q 9	Design a four-bit self-correcting Ring counter using state diagram. OR Design a sequence generator using D flip-flop to generate the sequence 11001011.	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
Q 10	What are shift registers? Explain the operation of different types of shift registers along with their circuit diagrams using J-K flip-flops.	**20**	**CO3**
Q 11	Design a Mod-12 synchronous UP counter using D flip-flops. OR Design a 3-bit synchronous UP/DOWN counter using J-K flip-flops.	**20**	**CO4**