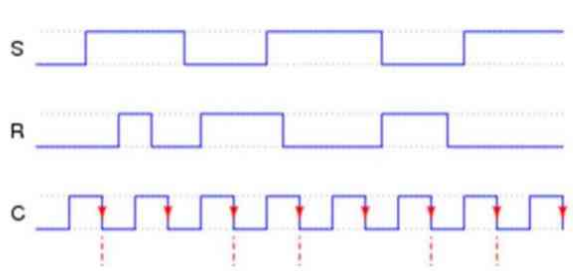


Vellore – 632014, Tamil Nadu, India
SCHOOL OF ELECTRICAL ENGINEERING
FALL SEMESTER 2023-2024
CAT-II

SLOT: F1+TF1

Programme Name & Branch:	B.Tech (EEE & EIE)	Course Code:	EEE206L
Course Name:	Digital Electronics	Class Number(s):	0102931
Faculty Members:	Dr. Vijayakumar D Dr. Rashmi Rajan Das Dr. Balaji S	Duration:	90 Mins
Date of the Examination:		Max. Marks:	50

General Instructions: Answer all the questions

Q. No	Questions	Marks
1.	Design the combinational circuit which produces three outputs based on the relative magnitudes of given two binary numbers and implement using Verilog code.	10
2.	Design and implement using Verilog code of decoder that decode the binary-coded decimal to display decimal value in segment.	10
3.	Draw the output Q and Q' timing diagram for the S-R flip flop with negative edge triggered.  Convert the old flip flop into new flip flop (positive edged clock) as given in the characteristic table 1.1 below and also draw the output timing diagram.	2+8

	<table><tr><th>Old FF input 1 W</th><th>Q_n</th><th>Q_{n+1}</th><th>Old FF Input 1 U</th><th>Old FF Input 2 V</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>X</td></tr><tr><td>0</td><td>1</td><td>0</td><td>X</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td><td>X</td></tr><tr><td>1</td><td>1</td><td>1</td><td>x</td><td>0</td></tr></table>	Old FF input 1 W	Q_n	Q_{n+1}	Old FF Input 1 U	Old FF Input 2 V	0	0	0	0	X	0	1	0	X	1	1	0	1	1	X	1	1	1	x	0																																																																		
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4.	Definition of flip flop is tabulated as truth table in table 2.1 below. Following table 2.1, characteristic table is given in table 2.2. Excitation is obtained from characteristic table and given in table 2.3. Table 2.1 <table><tr><th>U</th><th>V</th><th>$Q(t + 1)$</th><th>Remarks</th></tr><tr><td>0</td><td>0</td><td>1</td><td>Set</td></tr><tr><td>0</td><td>1</td><td>$\bar{Q}(t)$</td><td>Toggle</td></tr><tr><td>1</td><td>0</td><td>$Q(t)$</td><td>Hold</td></tr><tr><td>1</td><td>1</td><td>0</td><td>Reset</td></tr></table> Table 2.2 <table><tr><th>Minterm</th><th>$Q(t)$</th><th>U</th><th>V</th><th>$Q(t + 1)$</th></tr><tr><td>m_0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>m_1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>m_2</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>m_3</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>m_4</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>m_5</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>m_6</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>m_7</td><td>1</td><td>1</td><td>1</td><td>0</td></tr></table> Table 2.3 <table><tr><th>$Q(t)$</th><th>$Q(t + 1)$</th><th>U</th><th>V</th><th>Remarks</th></tr><tr><td>0</td><td>0</td><td>1</td><td>X</td><td>Consider minterms 2 and 3. U is 1 and V may be either 0 or 1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>X</td><td>Consider minterms 0 and 1. U is 0 and V may be either 0 or 1</td></tr><tr><td>1</td><td>0</td><td>X</td><td>1</td><td>Consider minterms 5 and 7. V is 1 and U may be either 0 or 1</td></tr><tr><td>1</td><td>1</td><td>X</td><td>0</td><td>Consider minterms 4 and 6. V is 0 and U may be either 0 or 1</td></tr></table>	U	V	$Q(t + 1)$	Remarks	0	0	1	Set	0	1	$\bar{Q}(t)$	Toggle	1	0	$Q(t)$	Hold	1	1	0	Reset	Minterm	$Q(t)$	U	V	$Q(t + 1)$	m_0	0	0	0	1	m_1	0	0	1	1	m_2	0	1	0	0	m_3	0	1	1	0	m_4	1	0	0	1	m_5	1	0	1	0	m_6	1	1	0	1	m_7	1	1	1	0	$Q(t)$	$Q(t + 1)$	U	V	Remarks	0	0	1	X	Consider minterms 2 and 3. U is 1 and V may be either 0 or 1	0	1	0	X	Consider minterms 0 and 1. U is 0 and V may be either 0 or 1	1	0	X	1	Consider minterms 5 and 7. V is 1 and U may be either 0 or 1	1	1	X	0	Consider minterms 4 and 6. V is 0 and U may be either 0 or 1	10
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