Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

End Semester Examination

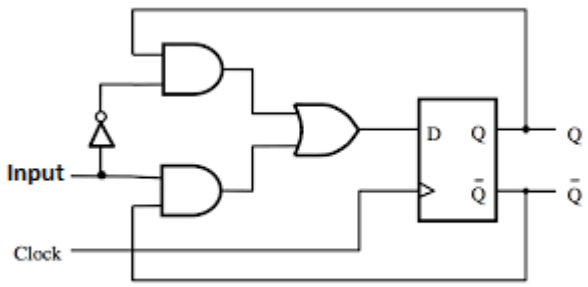
September-4th Sept 2021

Max. Marks: 60 **Duration: 130 min**
Class: F.E. **Semester: II**
Course Code: EC101 **Branch: E T R X / E X T C**

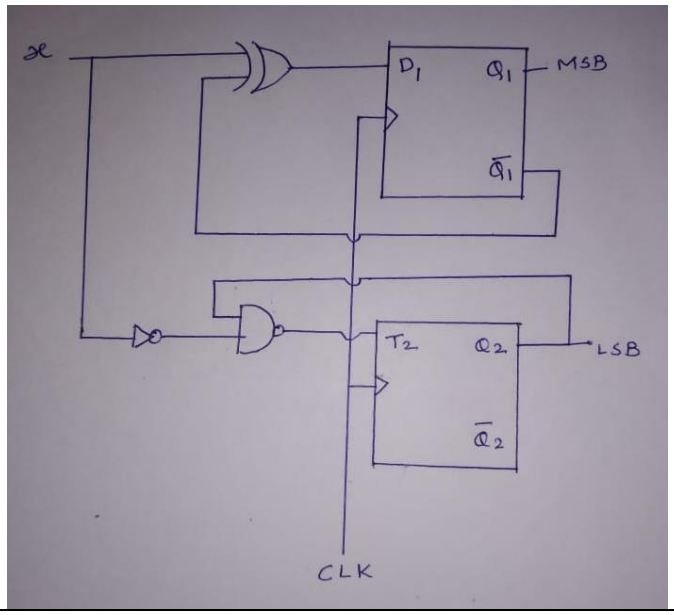
Name of the Course: Digital Systems and Microprocessor

Instructions:

(1) All Questions are Compulsory.
(2) Draw neat diagrams, wherever necessary
(3) Assume suitable data if necessary

Q.No.	Question	Max. Marks	CO
Q.1	**Attempt any 5 of the following**		
(A)	Design a combinational Circuit only using **NAND** gates for controlling panel light of satellite control room. **The Light should go ON if** The pressure in fuel and oxidizer tank is equal to or above the required minimum and there are 10 minutes or less for the satellite to lift off. **or** The pressure in fuel tank is below the required minimum but there are more than 10 minutes for the satellite to lift off. **or** The pressure in oxidizer tank is below the required minimum but there are more than 10 minutes for the satellite to lift off.	03	CO1
(B)	Find out the behavior of the following circuit. 	03	CO1

<table>
<tr><td>(C)</td><td>Design a minimum circuit which multiplies a 2-bit binary number with another 2 bit binary no, and produces the binary answer</td><td>03</td><td>CO2</td></tr>
<tr><td>(D)</td><td>Design a 2-4-2-1 to Excess 3 BCD code converter.</td><td>03</td><td>CO1</td></tr>
<tr><td>(E)</td><td>What are glinches in digital circuits? What are the causes of these glinches? How can these be</td><td>03</td><td>CO1</td></tr>
<tr><td>(F)</td><td>What is race around problem with the flip flops? How it is mitigated?</td><td>03</td><td>CO1</td></tr>
<tr><td>Q.2 A)</td><td>Obtain a “BMC” flip flop using T flip flop. The “BMC” flip flop has following truth table.
<table>
<tr><th>B</th><th>M</th><th>C</th><th>Output</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>Q_n</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>Q_n</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>$\overline{Q_n}$</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>$\overline{Q_n}$</td></tr>
</table></td><td>05</td><td>CO3</td></tr>
<tr><td>Q.2 B)</td><td>Realize the following function, $F(A,B,C,D)= \sum m(0,1,3,7,9,15) + d(8,11)$ using…
<ol type="a">
AND-OR network
NAND-NAND
OR-AND
NOR-NOR
16:1 Multiplexer
</td><td>05</td><td>CO2</td></tr>
<tr><td>Q.2 C)</td><td>Reduce the given State diagram and obtain reduced table using Normal Method and Implication Chart Method
<table>
<tr><td>X_1X_2</td><td>00</td><td>01</td><td>10</td><td>11</td></tr>
<tr><td>A</td><td>D,0</td><td>D,0</td><td>F,0</td><td>A,0</td></tr>
<tr><td>B</td><td>C,1</td><td>D,0</td><td>E,1</td><td>F,0</td></tr>
<tr><td>C</td><td>C,1</td><td>D,0</td><td>E,1</td><td>A,0</td></tr>
<tr><td>D</td><td>D,0</td><td>B,0</td><td>A,0</td><td>F,0</td></tr>
<tr><td>E</td><td>C,1</td><td>F,0</td><td>E,1</td><td>,0</td></tr>
<tr><td>F</td><td>D,0</td><td>D,0</td><td>A,0</td><td>F,0</td></tr>
<tr><td>G</td><td>G,0</td><td>G,0</td><td>A,0</td><td>A,0</td></tr>
<tr><td>H</td><td>B,1</td><td>D,0</td><td>E,1</td><td>A,0</td></tr>
<tr><td>Q_n</td><td colspan="4">Q_{n+1}, Output</td></tr>
</table></td><td>05</td><td>CO3</td></tr>
</table>

Q.3	**Solve any 3**		
(A)	Using **Quine Mc'Clusky** Method minimize the given expression. f(A,B,C,D)= ∑m(0,2,4,5,6,7,8,10,14)	05	CO1
(B)	**Analyze** the following Sequential machine and obtain the state diagram. 	05	CO3
(C)	Design a circuit which count only odd states when control line is high, and counts only even states when control line is low. The counter in both cases, should come out from illegal states automatically.	05	CO4
(D)	Design a sequency generator 1001100010011000.. using (a) N bit counter N bit shift register Compare these designs.	05	CO3
Q.4	**Solve Any 3.**		
(A)	What are essential requirements of a central processing unit of a microcomputer? List out and explain any 4 requirements in brief.	05	CO4
(B)	Draw the timing diagram for the **INR M** instruction. [No explanation required]	05	CO5
(C)	There are 50 numbers stored in the memory from 5000H. Write a program to sort out only odd numbers in the array having even parity. Store such numbers in the memory 6000H. How many such members are sorted out. Store this answer at 7000.	05	CO5
(D)	Compute the time of execution for the following program, assuming a crystal frequency of 2 MHz. LXIH, 1000H Again DCX H MOV A, H ORA L JNZ again HLT	05	CO5