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From the given information 4 variables are found.

They are :

- (i) study table, T
- (ii) Couch, C
- (iii) shelf, S
- (iv) Desk chair, D

Based on the conditions output "F" will be "1" when these combinations will be "1".

T C, T S, T D

$$\begin{aligned}\text{Truth table input} &= 2^n \\ &= 2^4 \\ &= 16\end{aligned}$$

Truth table to a combinational circuit :

input reference	C	D	S	T	F	min term	Max term
0	0	0	0	0	0		$C + D + S + T$
1	0	0	0	1	0		$C + D + S + T'$
2	0	0	1	0	0		$C + D + S' + T$
3	0	0	1	1	1	$C'D'ST$	
4	0	1	0	0	0		$C + D' + S + T$
5	0	1	0	1	1	$C'DS'T$	
6	0	1	1	0	0		$C + D' + S' + T$
7	0	1	1	1	0		$C + D' + S' + T'$
8	1	0	0	0	0		$C' + D + S + T$
9	1	0	0	1	1	$CD'S'T$	
10	1	0	1	0	0		$C' + D + S' + T$
11	1	0	1	1	0		$C' + D + S' + T'$
12	1	1	0	0	0		$C' + D' + S + T$
13	1	1	0	1	0		$C' + D' + S + T'$
14	1	1	1	0	0		$C' + D' + S' + T$
15	1	1	1	1	0		$C' + D' + S' + T'$

1<sup>st</sup> and 2<sup>nd</sup> Canonical forms of the combinational circuits of the truth table.

	Shorthand notation	Function
1 <sup>st</sup> Canonical form	$F = \Sigma(3, 5, 9)$	$F = C'D'ST + C'DS'T + CD'S'T$
2 <sup>nd</sup> Canonical form	$F = \Pi(0, 1, 2, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15)$	$F = (C+D+S+T)(C+D+S+T')$ $(C+D+S'+T)(C+D'+S+T)$ $(C+D'+S'+T)(C+D'+S'+T')$ $(C'+D+S+T)(C'+D+S'+T)$ $(C'+D+S'+T')(C'+D'+S+T)$ $(C'+D'+S+T')(C'+D'+S'+T)$ $(C'+D'+S'+T')$