vii) $p = (a \vee b) \wedge (c \vee d)$

a) Clauses are - a, b, c, d

b) Clause a

$$p = (a \vee F) \wedge (T \vee T)$$
$$= a \vee F$$
$$= a$$
$$p_a = \neg b \wedge (c \vee d)$$

Clause b

$$p = (F \vee b) \wedge (T \vee T)$$
$$= F \vee b$$
$$= b$$
$$p_b = \neg a \wedge (c \vee d)$$

Clause c

$$p = (T \vee T) \wedge (c \vee F)$$
$$= c \vee F$$
$$= c$$
$$p_c = (a \vee b) \wedge \neg d$$

Clause d

$$p = (T \vee T) \wedge (F \vee d)$$
$$= F \vee d$$
$$= d$$
$$p_d = (a \vee b) \wedge \neg c$$

$p_d \equiv (a \vee b) \wedge (c \vee d)$

c)

	a	b	c	d	$(a \vee b) \wedge (c \vee d)$	
1	T	T	T	T	T	
2	T	T	T	F	T	– c determine predicate
3	T	T	F	T	T	– d determine pred
4	T	T	F	F	F	– c/d determine pred
5	T	F	T	T	T	– a
6	T	F	T	F	T	– a/c
7	T	F	F	T	T	– a/d
8	T	F	F	F	F	– c/d
9	F	T	T	T	T	– b
10	F	T	T	F	T	– b/c
11	F	T	F	T	T	– b/d
12	F	T	F	F	F	– c/d
13	F	F	T	T	F	– a/b
14	F	F	T	F	F	– a/b
15	F	F	F	T	F	– a/b
16	F	F	F	F	F	

d) $a = \{5,6,7\} \times \{13,14,15\}$

$b = \{9,10,11\} \times \{13,14,15\}$

$c = \{2,6,10\} \times \{4,8,12\}$

$d = \{3,7,11\} \times \{4,8,12\}$

e) $a = \{5,6,7\} \times \{13,14,15\}$

$b = \{9,10,11\} \times \{13,14,15\}$

$c = \{2,6,10\} \times \{4,8,12\}$

$d = \{3,7,11\} \times \{4,8,12\}$

f) $a = \{5,13\}, \{6,14\}, \{7,15\}$

$b = \{9,13\}, \{10,14\}, \{11,15\}$

$c = \{2,4\}, \{6,8\}, \{10,12\}$

$d = \{3,4\}, \{7,8\}, \{11,12\}$

ix) $p = a \vee b \vee (c \wedge d)$

a) Clauses are - a, b, c, d

b) Clause a

$p = a \vee F \vee (F \wedge F)$

$= a \vee F \vee F$

$= a$

$p_a = \neg(b \vee (c \wedge d))$

$= \neg b \wedge (\neg c \vee \neg d)$

Clause b

$p = F \vee b \vee (F \wedge F)$

$= F \vee b \vee F$

$= b$

$p_b = \neg(a \vee (c \wedge d))$

$= \neg a \wedge (\neg c \vee \neg d)$

Clause c

$p = F \vee F \vee (c \wedge T)$

$= c \wedge T$

$= c$

$p_c = \neg(a \vee b \vee d)$

$= \neg a \wedge \neg b \wedge d$

clause d

$p = F \vee F \vee (T \wedge d)$

$= T \wedge d$

$= d$

$p_d = \neg(a \vee b \vee c)$

$= \neg a \wedge \neg b \wedge c$

c)

	a	b	c	d	$a \vee b \vee (c \wedge d)$	clause determining predicate
1	T	T	T	T	T	
2	T	T	T	F	T	
3	T	T	F	T	T	
4	T	T	F	F	T	
5	T	F	T	T	T	
6	T	F	T	F	T	

6	T	F	T	F	T	a
7	T	F	F	T	T	a
8	T	F	F	F	T	a
9	F	T	T	T	T	
10	F	T	T	F	T	b
11	F	T	F	T	T	b
12	F	T	F	F	T	b
13	F	F	T	T	T	c/d
14	F	F	T	F	F	a/b/d
15	F	F	F	T	F	a/b/c
16	F	F	F	F	F	a/b

d) $a = \{6,7,8\} \times \{14,15,16\}$

$b = \{10,11,12\} \times \{14,15,16\}$

$c = \{13\} \times \{15\}$

$d = \{13\} \times \{14\}$

e) $a = \{6,7,8\} \times \{14,15,16\}$

$b = \{10,11,12\} \times \{14,15,16\}$

$c = \{13\} \times \{15\}$

$d = \{13\} \times \{14\}$

f) $a = \{6,14\}, \{7,15\}, \{8,16\}$

$b = \{10,14\}, \{11,15\}, \{12,16\}$

c = {13, 15}

d = {13, 14}