

4. a) $\text{expr}_1 \rightarrow \text{expr}_2 \text{'|'} \text{term} \{ \text{expr}_1.t = \text{expr}_2.t \mid \text{term}.t; \}$
 $\quad \mid \text{term} \{ \text{expr}_1.t = \text{term}.t; \}$
 $\text{term}_1 \rightarrow \text{term}_2 \text{'\&'} \text{temp} \{ \text{term}_1.t = \text{term}_2.t \ \& \ \text{temp}.t; \}$
 $\quad \mid \text{temp} \{ \text{term}_1.t = \text{temp}.t; \}$
 $\text{temp} \rightarrow \text{'\u'} \text{factor} \{ \text{temp}.t = \text{'\u'} \text{factor}.t; \}$
 $\text{factor} \rightarrow (\text{expr}) \{ \text{factor}.t = \text{expr}.t; \}$
 $\quad \mid 0 \{ \text{factor}.t = 0; \}$
 $\quad \mid 1 \{ \text{factor}.t = 1; \}$

$\text{expr} \rightarrow \text{term}_1$
 $\rightarrow \text{term} \text{'\&'} \text{temp}$
 $\rightarrow \text{temp} \text{'\&'} \text{temp}$
 $\rightarrow \text{factor} \text{'\&'} \text{temp}$
 $\rightarrow \text{'|'} \text{'\&'} \text{temp}$
 $\rightarrow \text{'|'} \text{'\&'} \text{factor}$
 $\rightarrow \text{'|'} \text{'\&'} (\text{expr})$
 $\rightarrow \text{'|'} \text{'\&'} (\text{expr} \text{'|'} \text{term})$
 $\rightarrow \text{'|'} \text{'\&'} (\text{term} \text{'|'} \text{term})$
 $\rightarrow \text{'|'} \text{'\&'} (\text{temp} \text{'|'} \text{term})$
 $\rightarrow \text{'|'} \text{'\&'} (\text{factor} \text{'|'} \text{term})$
 $\rightarrow \text{'|'} \text{'\&'} (0 \text{'|'} \text{temp})$
 $\rightarrow \text{'|'} \text{'\&'} (0 \text{'|'} \text{'\u'} \text{factor})$
 $\rightarrow \text{'|'} \text{'\&'} (0 \text{'|'} \text{'\u'} 1)$

