## Department of Computer Science Engineering, SVNIT, Surat. Course: CO208 Automata and Formal Languages Tutorial – 12

(Context Free Grammar- Normal Form(CNF,GNF)

1. Convert the given grammar to CNF

$$\begin{array}{c} a \rightarrow qAD \\ A \rightarrow aB \mid bAB \\ B \rightarrow b \\ D \rightarrow d \end{array}$$

2. Convert the given grammar to CNF

$$S \rightarrow 1A/0B$$
  
 $A \rightarrow 1AA/0S/0$   
 $B \rightarrow 0BB/1S/1$ 

3. Convert the given grammar to CNF

$$S \rightarrow aX \mid Y \mid bab$$
  
 $X \rightarrow / \setminus Y$   
 $Y \rightarrow bb \mid bXb$ 

4. Convert the given grammar to GNF

$$S \rightarrow AB|BC$$

$$A \rightarrow AB|C$$

$$B \rightarrow AA|CBb$$

$$C \rightarrow a|b$$

5. Convert the given grammar to GNF-

$$s \rightarrow AB$$

$$A \rightarrow BS|b$$

$$B \rightarrow SA|a$$

6. Convert the given grammar to GNF-

 $S \rightarrow AA \mid 0$  $A \rightarrow SS \mid 1$