

## TUTORIAL 7

**Thapar Institute of Engineering and Technology Patiala**

**Computer Science and Engineering Department (CSED)**

1. Write a CFG for the following:

- a.  $\{a^n b^n \mid n \geq 1\}$
- b.  $\{a^n b^m \mid n, m \geq 1\}$
- c.  $\{a^n b^m \mid n \geq 1, m \geq 1\}$
- d.  $\{a^n b^m \mid n \geq 1, m \geq 1\}$
- e. The set of odd-length strings in  $\{a, b\}^*$  with middle symbol  $a$ .

2. Write a CFG for the language of even palindrome and odd palindrome. Also design the PDA for the same.

3. Write a CFG for  $\{a^n b^m \mid n, m \geq 1\}$