🧠 CCSL BOT EDITION – Rule Book v1.0

🎮 SECTION 1 – DEFINITIONS

1.1 Card Set:
Available cards: 0, 1, 2, 3, 4, 6

1.2 Turn:
A single card selection by the **player**, responded to by the **bot**.

1.3 Over:
6 turns (6 card selections = 1 over)

1.4 Innings:
One phase where either the player or the bot bats for the full over(s).

1.5 Match:
A full game has **2 innings**:

- Player Bats → Bot Bowls

- Bot Bats → Player Bowls

⚙️ SECTION 2 – MATCH FORMAT

2.1 Overs:
Configurable:

- 1 Over → 6 balls

- 2 Overs → 12 balls

- 3 Overs → 18 balls

2.2 Game Flow:

1. Player bats first → chooses cards

2. Bot replies using Q-Learning model

3. If same card is played → Player is OUT (unless Free Hit is active)

4. After first innings ends → Bot bats and player bowls

5. Final scores compared → Higher score wins

🏏 SECTION 3 – BATTING RULES (PLAYER & BOT)

3.1 Power Cards
Cards: 4 and 6 are **Power Cards**

Overs	Max Power Cards (total 4s & 6s)
1	2
2	4
3	6

3.2 Cooldown Rule:
After playing a 6, you **cannot** play another 6 for the next **2 turns**

3.3 Out Condition:
If the **bot's card** matches the **player's card**, the batsman is **OUT**

3.4 Free Hit Rule:

- If the **bot violates No Ball rule**, next ball is a **Free Hit**

- In Free Hit, even if cards match, **NOT OUT**

3.5 Score Addition:

- Valid cards (not OUT/pass) → runs added to batsman score

- Run is calculated as the card value

- No ball adds +1 to total runs

🎯 SECTION 4 – BOWLING RULES (BOT & PLAYER)

4.1 No Ball Condition (BOT & PLAYER):

- If the same card is played **2 times in a row** while bowling

- Triggered only for high-impact cards (like 6)

- +1 run added to batsman

- Next turn = Free Hit

4.2 OUT Condition (Reminder):

If both player & bot play the **same number**, the batsman is **OUT** (unless in Free Hit mode)

🧠 SECTION 5 – RL BOT INTELLIGENCE

5.1 Bot Decision-Making:

- Uses a trained **Q-Table** based on game state

- Applies **Bellman Update** after every turn

- Factors in:

    ○ Turn number

    ○ Power card usage

    ○ Cooldown active or not

    ○ Free Hit status

5.2 Game States:

State format: `T<turn>_P<powerCard>_C<cooldown>_F<freeHit>`

5.3 Bellman Formula Used:

$$Q(s,a) = Q(s,a) + \alpha\left[r + \gamma \cdot \max Q(s',a') - Q(s,a)\right]$$

- α = Learning Rate

- γ = Discount Factor

- r = Reward = Run scored or penalty for OUT

🏆 SECTION 6 – ENDING THE GAME

6.1 End of Innings:

- Occurs when:

    - All balls played

    - OR batsman gets OUT

6.2 Match End:

- After 2nd innings completes

- Compare scores → Higher wins

6.3 Tie Rule:

- Optional: Super Over can be implemented (not active in current bot version)