Here is a **Project Report** for your Java-based **Turn-Based Tank Battle Game**. This document is structured for submission as a final year or academic project report.

**🎯 Project Report: Turn-Based Tank Battle Game**

**📘 Title:**

**Turn-Based Tank Battle Game using Java**

**🔖 Abstract:**

The "Turn-Based Tank Battle Game" is a 2D graphical game built using Java Swing that simulates a two-player tank battle. Each player can move their tank, adjust angle and power, and fire missiles in turn. The game demonstrates basic principles of projectile motion, turn-based logic, and real-time GUI interaction. This project showcases core concepts of object-oriented programming, physics-based animations, and user interface development in Java.

**🔧 Technologies Used:**

* **Programming Language**: Java
* **GUI Library**: Java Swing & AWT
* **Development Environment**: IntelliJ IDEA / Eclipse / NetBeans
* **OS Compatibility**: Windows, Linux, macOS

**🧩 Modules Overview:**

**1. Game Window (GameFrame)**

* Creates the main window using JFrame.
* Sets resolution, title, and integrates the game panel.

**2. Game Panel (GamePanel)**

* Manages UI components and game rendering.
* Handles game loop, animation, player turns, missile movement, and hit detection.

**3. Tank**

* Represents each player's tank.
* Includes position, movement (left/right), drawing on canvas.

**4. Missile**

* Handles physics of projectile motion using angle and power.
* Updates position frame by frame and checks for collisions.

**5. Player**

* Stores player's name and turn handling.

**🎮 Gameplay Features:**

| **Feature** | **Description** |
| --- | --- |
| 2D Canvas | Simple 2D environment with tanks on ground. |
| Turn-Based Mechanics | Players take turns to fire based on angle/power input. |
| Tank Movement | Players can move tanks left/right during their turn. |
| Physics-Based Firing | Missiles follow a realistic parabolic path. |
| Hit Detection | Checks missile collision with opposing tank. |
| Victory Condition | Displays hit alert when one tank is hit and resets the game. |

**🎯 Controls:**

| **Player** | **Move Left** | **Move Right** | **Fire Control** |
| --- | --- | --- | --- |
| Player 1 | ← | → | Set angle/power and click **FIRE** |
| Player 2 | A | D | Set angle/power and click **FIRE** |

**💡 Key Concepts Demonstrated:**

* Object-Oriented Programming (OOP)
* GUI using Swing
* Real-time animations
* Timer-based game loop
* Collision detection
* Simple physics simulation (projectile motion)
* Event-driven programming (keyboard and button events)

**📈 Limitations:**

* No AI: Only two-player (no computer opponent).
* Basic collision detection (rectangle bounds).
* No health points, terrain effects, or power-ups.
* No sound effects.

**🚀 Future Enhancements:**

* Add health bars for tanks.
* Add terrain and wind mechanics.
* Multiplayer over network using Java Sockets.
* Add sound effects and background music.
* Improve UI with animations and scores.

**📷 Screenshots (Optional):**

*Include screenshots of game interface, tanks firing, and hit detection.*

**👨‍💻 Team Members:**

* **Developer**: [Your Name]
* **Roll Number**: [Your Roll Number]
* **Course**: B.E. Information Technology
* **College**: [Your College Name]

**📚 References:**

* Oracle Java Documentation
* Stack Overflow
* GeeksforGeeks Java Swing Tutorials

Would you like me to format this into a **Word** or **PDF** document for submission?