Assignment#1:

Each of these exercises will help you explore the different properties of rectifiers, Zener diodes, and BJTs while getting hands-on experience with Tinkercad's simulation environment.
Provide your solution as a single zip file with the student ID as file name:

1. **Half-Wave Rectifier Circuit**:
    - Components: 1 diode (e.g., 1N4007), AC power source, resistor, and oscilloscope.
    - Instructions: Connect the diode in series with the resistor and the AC source. Observe the waveform on the oscilloscope to see the rectified output.
2. **Full-Wave Rectifier (Center-Tapped)**:
    - Components: 2 diodes, center-tapped transformer, resistor, and oscilloscope.
    - Instructions: Connect the diodes to each side of the center-tap. Connect the load resistor and observe the full-wave rectified output on the oscilloscope.
3. **Full-Wave Rectifier (Bridge Configuration)**:
    - Components: 4 diodes, AC power source, resistor, and oscilloscope.
    - Instructions: Arrange the diodes in a bridge configuration with the AC source and resistor. Observe the full-wave rectified waveform on the oscilloscope.
4. **Capacitive Filtering in Rectifiers**:
    - Components: Full-wave rectifier setup, capacitor (for filtering), and oscilloscope.
    - Instructions: Add a capacitor across the load resistor. Observe the waveform and note the smoothing effect of the capacitor.
5. **Zener Diode Voltage Regulation**:
    - Components: Zener diode, DC power source, resistor, and voltmeter.
    - Instructions: Connect the Zener diode in reverse bias with the resistor. Adjust the voltage and observe how the Zener diode maintains a stable output.
6. **BJT Characteristics in Common Emitter (CE) Configuration**:
    - Components: NPN BJT, resistors, power source, and multimeter.
    - Instructions: Set up the BJT in CE mode. Measure the input and output voltages and plot the input/output characteristics.
7. **BJT Characteristics in Common Base (CB) Configuration**:
    - Components: NPN BJT, resistors, power source, and multimeter.
    - Instructions: Connect the BJT in CB configuration. Measure and plot the input and output characteristics.
8. **BJT Characteristics in Common Collector (CC) Configuration**:
    - Components: NPN BJT, resistors, power source, and multimeter.
    - Instructions: Set up the BJT in CC mode. Measure the characteristics and observe the low output impedance.
9. **Transistor as an Electronic Switch**:
    - Components: NPN BJT, LED, resistor, and DC power source.
    - Instructions: Connect the transistor in a switching configuration with the LED. Adjust the base current to switch the LED on and off.
10. **BJT Amplification in Common Emitter (CE) Configuration**:

- Components: NPN BJT, AC signal source, power source, resistors, and oscilloscope.
- Instructions: Connect the BJT in CE mode and apply an AC input. Observe the amplified output signal on the oscilloscope.