

PROBLEM STATEMENTS FOR RECRUITMENT 2025

(ASTC ELECTRONICS DIVISION)

PROBLEM STATEMENT 2:

Title:

Program and integrate an **ESP32** microcontroller with other components to demonstrate a simplified **ADCS (Attitude Determination and Control System)** model for a CubeSat.

Background:

The ADCS subsystem controls the orientation of a satellite in orbit using sensor feedback (gyroscope, accelerometer, magnetometer, etc.) and actuators (reaction wheels, magnetorquers). While building a full ADCS is complex, you can simulate the logic and control system at a smaller scale.

Objective:

Use an **ESP32** to read sensor data (simulated or real) and control actuators that mimic CubeSat attitude correction mechanisms.

Requirements:

- ESP32 must interface with at least **one sensor** (e.g., MPU6050, BNO055, or simulated input).
- Use the sensor data to determine “attitude” or orientation parameters.
- Implement control logic that drives an **output actuator** such as a motor, LED matrix, or servo to represent correction or stabilization.
- Optional: display sensor readings or system state on a **serial monitor, OLED screen, or via Wi-Fi dashboard**.
- Provide commented code and a wiring diagram.

Deliverables:

- ESP32 code (Arduino/C++) and connection schematic.
- Demonstration video (if possible) or screenshots showing working integration.
- Short explanation (1–2 pages) on system logic, sensor calibration, and control response.