



Unit-1 INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS

1. What is a UAS and what are its primary components?

Answer: A UAS (Unmanned Aircraft System) is an aircraft operated without a pilot onboard, consisting of three primary components:

1. **Unmanned Aircraft (UA):** The aircraft itself, which may include a drone or UAV.
 2. **Ground Control Station (GCS):** The interface where operators control the UAS and monitor its performance.
 3. **Communication System:** The link between the UA and the GCS for sending and receiving commands and data.
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2. Classify UAS based on their size and operational range.

Answer: UAS can be classified as:

1. **Micro UAS:** Very small drones, often used for recreational or indoor purposes, with limited range.
 2. **Small UAS:** Includes most commercial drones with a moderate range.
 3. **Medium UAS:** Used for tactical military applications or commercial purposes, with a longer range.
 4. **Large UAS:** Used for strategic military applications or large-scale commercial tasks, with extended range and payload capacity.
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3. Define the term "payload" in the context of UAS.

Answer: In UAS terminology, "payload" refers to the equipment or cargo carried by the unmanned aircraft, which can include cameras, sensors, or any other equipment that the UAS is designed to transport and operate during its mission.

4. What is a "ground control station" (GCS) in a UAS?

Answer: A Ground Control Station (GCS) is a facility or equipment used by operators to control and monitor the unmanned aircraft. It includes displays, control interfaces, and communication systems to manage the UAS's flight and collect data.

5. Describe the difference between a "model" and a "prototype" in UAS development.

Answer:

- **Model:** A simplified or scaled representation used for initial design, simulation, or conceptual visualization. It may not be functional.
 - **Prototype:** A working version of the UAS used for testing and validation of design concepts. It is built to assess the performance and functionality before mass production.
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6. What is the primary purpose of the conceptual design phase in UAS development?

Answer: The primary purpose of the conceptual design phase is to define the overall system requirements and establish a preliminary design framework. This includes identifying the mission objectives, basic system architecture, and key performance criteria.

7. In UAS design, what is the focus of the preliminary design phase?

Answer: The preliminary design phase focuses on developing detailed specifications for the UAS components and systems, including performance estimates, structural design, and integration plans. It aims to refine the initial concepts into a more detailed and workable design.

8. Explain the role of the detail design phase in UAS development.

Answer: The detail design phase involves creating comprehensive engineering drawings, specifications, and plans for the manufacturing and assembly of the UAS. It includes finalizing all design aspects, testing prototypes, and preparing for production.

9. What are some common applications of UAS in agriculture?

Answer: Common applications of UAS in agriculture include:

1. **Crop Monitoring:** Assessing plant health and detecting pests or diseases.
 2. **Precision Farming:** Applying fertilizers and pesticides in targeted areas.
 3. **Field Mapping:** Generating high-resolution maps for better planning and management.
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10. List two key factors considered in the design and selection of a UAS.

Answer:

1. **Mission Requirements:** The UAS must meet specific operational needs, such as payload capacity, flight range, and endurance.
2. **Environmental Conditions:** The design should consider factors like weather resistance, temperature ranges, and terrain where the UAS will be deployed.

