

**UAS Flight**

**Proficiency Examination**

**A drone flying over a river

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**Overview**

**Introduction**

To legally operate Unmanned Aircraft Systems (UAS) or "drones," pilots must obtain a remote pilot certificate from the Federal Aviation Administration (FAA). This certification involves passing a multiple-choice knowledge exam that covers various topics, including regulations, airspace classification, weather, loading and performance, and operational procedures. While the Part 107 knowledge exam evaluates theoretical understanding, it does not test the operator's practical flight operations skills or aircraft handling abilities. The Flight Proficiency Examination aims to complement the Part 107 knowledge exam by offering a voluntary evaluation of flight operations and skills.

**Examination Development**

The Flight Proficiency Examination criteria are derived from ASTM F3266: Standard Guide for Training for Remote Pilot in Command of Unmanned Aircraft Systems (UAS) Endorsement, which outlines the necessary knowledge, skills, and abilities for safe commercial unmanned aircraft operation. The key areas of knowledge, skills, and abilities are detailed in Section 5: General Knowledge Subject Matter Requirements, and Section 6: Indoctrination Curriculum Requirements. Section 5 indicates that "General Knowledge" can be gauged through written exams, citing the FAA’s Knowledge Exam as an example. Therefore, this assessment will primarily focus on developing methods to gauge proficiency in the areas outlined in Section 6. The standard categorizes proficiency topics under "Tasks" and "Knowledge." Proficiency in a task requires "Task Performance" and "Task Knowledge" skills. A 4-tier matrix in "Table 1" is provided for Exam Proctors to assess flight proficiency, with Task Performance rated on a scale of 1 (is limited) to 4 (is proficient), and Task Knowledge measured from "a" (knows nomenclature) to "d" (understands advanced theory). Both Task Performance and Task Knowledge are evaluated concurrently. "Subject Knowledge" is similarly rated on a four-tier scale from "A" (knows facts) to "D" (knows evaluation). ASTM F3266 sets minimum proficiency levels using this 4-tier matrix. This assessment includes questions on each flight proficiency topic from the standard and equips Exam Proctors with the means and context to determine whether a UAS pilot meets the standard’s criteria for minimum proficiency.

**Overview of Examination**

The Flight Proficiency Examination comprises four Parts: 1) Pre-Mission Ground School Assessment, 2) Pre-Flight Ground School Assessment, 3) Check Ride Assessment, and 4) Flight Control Assessment, all to be conducted by an Exam Proctor with one UAS Pilot at a time. The first part focuses on pre-mission preparations that are typically conducted off-site, such as airspace identification, maintenance checks, and mission planning. The second part assesses the UAS Pilot’s theoretical knowledge, skills, and ability to execute a mission. The first two parts are administered orally and do not necessitate flying the aircraft. The third part requires the UAS Pilot to perform basic flying maneuvers under the guidance of the Exam Proctor, to evaluate their skills in mission planning, flight operations, and piloting. The examination culminates in the fourth part, where the UAS Pilot undertakes the National Institute of Standards and Technology’s (NIST’s) Basic Proficiency Evaluation for Remote Pilots (BPERP) test, demonstrating their overall UAS control proficiency.

**Grading Assessment Questions**

Parts 1, 2, and 3 of the Flight Proficiency Examination include open-ended questions that the Exam Proctor will pose orally to the UAS Pilot. Each question correlates with at least one section of ASTM F3266, establishing the fundamental level of understanding or skill required for demonstrating competency. This required level is depicted as a four-tier matrix in ASTM F3266 Table 1 below. Evaluation of tasks is based on two metrics: “Task Performance,” indicated by a numeric value, and “Task Knowledge,” represented by a lowercase letter. The evaluation of Subject Knowledge utilizes a single standard, marked by an uppercase letter. Exam Proctors are responsible for assessing the UAS Pilot's answers against the “assessment criteria” specified in the question, aligned with the ASTM task and knowledge level matrix. Each question is accompanied by a scoring table, which should be utilized to document the evaluation of the UAS Pilot's response. The cell highlighted in bold indicates the minimum level of understanding required.A close-up of a document

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Scoring Example: In the example below, the Exam Proctor assessed that the pilot “Is competent” and “Knows operating principles” of the task. This meets the requirement of the “task performance” and exceeds the requirement of the “task knowledge.”



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | Checkmark with solid fillc | d | n/a |

END OF SECTION

**Part 1: Pre-Mission Ground School Assessment**

**Instructions:** For this portion of the exam, the Exam Proctor will ask the UAS Pilot a series of questions related to pre-mission activities. The UAS Pilot is permitted to use appropriate tools and resources that would be available during mission planning. These include websites and applications; however, they would not include other UAS Pilots or operators. This portion of the exam does not need to be completed at the mission site. The Exam Proctor will evaluate their answer to determine if their performance meets the level prescribed in ASTM F3266 Table 1

**Question #1**

Field Question: Identify the closest airport in controlled airspace to your current location. Assume you have been tasked with a UAS mission that is located 3 miles west of the runway. The mission area has a radius of 300 feet. What are the lateral and vertical boundaries of the airspaces at the mission site and the surrounding area?

Assessment Criteria: The UAS Pilot will likely use an online tool or app to complete this question. They should be able to identify the lateral and vertical boundaries of the controlled airspace. The UAS Pilot may show the Exam Proctor on their screen or device to demonstrate their understanding. However, they should also verbally explain the boundaries to demonstrate a 3b level at task performance and knowledge.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.1 The altitude or height, or both, restrictions of each type of airspace (Level B)

6.3.7.7 The RPIC shall know how to ensure that all necessary operating permissions and authorizations are obtained for the mission from the regulatory agencies (Leve 3b)

Additional Instructor Notes: The instructor can use a different airport or location if appropriate.

**Question #2**

Field Question: Identify the closest airport in controlled airspace to your current location. Assume you have been tasked with a UAS mission that will require you to operate a drone in an area that has a 300-foot radius with the center 3 miles due west of the runway. What is the maximum altitude allowable for immediate LAANC air traffic control authorization at this mission site?

Assessment Criteria: The UAS Pilot will likely use an online tool or app to complete this question. They should be able to identify the maximum altitudes allowable as described by the FAA’s facility maps. The UAS Pilot may show the Exam Proctor on their screen or device to demonstrate their understanding. However, they should also verbally explain the boundaries to demonstrate a 3b level at task performance and knowledge.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.1 The altitude or height, or both, restrictions of each type of airspace (Level B)

6.3.7.7 The RPIC shall know how to ensure that all necessary operating permissions and authorizations are obtained for the mission from the regulatory agencies (Leve 3b)

Additional Instructor Notes: The instructor can use a different airport or location if appropriate.

**Question #3**

Field Question: Identify the closest airport in controlled airspace to your current location. Assume you have been tasked with a UAS mission that will require you to operate a drone in an area that has a 300-foot radius with the center 3 miles due west of the runway. Demonstrate how you would request LAANC authorization to conduct this mission 24 hours from now. Only demonstrate the steps. Do not submit a LAANC authorization at this time.

Assessment Criteria: The UAS Pilot will likely use an online tool or app to complete this question. They should be able to identify the steps to submit a LAANC ATC authorization request. The UAS Pilot may show the Exam Proctor on their screen or device to demonstrate their understanding.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.1 The altitude or height, or both, restrictions of each type of airspace (Level B)

Additional Instructor Notes: The instructor can use a different airport or location if appropriate. Task Performance and Task Knowledge exceed ASTM standard requirements.

**Question #4**

Field Question: Identify the closest airport in controlled airspace to your current location. Assume you have been tasked with a UAS mission that will require you to operate a drone in an area that has a 300-foot radius with the center 3 miles due west of the runway. What special operations, such as ballooning or parachuting, often occur at this airport?

Assessment Criteria: The UAS Pilot will likely need to review an FAA section chart to answer this question. They will likely use an electronic source; however, could provide the information via a hard copy section chart. The UAS Pilot may show the Exam Proctor on their screen, device, or hard copy chart to demonstrate their understanding. However, they should also verbally explain any special operations or lack thereof to demonstrate a 3b level at task performance and knowledge.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.2 UAS operations permitted in each type of airspace, and (Level B)

Additional Instructor Notes: The instructor can use a different airport or location if appropriate. Task Performance and Task Knowledge exceed ASTM standard requirements.

**Question #5**

Field Question: Identify the closest airport in controlled airspace to your current location. Assume you have been tasked with a UAS mission that will require you to operate a drone in an area that has a 300-foot radius with the center 3 miles due west of the runway. Are there any Notice to Air Missions (NOTAMs) or Temporary Flight Restrictions (TFRs) at this time?

Assessment Criteria: The UAS Pilot will likely use an online tool or app to complete this question. They should be able to identify if a NOTAM or TFR is present at this time. The UAS Pilot may show the Exam Proctor on their screen or device to demonstrate their understanding. However, they should also verbally explain what is being shown to demonstrate a 3b level at task performance and knowledge.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.2 UAS operations permitted in each type of airspace, and (Level B)

Additional Instructor Notes: The instructor can use a different airport or location if appropriate. Task Performance and Task Knowledge exceed ASTM standard requirements.

**Question #6**

Field Question: Identify all of the controlled and restricted airspaces as well as any air space that may significantly impact mission planning in the geographic area in which your agency operates.

Assessment Criteria: The UAS Pilot should be able to list the relevant airspaces but does not need to memorize the classification or specific details about the airspace to demonstrate a “B” level of subject knowledge.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.6 The RPIC shall understand the following topics as appropriate to the UA type and flight operations:

6.2.7 Classes and types of controlled and uncontrolled airspace.

6.2.7.3 Regulations and restrictions that may apply to sUA operating in the CAA airspace.

**Question #7**

Field Question: Show the Exam Proctor the manufacturer's specifications and describe the operational limitations of the aircraft. These limitations should include the maximum altitude, range, temperature range, wind speed, precipitation, GPS dependence, and other factors particular to anticipated missions.

Assessment Criteria: The UAS Pilot should indicate in the aircraft’s specifications all relevant operating limitations. Showing the specifications is insufficient. They should be able to locate the relevant information to satisfy level 2 of the task performance criteria.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with:

6.3.2.1 Manufacturers operating limitations (Level 2b)

**Question #8**

Field Question: What are the weather conditions that must be met, based on your agency's operating procedures, before a UAS mission can begin? Your answer must include all relevant weather conditions including wind speed, visibility, precipitation, max/min temperatures, cloud cover, and fog.

Assessment Criteria: Part 107 indicates that a minimum of 3 statute miles of visibility must be maintained; UAS must maintain 500 feet below and 2,000 feet laterally to clouds, including fog. The agency may have other environmental conditions that must be met as part of its operating procedures. Examples include maximum sustained wind speed of 15 mph, no precipitation, minimum temperature of 25 degrees and maximum temperatures of 95 degrees.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.10.1 The RPIC shall have a sufficiently detailed understanding of the following subject matter to assure safe flight operations with regards to prevailing weather conditions:

6.2.10.2-12 Aviation and surface weather, wind, visibility, cloud cover, icing, precipitation static, turbulence, temperature, air pressure, density altitude, and air mass characteristics.

**Question #9**

Field Question: What are the current weather conditions where you are currently located? Your answer must include wind speed, visibility, precipitation, temperatures, the elevation of the lowest cloud cover, and any other conditions relevant to a UAS mission.

Assessment Criteria: The UAS Pilot can use any tool, including the internet or application, to retrieve the required information. Retrieving and interpreting the METAR or TAF of a nearby airport is one method for answering the question. The UAS Pilot may show the Exam Proctor on their screen or device to demonstrate their understanding. However, they should also verbally explain what is being shown to demonstrate a 3b level at task performance and knowledge.

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| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.10.1 The RPIC shall have a sufficiently detailed understanding of the following subject matter to assure safe flight operations with regards to prevailing weather conditions: (Level B)

6.2.10.2-12 Aviation and surface weather, wind, visibility, cloud cover, icing, precipitation static, turbulence, temperature, air pressure, density altitude, and air mass characteristics. (Level B)

Additional Instructor Notes: Task Performance and Task Knowledge exceed ASTM standard requirements.

**Question #10**

Field Question: What are the specified performance metrics provided by the manufacturer for the following aspects of the aircraft you are being evaluated on? Provide estimates or performance descriptions if exact numbers or specifications are not known.

1. Flight Time: Duration the drone can stay airborne on a single charge or fuel tank.
2. Range: Maximum distance from the controller the drone can fly.
3. Speed: The top speed the drone can achieve in flight.
4. Payload Capacity: The weight the drone can carry in addition to its own weight.
5. Wind Resistance: Ability to operate effectively in windy conditions.
6. Altitude Ceiling: Maximum altitude the drone can reach.
7. GPS Accuracy: Precision of the drone's GPS for location and navigation.
8. Camera Quality (if applicable): Resolution and capabilities of any onboard camera.
9. Automated Features: Capabilities like auto-takeoff, auto-landing, and waypoint navigation.
10. Communication System: Quality of the link between the drone and its controller.
11. Sensors and Data Processing: Types and quality of sensors (e.g., LIDAR, thermal) and the drone's ability to process collected data.

Assessment Criteria: The UAS Pilot should be able to “state general principles” about the flight performance of the UAS they are being tested on. Memorizing exact numbers is not required to have a “B” level subject knowledge. Exam Proctor should determine if their response demonstrates the UAS Pilot has sufficient knowledge about the aircraft’s performance for safe operations. Not all conditions listed in the question will be appropriate for the aircraft the UAS pilot is being qualified to use.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.1 (1) RPIC shall be familiar with all available manufacturer aircraft performance data. (2) In the absence of manufacturer provided performance data, refer to Specification F3298

**Question #11**

Field Question: If the propellers on the aircraft are not from the manufacturer, or if there are multiple types of propellers available for the aircraft, describe how the current propeller(s) performance differs from the propellers recommended by the manufacturer. This question can be skipped if the UAS Pilot is using the manufacturer's recommended propellers.

Assessment Criteria: The UAS Pilot should demonstrate their understanding of how the use of multiple or non-standard propellers has on the performance of the aircraft.

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| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.2 (1) Understanding of motors including proper rotational direction depending on flight controller and airframe configuration (2) Understanding the relationship between motor specifications (for example, diameter, windings, kV rating), propeller selection, and operating current and voltage and the detrimental effects of improper operation (3) Understanding damaging effects of excessive heat and mitigation strategies.

**Question #12**

Field Question: Demonstrate how to verify and update the aircraft firmware.

Assessment Criteria: The UAS Pilot will need to show the instructor on the controller or computer screen that the UAS has the latest firmware.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.3 (1) Understanding of safe charging, discharging, storage, proper operating techniques, firmware updating, transportation by air, pre-flight inspection, effect of ambient temperature on charge capacity and delivery, and proper disposal at end of life.

6.3.1.7. (2) Understanding all aspects of firmware updating procedures

**Question #13**

Field Question: Describe the method for safe charging, discharging, storing, updating firmware, and operating the batteries.

Assessment Criteria: The answer to this question will depend on the aircraft. Generally, batteries should be fully charged immediately before the mission, partially charged when stored and never allowed to fully deplete. Many batteries self-discharge over time. Batteries should be stored in a cool, dry location away from sunlight or extreme conditions. The UAS Pilot should describe how the battery’s firmware is updated and any other operational procedures.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.6 (1) Understanding of safe charging, discharging, storage, proper operating techniques, firmware updating, transportation by air, pre-flight inspection, effect of ambient temperature on charge capacity and delivery, and proper disposal at end of life.

**Question #14**

Field Question: How often should batteries be visually inspected by the remote pilot in command? What are common indications of a defective battery?

Assessment Criteria: The batteries should be inspected before every flight. Common symptoms of defective batteries include physical damage, bulging, leakage, an odor, or being warm. Other symptoms include reduced runtime, slow charging or excessive heating during charging.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.3 (1) Understanding of safe charging, discharging, storage, proper operating techniques, firmware updating, transportation by air, pre-flight inspection, effect of ambient temperature on charge capacity and delivery, and proper disposal at end of life.

**Question #15**

Field Question: Explain each open field in the agency’s maintenance logbook and how to file it per the agency’s operating procedures.

Assessment Criteria: The UAS Pilot should demonstrate that they understand all aspects and fillable fields of the agency’s standard maintenance logbook and detail any discrepancies and corrective actions made to the UAS.

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| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.3.3 The RPIC shall understand the need for and how to create an accurate, up-to-date, aircraft maintenance logbook detailing any discrepancies and corrective actions made to the UAS.

Additional Instructor Notes: ASTM does not have a task subject knowledge level associated with this article. A level of 3b is voluntarily being complied with to meet the intent of this article.

**Question #16**

Field Question: Identify common hazards and risks that should be evaluated during a site survey of a common mission site.

Assessment Criteria: The UAS Pilot should be able to identify common hazards associated with mission sites that they are likely to fly. These include structures, antennas, low-flying aircraft, wildlife, EM fields, pedestrians, and traffic, among others.

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| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.5.1 The RPIC shall know how to perform a site survey for each location where flight operations are to be performed paying specific attention to structures, antennas, and aerial hazards that may affect safe flight operations.

6.3.7 The RPIC shall know how to assess operational risk including:

6.3.7.3 operational limitations considering the flight path, the terrestrial and solar

**Question #17**

Field Question: What are the major elements that should be included in a mission plan?

Assessment Criteria: The UAS Pilot should list the following items. Other items may be applicable based on the type of mission they are expected to perform.

* Mission objective(s)
* Hazards
* Weather considerations
* Interactions with terrain and structures
* Payload details, risks and mitigations for risks
* Emergency procedures

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| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.6 The RPIC shall know how to prepare a mission planning document that shall

6.3.6.1 the overall objective for specific flights,

6.3.6.2 all hazards observed during the site survey,

6.3.6.3 weather considerations both in terms of solar and terrestrial weather

6.3.6.4 and in interactions with terrain, and structures.

6.3.7.5 Payload details: The RPIC shall know how to include in the mission planning document details of each type of payload to be used for flight operations and, where appropriate, any risks thus caused and the mitigations for those risks.

**Question #18**

Field Question: How would you assess the operational risk associated with the mental and physiological conditions of the RPIC, the VO and other crewmembers?

Assessment Criteria: Here are several methods that the RPIC can use to assess the operational risk associated with themselves and their crew

* Pre-flight health checks
* Signs of obvious impairment
* Signs of obvious physical impairment, discomfort or lack of performance
* Awareness of chronic and acute work and life stress events
* Awareness of training completed
* Monitoring workload and crew scheduling
* Recent medical issues
* Recent new or changes to existing medicines
* Maintain good communications
* Impact of extreme weather conditions such as high heat

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| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.7 The RPIC shall know how to assess operational risk including:

6.3.7.1 mental and physiological condition of the RPIC, the VO and the crewmembers

**Question #19**

Field Question: How would you determine the operational risk associated with the piloting skills of an RPIC?

Assessment Criteria: Here are several methods that the RPIC can use to assess the operational risk associated with themselves and their crew:

* Score associated with their last flight assessment
* Date last assessment was performed
* Frequency of training or operational missions
* Date training or operation mission

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.7 The RPIC shall know how to assess operational risk including:

6.3.7.2 the degree of remote piloting skills required

END OF SECTION

**Part 2: Pre-Flight Ground School Assessment**

**Instructions:** For this portion of the exam, the Exam Proctor will ask the UAS Pilot a series of questions based on a multi-rotor aircraft the pilot seeks authorization to use. The UAS Pilot should provide as much detail as necessary to fully answer the question. Many of the questions are situationally based and should be conducted at the check-ride mission site. The Exam Proctor will evaluate the UAS Pilot’s answer and indicate the level of performance/knowledge based on the matrix prescribed in ASTM F3266 Table 1. The minimum level of understanding is in the bolded box.

**Question #1**

Field Question: Identify the major components of the aircraft and describe their function to the Exam Proctor.

Assessment Criteria: The answer will depend on the model. However, for a multi-rotor UAS, the UAS Pilot should be able to identify and describe the function of the propellers (lift and control), sensors (data collection and navigation), gimble (stabilize sensor), battery (power unit), and landing gear such as struts.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3 The RPIC shall be familiar with the individual airframe and system components of the sUA as detailed in the following sections and be able to readily identify them and possess a basic understanding of their operation.

**Question #2**

Field Question: Explain to the Exam Proctor the action the aircraft will take when the stick control is moved in the following direction.

1. Left stick positioned up and down
2. Left stick positioned left and right
3. Right stick positioned up and down
4. Right stick positioned left and right

Assessment Criteria: The UAS Pilot should indicate that the aircraft will move in the following ways:

1. Aircraft will ascend and descend.
2. Aircraft will yaw left and right.
3. Aircraft will pitch forward and backward
4. Aircraft will roll left and right.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3 The RPIC shall be familiar with the individual airframe and system components of the sUA as detailed in the following sections and be able to readily identify them and possess a basic understanding of their operation.

**Question #3**

Field Question: You are conducting a routine mission observing the traffic flow at a four-way stop. Your altitude will be 200ft AGL, and you will be within 50 feet of obstructions. Which flight mode is the most appropriate and why?

Assessment Criteria: This answer will depend on the UAS model. For example, the answer for a DJI Mavic 2 Pro would likely be “P-Mode” unless the proctor believed the test taker provided a compelling reason for an alternative mode.

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| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.4 Automated Flight Control System—Understanding of flight modes and stability augmentation technology (Level B)

Additional Instructor Notes: Many drones have preprogrammed flight modes that adjust control sensitivity and overall speed of the aircraft. For example, DJI's drone controllers feature three primary modes to cater to various flying needs. The default P-Mode (Positioning flight mode) is a frequently used setting that utilizes an extensive range of GPS signals to maintain a stable connection between the drone and the remote control and to support the Vision Systems in obstacle detection, stabilization, and precise flight mode operations. It offers a balance of responsiveness and control sensitivity, ideal for standard filming and flight operations. S-Mode (Sport Mode) increases the responsiveness of the control sticks and disables Vision Systems and Sensors, favoring GPS for positioning; this mode is best used in obstacle-free environments due to its increased control sensitivity. Lastly, T-Mode (Tripod Mode) is optimized for video production, reducing the drone's speed to approximately 1 meter per second for enhanced stability and smooth, cinematic shot capture, providing a secure operating condition for close proximity flying. Each mode is designed to enhance the drone's performance under different flight conditions and user requirements.

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**Question #4**

Field Question: You have been tasked to inspect a tower that is known to emit a large amount of electromagnetic (EM) interference. How would this impact the method for which you collect data, and what mitigation strategies should you deploy?

Assessment Criteria: The test taker should indicate that the EM interference could impact the drone telemetry data (compass, GPS location, etc.) and disrupt communications (video feed and loss of control). Mitigation strategies include keeping a distance from the source of the EM interference and never placing the source of the interference between the aircraft and the controller.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.2 Impact of solar weather and terrestrial interference on GNSS

**Question #5**

Field Question: List various mechanical or environmental factors that could impact the functionality of onboard GNSS/GPS telemetry data.

Assessment Criteria: The test taker should be able to list a minimum of five factors and demonstrate an objective understanding that GNSS/GPS telemetry data is not absolute and subject to degradation based on mechanical and/or environmental conditions. Acceptable factors include urban canyons, dense forests, large amounts of metal, EM fields, overhead coverings, loss of the satellite, mechanical failures in the GNSS/GPS unit, solar winds, and others at the Exam Proctors' discretion.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.3 GNSS limitations

**Question #6**

Field Question: How should the controller or antenna be positioned to have the greatest lateral range of control on the aircraft?

Assessment Criteria: The long edge of the controller should be perpendicular to the aircraft to have the maximum range.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3.6 Understanding of radio control including transmitters, receivers, propagation/shielding, antennae types and orientation, frequency bands, signal strength and UAS behavior on loss of link.

Additional Instructor Notes:

A black device with a screen and blue arrows

Description automatically generated

**Question #7**

Field Question: What is the maximum distance that the aircraft can be reliably controlled by the controller or the maximum distance allowed by your agency’s operating procedures?

Assessment Criteria: The answer will depend on the aircraft or the agency’s operating procedures. The UAS Pilot is required to state the distance +/-10% to be evaluated at a “B” level of subject knowledge.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3.6 Understanding of radio control including transmitters, receivers, propagation/shielding, antennae types and orientation, frequency bands, signal strength and UAS behavior on loss of link.

**Question #8**

Field Question: Describe potential factors that could reduce the range in which a controller can effectively communicate with the aircraft.

Assessment Criteria: Examples of factors that could reduce the range include physical obstructions, EM interference, low battery, weather conditions (rain, fog, heavy clouds), antenna orientation, signal crowding and atmospheric conditions (solar flares or ionospheric disturbances).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3.6 Understanding of radio control including transmitters, receivers, propagation/shielding, antennae types and orientation, frequency bands, signal strength and UAS behavior on loss of link.

**Question #9**

Field Question: Describe what the UAS Pilot would observe on the controller when the maximum UAS range from the controller is exceeded. What are the appropriate steps when these conditions are observed?

Assessment Criteria: Typically, the information that requires the most amount of data transferred, such as remote video, will be lost first. When these conditions are observed, the UAS Pilot should reduce the distance from the controller. If unable to do this manually, the UAS Pilot should engage the aircraft’s emergency return to home feature.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.3.6 Understanding of radio control including transmitters, receivers, propagation/shielding, antennae types and orientation, frequency bands, signal strength and UAS behavior on loss of link.

**Question #10**

Field Question: Does this UAS restrict flight operations in specific geographic locations, such as restricted areas or prisons? The feature is commonly referred to as “geo-fencing.” If it does, how do you identify and unlock geo-fenced areas?

Assessment Criteria: This answer is dependent on the aircraft. The UAS Pilot should be able to accurately indicate if the UAS has a geo-fencing feature, how to identify it, and the conceptual means for disabling it.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.4 Geo-fencing (Level B)

**Question #11**

Field Question: Indicate what strategies you would take to prevent excessive heat on the components of the UAS.

Assessment Criteria: A common source of excessive heat for exterior UAS missions comes from exposure to direct sunlight. The UAS Pilot should indicate an awareness of this and identify strategies for keeping UAS equipment (controller, batteries, chargers, etc.) in the shade and away from other external heat sources.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.2 (1) Understanding of motors including proper rotational direction depending on flight controller and airframe configuration (2) Understanding the relationship between motor specifications (for example, diameter, windings, kV rating), propeller selection, and operating current and voltage and the detrimental effects of improper operation (3) Understanding damaging effects of excessive heat and mitigation strategies.

**Question #12**

Field Question: Assume a battery were to catch fire in the UAS case at your current location. Describe the emergency procedures for this situation.

Assessment Criteria: The emergency procedures may include the following items (1) evacuate the area, (2) use an appropriate fire extinguisher, (3) do not inhale fumes, (4) contain the fire in a noncombustible container, (5) inspect for secondary damage, and (6) report the incident.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.3 (1) Understanding of safe charging, discharging, storage, proper operating techniques, firmware updating, transportation by air, pre-flight inspection, effect of ambient temperature on charge capacity and delivery, and proper disposal at end of life. (Level B)

6.3.2 The RPIC shall be familiar with:

6.3.2.3 Emergency procedures (Level 2B)

Additional Instructor Notes: Task Knowledge level of 3 exceeds ASTM standard requirements for 2.

**Question #13**

Field Question: Demonstrate to the Exam Proctor how to adjust the following programmable features of the flight control system.

1. Binding/linking controller to aircraft
2. Frequency band
3. Aircraft behavior on the loss of link to controller
4. Return to home altitude and multi-pathing
5. Set new return to home point
6. Latitude and longitude position
7. Waypoints
8. Auto-takeoff
9. Auto-land
10. Other applicable intelligent automatic flight features
11. Geo-fencing
12. Lost link presets

Assessment Criteria: The UAS Pilot should be able to satisfactorily demonstrate their ability to navigate to the settings, understand the setting options, and make adjustments.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.7 (1) Understanding of the programmable features including those of automated flight control system, power distribution, and the use of computer software to configure Automatic Flight Control System parameters. (Level B) (2) Understanding all aspects of firmware updating procedures (Level 2b) (3) Understanding of how to set all user adjustable parameters (Level 2b)

6.3.1.8 Understanding of radio control including: (1) Binding/linking specific transmitters to receivers (2) Frequency bands (3) UAS behavior on loss of link.

6.3.1.9 (1) Multi-pathing, (2) Latitude and longitude, (3) Waypoints, (4) Position hold/loiter,(5) Auto-takeoff, (6) Auto-land, (7) Return to home, (8) Other intelligent automatic flight features, and (9) Geo-fencing.

6.4.1.4 Including when possible: (1) return-to-home, (2) set new home point, (3) manual override of return-to-home, (4) GNSS-based waypoint navigation programming and mission execution, (5) lost link presets, and (6) re-establishment of control from lost link

**Question #14**

Field Question: Explain to the instructor where telemetry data is located on the controller. Specifically include the following if applicable:

1. Altitude
2. Distance from controller
3. Compass direction
4. Location of drone in relation to the controller
5. Battery charge
6. Controller charge
7. Controller signal strength
8. GPS satellite strength/count
9. Camera settings
10. Warning and notifications

Assessment Criteria: The UAS Pilot should be able to demonstrate on the controller screen all controls and parameters including their effects, nominal settings, and typical adjustments.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.3.1.10 Understanding of all controls and parameters, including their effects, nominal settings and typical adjustments, and uplink and downlink telemetry values (normal and abnormal).

**Question #15**

Field Question: Describe the actions you would take if the aircraft experienced a malfunction after liftoff that significantly reduced your ability to control the aircraft.

Assessment Criteria: The UAS Pilot should describe a plan to ground the aircraft as quickly as possible that minimizes the likelihood of injuring people first and secondarily damage to property. The answer should demonstrate that the UAS Pilot places a higher value on preventing injury than damaging the aircraft.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with:

6.3.2.3 emergency procedures (Leve 2b)

6.4.1.5 The recognition of all likely flight mode failures and the appropriate recovery from or mitigation of those failures. (Leve 3b)

6.4.2.8 (1) Engine Failure after liftoff (2) Engine failure approach to landing (3) Lost link (4) Autorotation – if applicable. (Level 3b)

**Question #16**

Field Question: Describe the actions you would take if the aircraft became non-responsive to controls and began to fly away.

Assessment Criteria: The UAS Pilot should indicate that they would make note of the drone’s last known position, the direction it is flying in, and battery life. They should then attempt to regain control by engaging the return-to-home feature (if possible) or restarting the controller. After efforts to regain control fail, they should track the UAS’s path and identify the GPS position from the controller if possible. The UAS Pilot can also show competency by indicating they would notify the ground crew of the situation and ask them to track the drone.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with:

6.3.2.3 emergency procedures

6.4.1.4 Including when possible: (1) return-to-home, (2) set new home point, (3) manual override of return-to-home, (4) GNSS-based waypoint navigation programming and mission execution, (5) lost link presets, and (6) re-establishment of control from lost link (Level 2b)

6.4.2.8 (1) Engine Failure after liftoff (2) Engine failure approach to landing (3) Lost link (4) Autorotation – if applicable. (Level 3b)

**Question #17**

Field Question: Describe the actions you would take if the aircraft experienced a rapid loss of battery power.

Assessment Criteria: The UAS Pilot’s response should indicate an immediate attempt to decrease the altitude of the aircraft. The specific altitude would depend on the situation but would not interfere with a safe landing. The UAS Pilot should describe a plan to ground the aircraft as quickly as possible that minimizes the likelihood of injuring people first and secondarily damage to property. The answer should demonstrate that the UAS Pilot places a higher value on preventing injury than damaging the aircraft.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with:

6.3.2.3 emergency procedures (Level 2b)

6.4.2.8 (1) Engine Failure after liftoff (2) Engine failure approach to landing (3) Lost link (4) Autorotation – if applicable. (Level 3b)

**Question #18**

Field Question: What is the minimum level of battery charge before the UAS must return for a replacement battery? What is the minimum level of battery charge for the UAS to be on the ground per your agency's operating procedures?

Assessment Criteria: The UAS Pilot should indicate that the minimum level of battery charge before returning home is based on the mission and the location of the drone when the threshold is reached. However, the agency should have a recommended level of battery charge that a drone must be grounded by. Exceptions may be justified based on the mission and mitigation procedures put in place.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.4.1.6 1) Perform dead reckoning navigation, (2) perform visual line of sight navigation, (3) perform map reading, (4) identify appropriate visual landmarks, (5) correlate position with map, (6) compare actual and planned ground speeds, (7) compare actual and planned rate of fuel consumption or battery usage, (8) calculate actual fuel consumption or battery usage, (9) perform in-flight navigation planning, (10) calculate/compensate for in-flight winds, (11) calculate new estimated time of arrival (ETA), (12) perform time and fuel/battery usage management, (13) calculate back azimuth in order to manually navigate back to the home point or point of landing.

**Question #19**

Field Question: Describe the appropriate pre-flight procedures of a routine UAS mission starting when you arrive at a typical mission site.

Assessment Criteria: The answer to this question will vary based on the specifics of the mission site; however, there will be many actions routinely taken and included on the agency’s checklist and standard operating procedures. The pre-flight procedures should at a minimum, include the following:

* Pre-flight inspection, take-off data
* Pre-start, start, and after-start procedures
* Flight instruments and navigation aids set and checked
* Taxi and aerodrome procedures
* Take-off briefing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.4.2.2 (1) Pre-flight inspection, take-off data (2) Pre-start, start, and after start procedures (3) Flight instruments and navigation aids set and checked (4) Taxi and aerodrome procedures (5) Take-off briefing

**Question #20**

Field Question: Complete the agency’s pre-flight checklist and describe how it is filed per the agency’s operating procedures for the check ride assessment.

Assessment Criteria: The UAS Pilot should demonstrate that they understand all aspects and fillable fields of the agency’s standard pre-flight checklist. They should also be able to complete the pre-flight checklist for the check-ride assessment.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.3.1 The RPIC shall know how to create or obtain an accurate, up-to-date aircraft flight manual and a flight operations manual in the format and with the content as required by the CAA.

6.4.1.1 Consistent use of checklists and normal operating procedures to ensure safe operations.

**Question #21**

Field Question: What physical features of the aircraft are required to be inspected before the mission begins? What should the RPIC look for to determine if an aircraft is airworthy?

Assessment Criteria: The answer will depend on the aircraft, payload, and mission. However, common answers include anomalies with the battery, chipped propellers, loose struts, damage to the hull, non-illuminated lights, and a clean camera/sensor lens.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.4.2.2 (1) Pre-flight inspection, take-off data (2) Pre-start, start, and after start procedures (3) Flight instruments and navigation aids set and checked (4) Taxi and aerodrome procedures (5) Take-off briefing

6.4.1.1 Consistent use of checklists and normal operating procedures to ensure safe operations.

**Question #22**

Field Question: Review the site location and identify any hazards as well as corresponding mitigation measures to those hazards.

Assessment Criteria: The UAS Pilot must be able to conduct a site survey at the mission site with a particular focus on identifying structures, antennas, and other aerial hazards that could impact the safety of the flight operations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.5.1 The RPIC shall know how to perform a site survey for each location where flight operations are to be performed paying specific attention to structures, antennas, and aerial hazards that may affect safe flight operations.

6.4.1.1 Consistent use of checklists and normal operating procedures to ensure safe operations.

END OF SECTION

**Part 3: Check Ride Assessment**

**Instructions:** For this portion of the exam, the UAS Pilot will be asked to perform a series of scenario-based maneuvers to test their fight proficiency at the check-ride mission site. The Exam Proctor will evaluate their answer to determine if their performance meets the level prescribed in ASTM F3266 Table 1.

**Question #1**

Field Question: Assume the check-ride mission will have three visual observers, one of which will be the Exam Proctor. Conduct a pre-flight mission briefing covering all relevant topics, tasks the crew should perform, risk assessment and documentation.

Assessment Criteria: The UAS Pilot should be able to conduct a pre-flight briefing addressing all of the topics below and any additional items specific to the mission.

* Agency’s checklists
* Mission planning details
* Effectively communicate VO and other crew member responsibilities.
* Mission weather conditions
* Airspace restrictions that may affect flight operations
* Airspace clearances required
* Details of decision-making responsibilities, operational considerations when in proximity to people, property on the ground, infrastructure, emergency procedures and responsibilities

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.7.6 The RPIC shall know how to: (1) assign specific mission responsibilities to the VO and other crew members when applicable, (2) conduct a pre-flight mission briefing to ensure that everyone involved is aware of their responsibilities.

6.3.8 The RPIC shall know how to:

6.3.8.1 conduct a pre-flight mission briefing for the VO and other crew members to ensure that everyone involved is aware of the mission plan,

6.3.8.2 mission weather conditions,

6.3.8.3 hazards to the mission identified in the site survey,

6.3.8.4 airspace restrictions that may affect flight operations,

6.3.8.5 contact procedures for ATC and additional clearances required,

6.3.8.6 the specific responsibilities for the VO and other crew members before, during, and after flight operations.

6.3.8.7 This briefing shall also include details of decisions making responsibilities, operational considerations when in proximity to people, property on the ground, infrastructure, emergency procedures and responsibilities.

6.4.1.1 Consistent use of checklists and normal operating procedures to ensure safe operations.

**Question #2**

Field Question: Demonstrate how to attach the payload associated with all mission types you would be asked to fly with this aircraft.

Assessment Criteria: The UAS Pilot should be able to attach the payload securely and within the manufacturer's guidelines. For UASs that have permanently affixed payloads, the UAS Pilot can demonstrate proficiency in this area with a visual inspection of the payload.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with:

6.3.2.4 weight and balance calculations

**Question #3**

Field Question: Start the drone, climb to an altitude of 50 feet, test all of the stick maneuvering controls to test responsiveness, land the aircraft and power down.

Assessment Criteria: Evaluate the UAS Pilot to determine if they have a “3b” level of task performance and knowledge of the controller and how to operate the aircraft. This specifically includes take-off, climb procedures, stick control, descent, arrival, and landing procedures.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.2 The RPIC shall be familiar with

6.3.2.2 Normal operating procedures (Leve 2b)

6.4.1.2 (1) All switches, rotary controls, sliders, control sticks and their function,

(2) radio range checks, (Level 3b)

6.4.2.3 (1) Take-off technique (T/O roll, speeds, rotation, transition to instruments) (2) Initial climb-off (speed and direction), after take-off checks and en route climb including altimeter setting procedures (if applicable) (3) Climb profile (Level 3b)

**Question #4**

Field Question: Turn your back to the UAS. Navigate to an altitude of 200 ft AGL and 200 ft to the north of the pilot and then return home and land using only the telemetry data shown on the UAS controller.

Assessment Criteria: Review the telemetry data on the controller to verify that the drone is 200 ft AGL and 200 ft to the north of the pilot’s location. Additionally, determine if the UAS Pilot demonstrated a “3b” level of task performance and knowledge of the controller and how to operate the aircraft. This specifically includes take-off, climb procedures, stick control, descent, arrival, and landing procedures.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.1 GNSS technology used to provide position and altitude. (Level B): knows principles,

6.4.1.6 1) Perform dead reckoning navigation, (2) perform visual line of sight navigation, (3) perform map reading, (4) identify appropriate visual landmarks, (5) correlate position with map, (6) compare actual and planned ground speeds, (7) compare actual and planned rate of fuel consumption or battery usage, (8) calculate actual fuel consumption or battery usage, (9) perform in-flight navigation planning, (10) calculate/compensate for in-flight winds, (11) calculate new estimated time of arrival (ETA), (12) perform time and fuel/battery usage management, (13) calculate back azimuth in order to manually navigate back to the home point or point of landing. (Leve 2b)

6.4.2.3 (1) Take-off technique (T/O roll, speeds, rotation, transition to instruments) (2) Initial climb-off (speed and direction), after take-off checks and en route climb including altimeter setting procedures (if applicable) (3) Climb profile (Level 3b)

**Question #5**

Field Question: For this exercise, do not use the telemetry data on the screen. Navigate to an altitude of 100 ft AGL and 100 ft to the south of the pilot and then return home and land using only visual line-of-sight navigation.

Assessment Criteria: Review the telemetry data on the controller to verify that the drone is approximately 100 ft AGL and 100 ft to the south of the pilot’s location. Additionally, determine if the UAS Pilot demonstrated a “3b” level of task performance and knowledge of the controller and how to operate the aircraft. This specifically includes take-off, climb procedures, stick control, descent, arrival, and landing procedures.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.1 GNSS technology used to provide position and altitude. (Level B): knows principles,

6.4.1.6 1) Perform dead reckoning navigation, (2) perform visual line of sight navigation, (3) perform map reading, (4) identify appropriate visual landmarks, (5) correlate position with map, (6) compare actual and planned ground speeds, (7) compare actual and planned rate of fuel consumption or battery usage, (8) calculate actual fuel consumption or battery usage, (9) perform in-flight navigation planning, (10) calculate/compensate for in-flight winds, (11) calculate new estimated time of arrival (ETA), (12) perform time and fuel/battery usage management, (13) calculate back azimuth in order to manually navigate back to the home point or point of landing. (Leve 3b)

6.4.2.3 (1) Take-off technique (T/O roll, speeds, rotation, transition to instruments) (2) Initial climb-off (speed and direction), after take-off checks and en route climb including altimeter setting procedures (if applicable) (3) Climb profile (Level 3b)

Additional Instructor Notes: At their option, the Exam Proctor can place a sticky-note on the controller screen to obstruct the UAS pilot’s view of the telemetry data.

**Question #6**

Field Question:

Part 1: Start this exercise with the drone powered off. Power up the drone and position the aircraft so that it is 200 ft AGL and 200 ft to the north.

(Instructor: Wait until Part 1 is complete before reading Part 2)

Part 2: Engage the aircraft's autonomous emergency return-to-home function. When the aircraft is within 100 ft of the landing site, regain manual control of the aircraft and land the drone.

Assessment Criteria: To complete this activity satisfactorily, the pilot must (1) give the drone sufficient time to establish GPS lock while on the ground, (2) be able to activate the return to home feature within 5 seconds, and (3) be able to return manual control within 5 seconds.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subject Knowledge | A | B | C | D | n/a |

ASTM Section: 6.2.5 GNSS Navigation Control System—Understanding of:

6.2.5.3 GNSS limitations

6.4.1.4 Including when possible: (1) return-to-home, (2) set new home point, (3) manual override of return-to-home, (4) GNSS-based waypoint navigation programming and mission execution, (5) lost link presets, and (6) re-establishment of control from lost link.

**Question #7**

Field Question: Complete the agency’s flight log and file per the agency’s operating procedures for the check ride assessment.

Assessment Criteria: The UAS Pilot should demonstrate that they understand all aspects and fillable fields of the agency’s standard flight log. They should also be able to complete the flight log for the check-ride assessment.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Performance | 1 | 2 | 3 | 4 | n/a |
| Task Knowledge | a | b | c | d | n/a |

ASTM Section: 6.3.3.1 The RPIC shall understand the need for and how to create an accurate, up-to-date, flight logbook showing all flights made under the responsibility of the RPIC.

Additional Instructor Notes: ASTM does not have a task subject knowledge level associated with this article. A level of 3b is voluntarily being complied with to meet the intent of this article.

END OF SECTION

**Part 4: Flight Control Assessment**

**Instructions:** For this portion of the exam, the UAS Pilot will be asked to perform a flight proficiency assessment based on the National Institute of Standards and Technology’s (NIST’s) Basic Proficiency Evaluation for Remote Pilots (BPERP) test. The Exam Proctor will administer the exam by reading out the instructions script below. The UAS Pilot is encouraged to be familiar with the target location and nomenclature prior to starting the exam. [BPERP instructions provided by NIST can be downloaded here](https://www.nist.gov/system/files/documents/2022/06/02/NIST%20sUAS%20Open%20Test%20Lane%20-%20Quick%20Start%20Trifold%20%282020D%29.pdf). The UAS Pilot may complete one practice run prior to the start of the exam. The proficiency assessment meets the requirements of ASTM 6.4.2.1 and 6.4.2.6.

Assessment Criteria: The target green ring must be uninterrupted, as indicated in the NIST image below, for the target to be considered “aligned” and the points awarded. Aircraft must have one leg within 12” of the center of the landing platform for the point to be awarded. The UAS Pilot must be able to record aligned images of 80% of the targets within 5 minutes from take-off to pass this assessment.

A close-up of a cup

Description automatically generated

A diagram of a bucket

Description automatically generated

|  |  |
| --- | --- |
| **Exam Proctor Script** | **Captured** |
| Launch and hover at 10 feet over stand 1. Capture image of target 1. | 1 |
| Angle camera up and capture image of target 2A. | 2A |
| Rotate left 360 degrees over stand 1 and capture image of target 1. | 1 |
| Angle camera up and capture image of target 2A. | 2A |
| Rotate right 360 degrees over stand 1 and capture image of target 1. | 1 |
| Angle camera up and capture image of target 2A. | 2A |
| Climb vertically to 20 feet over stand 1 and capture image of target 1. | 1 |
| Angle camera up and capture image of target 3A. | 3A |
| Descend vertically to 10 feet over stand 1 and capture image of target 1. | 1 |
| Angle camera up and capture image of target 2A. | 2A |
| Move forward to hover over stand 2 and capture image of target 2. | 2 |
| Angle camera up and capture image of target 3A. | 3A |
| Move backward to hover over stand 1 and capture image of target 1. | 1 |
| Angle camera up and capture image of target 2A. | 2A |
| Move forward to stand 2 then rotate left 180 degrees. Capture image of target 2. | 2 |
| Angle camera up and capture image of target 1C. | 1C |
| Move forward over launch platform then rotate 180 degrees. Capture image of launch platform. | Launch  Platform |
| Angle camera up and capture image of target 1A. | 1A |
| Land in circle of launch platform. | Land |
| Launch and hover at 10 feet over launch platform. Capture image of target 1A. | 1A |
| Orbit 90 degrees leftward around stand 1. Capture image of target 1B. | 1B |
| Traverse leftward to stand 2. Capture image of target 2B. | 2B |
| Traverse leftward to stand 3. Capture image of 3B. | 3B |
| Orbit 90 degrees leftward around stand 3. Capture image of target 3C. | 3C |
| Orbit 90 degrees leftward around stand 3. Capture image of target 3D. | 3D |
| Traverse leftward to stand 2. Capture image of target 2D. | 2D |
| Traverse leftward to stand 1. Capture image of target 1D. | 1D |
| Orbit 90 degrees leftward around stand 1. Capture image of target 1A. | 1A |
| Land in circle of launch platform. | Land |
| Launch and hover at 10 feet over launch platform. Capture image of target 1A. | 1A |
| Orbit 90 degrees rightward around stand 1. Capture image of target 1D. | 1D |
| Traverse rightward to stand 2. Capture image of target 2D. | 2D |
| Traverse rightward to stand 3. Capture image of target 3D. | 3D |
| Orbit 90 degrees rightward around stand 3. Capture image of target 3C. | 3C |
| Orbit 90 degrees rightward around stand 3. Capture image of target 3B. | 3B |
| Traverse rightward to stand 2. Capture image of target 2B. | 2B |
| Traverse rightward to stand 1. Capture image of target 1B. | 1B |
| Orbit 90 degrees rightward around stand 1. Capture image of target 1A. | 1A |
| Land in circle of launch platform. | Land |
| **Total Score** |  |

END OF SECTION

**Flight Proficiency Assessment**

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