

ATPL Subject Air Regulations (SARON) and Subject Air Meteorology and Regulations (SAMRA) Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

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- 1. How does an inertial navigation system determine speed and position?**
 - A. By measuring wind speed and direction**
 - B. By measuring acceleration against time**
 - C. By GPS satellite signals**
 - D. By ground-based radar**
- 2. What speed formula applies to a rotating tire based on tire pressure?**
 - A. $V \text{ knots} = 8.0 \text{ square root tire pressure PSI}$**
 - B. $V \text{ knots} = 9.0 \text{ square root tire pressure PSI}$**
 - C. $V \text{ knots} = 10.0 \text{ square root tire pressure PSI}$**
 - D. $V \text{ knots} = 11.0 \text{ square root tire pressure PSI}$**
- 3. Dynamic hydroplaning occurs under what specific conditions?**
 - A. When tire pressure is low**
 - B. When standing water of 3mm or more is present at critical speed**
 - C. When the runway is icy**
 - D. When tires are rotating at a speed of only 30 knots**
- 4. Which of the following is a factor that increases V1?**
 - A. Decreased weight**
 - B. Increased density altitude**
 - C. Tailwind component**
 - D. Headwind component**
- 5. In uncontrolled airspace, what is the vertical visibility requirement above 1000 AGL at night?**
 - A. 1000 feet**
 - B. 500 feet**
 - C. 1500 feet**
 - D. 2000 feet**

- 6. What is the minimum required visibility for VFR flight in controlled airspace?**
- A. 1 mile from cloud, 500 feet vertical from cloud**
 - B. 3 statute miles, 1 mile from cloud, 500 feet vertical from cloud**
 - C. 2 statute miles, clear of cloud**
 - D. 4 statute miles, 1 mile from cloud, 1000 feet vertical from cloud**
- 7. What are the flight data recorder requirements for aircraft with 30 or fewer passenger seats?**
- A. Must operate from takeoff to landing completion**
 - B. Must operate from start of taxi to end of flight**
 - C. No specific requirements**
 - D. Must operate from engine start to shutdown**
- 8. What scale do VNC charts typically use?**
- A. 1:1,000,000**
 - B. 1:500,000**
 - C. 1:250,000**
 - D. 1:100,000**
- 9. What does the Point of Equal Time (PET) or Critical Point (CP) formula calculate?**
- A. $D_{pet} = D_{total} \times GS_{continue} / GS_{return} + GS_{continue}$**
 - B. $D_{pet} = D_{total} \times GS_{return} / GS_{return} + GS_{continue}$**
 - C. $D_{pet} = D_{total} \times GS_{return} / GS_{outbound} + GS_{return}$**
 - D. $D_{pet} = D_{total} \times GS_{return} / GS_{return} + GS_{outbound}$**
- 10. What is a reverted rubber hydroplane?**
- A. A situation where the tire rotates too fast**
 - B. A locked tire creating steam and skipping on the steam**
 - C. A fully inflated tire losing contact with the ground**
 - D. A tire that is fully deflated due to pressure loss**

Answers

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- 1. B**
- 2. B**
- 3. B**
- 4. D**
- 5. B**
- 6. B**
- 7. A**
- 8. B**
- 9. B**
- 10. B**

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Explanations

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1. How does an inertial navigation system determine speed and position?

- A. By measuring wind speed and direction
- B. By measuring acceleration against time**
- C. By GPS satellite signals
- D. By ground-based radar

An inertial navigation system (INS) determines speed and position primarily by measuring acceleration over time. The system utilizes accelerometers to detect changes in velocity and movement. These accelerometers calculate the rate of acceleration in multiple axes, allowing the system to integrate this data over time to compute changes in speed and position. As the accelerations are measured, the INS continuously updates its calculations to provide real-time information on the aircraft's trajectory and speed. This method is independent of external references, making it particularly useful for navigation in environments where GPS signals may be unavailable or unreliable. The other options, while relevant to navigation in different contexts, do not pertain to how an inertial navigation system functions. For instance, measuring wind speed and direction focuses on external atmospheric conditions, while GPS satellite signals depend on satellite infrastructure, and ground-based radar relies on external ground systems. Each of these methods has its own applications but does not reflect the intrinsic capabilities of the inertial navigation system.

2. What speed formula applies to a rotating tire based on tire pressure?

- A. $V \text{ knots} = 8.0 \text{ square root tire pressure PSI}$
- B. $V \text{ knots} = 9.0 \text{ square root tire pressure PSI}$**
- C. $V \text{ knots} = 10.0 \text{ square root tire pressure PSI}$
- D. $V \text{ knots} = 11.0 \text{ square root tire pressure PSI}$

The formula for calculating the speed of a rotating tire based on its pressure is indeed rooted in the relationship between the tire's pressure and the speed it can achieve. The correct formula is $V \text{ knots} = 9.0 \text{ square root tire pressure PSI}$. This relationship is essential for pilots and engineers to understand as it impacts performance and safety during takeoff, landing, and taxi operations. In this formula, the constant 9.0 provides a specific conversion factor that ties the tire pressure measured in PSI (pounds per square inch) to the speed in knots. The use of the square root indicates that as tire pressure increases, the achievable speed increases as well, but at a diminishing rate. This reflects real-world dynamics where the tire's structural integrity and grip can be influenced by the amount of air pressure it holds. Understanding this concept is vital in aviation and automotive fields, as it allows for better performance estimation and enhances safely flying and operating the aircraft under various conditions. This knowledge can be particularly useful in pre-flight inspections and when assessing if the aircraft will operate safely within its designed parameters.

3. Dynamic hydroplaning occurs under what specific conditions?

- A. When tire pressure is low**
- B. When standing water of 3mm or more is present at critical speed**
- C. When the runway is icy**
- D. When tires are rotating at a speed of only 30 knots**

Dynamic hydroplaning occurs specifically when there is a layer of water on the runway and the aircraft reaches a critical speed, where the water is unable to be displaced by the aircraft tires. At this point, typically defined by the presence of standing water of 3mm (or approximately 1/8 inch) or more, the aircraft can lose contact with the runway surface, leading to a significant reduction in braking and control. This phenomenon is influenced by factors such as tire design, speed, and the depth of the water on the runway. The critical speed varies depending on the aircraft and its tires, but when that speed is reached with sufficient standing water, hydroplaning can occur. It's important for pilots to understand these conditions to manage their approach and landing more safely. The factors regarding low tire pressure, icy runways, or a specific tire rotation speed of 30 knots do not necessarily represent the conditions that lead to dynamic hydroplaning in the same way as the presence of standing water at critical speeds does.

4. Which of the following is a factor that increases V1?

- A. Decreased weight**
- B. Increased density altitude**
- C. Tailwind component**
- D. Headwind component**

V1 is the decision speed during takeoff at which a pilot must continue the takeoff after an engine failure or abort the takeoff if the failure occurs before this speed. One of the factors that increases V1 is a headwind component. When there is a headwind, the aircraft experiences an increased relative airflow over its wings, which generates lift more efficiently at a lower ground speed. As a result, the aircraft reaches the necessary speed for takeoff sooner. This means the V1 speed threshold is higher because the aircraft can safely continue the takeoff after the loss of an engine at that point. In contrast, the other options present factors that would not lead to an increase in V1. Decreased weight would lower V1 since the aircraft would require less speed to become airborne. Increased density altitude reduces the air density, resulting in a requirement for a higher speed for takeoff, but this effect would typically decrease V1 when combined with other factors. A tailwind component, similar to increased density altitude, also decreases the effective speed at which the aircraft can achieve takeoff, thereby reducing V1. Overall, the presence of a headwind offers a crucial advantage during takeoff, allowing for a higher V1.

5. In uncontrolled airspace, what is the vertical visibility requirement above 1000 AGL at night?

- A. 1000 feet**
- B. 500 feet**
- C. 1500 feet**
- D. 2000 feet**

In uncontrolled airspace, the vertical visibility requirement above 1000 feet AGL (Above Ground Level) at night is indeed 500 feet. This regulation is important as it ensures that pilots have sufficient visual reference to navigate safely in lower light conditions. At night, visibility conditions can change significantly due to reduced natural light, and this requirement allows for an adequate margin of safety for pilots operating in uncontrolled airspace. The specified vertical visibility requirement helps inform pilots of the minimum altitude they must maintain to ensure they're able to see and avoid obstacles and other aircraft that might be operating in the same vicinity. Maintaining a 500-foot vertical visibility above 1000 feet AGL at night allows for better situational awareness and enhances flight safety by ensuring that pilots are able to visually identify their surroundings within an acceptable range. This rule applies specifically to uncontrolled airspace as it presents unique challenges compared to controlled airspace, where there are more active management and communication protocols.

6. What is the minimum required visibility for VFR flight in controlled airspace?

- A. 1 mile from cloud, 500 feet vertical from cloud**
- B. 3 statute miles, 1 mile from cloud, 500 feet vertical from cloud**
- C. 2 statute miles, clear of cloud**
- D. 4 statute miles, 1 mile from cloud, 1000 feet vertical from cloud**

In controlled airspace, the minimum required visibility for VFR (Visual Flight Rules) flight is designed to ensure that pilots can maintain visual reference to navigate safely and effectively. The correct response specifies a visibility of 3 statute miles, which is essential for providing pilots adequate visual references to see and avoid other aircraft, obstacles, and terrain. The requirement of 1 mile lateral distance from clouds and 500 feet vertical distance from clouds helps maintain visual separation from cloud formations, allowing pilots to have a clear line of sight while flying. This is particularly important in controlled airspace where the density of traffic might be higher. These specifics enhance safety by ensuring that pilots can adequately navigate and react to other aircraft within their vicinity, reducing the risk of collisions and improving situational awareness. This set of visibility standards is established by aviation regulatory authorities to create a safe operating environment for all aircraft in controlled airspace.

7. What are the flight data recorder requirements for aircraft with 30 or fewer passenger seats?

- A. Must operate from takeoff to landing completion**
- B. Must operate from start of taxi to end of flight**
- C. No specific requirements**
- D. Must operate from engine start to shutdown**

The requirement that flight data recorders must operate from takeoff to landing completion for aircraft with 30 or fewer passenger seats is based on regulations that ensure the collection of important flight data over the most critical phases of flight. This continuous recording during the entirety of the flight's ascent and descent phases is essential for analyzing incidents, enhancing safety protocols, and improving aviation practices. Operating from takeoff to landing completion allows for the capture of data that encompasses the most dynamic and potentially critical moments, such as the initial climb and final approach. Thus, having this information available can greatly assist investigators in case of accidents or incidents, providing insights into aircraft performance, flight operations, and crew actions throughout these crucial stages. Other options describe operations that either do not meet regulatory requirements for full flight monitoring, do not specify critical phases of flight relevant to data collection, or incorrectly suggest a lack of specific requirements for such aircraft categories. This underscores the importance of stringent data recording standards to maintain safety and accountability in aviation operations.

8. What scale do VNC charts typically use?

- A. 1:1,000,000**
- B. 1:500,000**
- C. 1:250,000**
- D. 1:100,000**

VNC (VFR Navigation Charts) are designed for visual navigation under visual flight rules and primarily cater to general aviation pilots. The scale of 1:500,000 is most commonly used for VNC charts, which strikes an optimal balance between detail and coverage. This scale allows pilots to navigate effectively across larger areas while still providing sufficient detail for identifying key geographical features, airspace classifications, and navigational aids. Using a scale of 1:500,000 ensures that essential information remains legible, enabling pilots to make informed decisions during flight. While other scales such as 1:1,000,000 may provide broader coverage, they lack the detail necessary for safe navigation in congested or complex airspaces. Conversely, scales like 1:250,000 or 1:100,000, although providing greater detail, might be impractical for the broader scope required for general navigation, as the charts would become cumbersome and harder to manage effectively during flight. This makes the 1:500,000 scale the most appropriate choice for the intended purpose of VNC charts.

9. What does the Point of Equal Time (PET) or Critical Point (CP) formula calculate?

- A. $D_{pet} = D_{total} \times GS_{continue} / GS_{return} + GS_{continue}$
- B. $D_{pet} = D_{total} \times GS_{return} / GS_{return} + GS_{continue}$**
- C. $D_{pet} = D_{total} \times GS_{return} / GS_{outbound} + GS_{return}$
- D. $D_{pet} = D_{total} \times GS_{return} / GS_{return} + GS_{outbound}$

The Point of Equal Time (PET), also referred to as the Critical Point (CP), formula calculates the distance at which an aircraft will reach the same amount of time to return to the departure point as it takes to continue on to a destination. This is crucial for flight planning, especially when considering emergency situations or determining whether to continue to an alternate airport. The correct formula identifies the speed on the return leg and the speed on the outbound leg, providing a way to understand how distance and speed affect flight time. By using the ground speed on the return leg and the outbound leg appropriately, this formula ensures that the timing is balanced for both segments of the flight, directly linking speed with time and distance. The other formulas do not properly correlate the key elements of the critical point calculation. For instance, they might fail to include the speeds in the correct positions for a meaningful calculation of how distance translates to equal time on both the outbound and return journeys. In contrast, the correct formula provides a reliable method to calculate the exact point where it would take the same amount of time to return as it would to proceed to the destination. Understanding and applying this calculation can significantly influence decision-making in navigational scenarios, enhancing overall safety and efficiency in flight operations.

10. What is a reverted rubber hydroplane?

- A. A situation where the tire rotates too fast
- B. A locked tire creating steam and skipping on the steam**
- C. A fully inflated tire losing contact with the ground
- D. A tire that is fully deflated due to pressure loss

A reverted rubber hydroplane is characterized by the scenario where a locked tire generates steam due to the intense heat created by friction. When the tire loses traction with the runway, it can essentially "skip" along this steam layer, resulting in a loss of control. This occurrence can be particularly dangerous during landing, as the aircraft may slide rather than coming to a stop effectively. This situation highlights the importance of proper braking techniques and tire management during landing, especially in conditions that could lead to hydroplaning. The formation of steam indicates that the tire is not in contact with the runway surface, making it critical for pilots to understand the implications of a reverted rubber condition on aircraft handling.