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

Study Guide

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Questions

1. Anaemic hypoxia affects the body by what means?

A. Insufficient oxygen reaching the lungs

B. The blood being unable to absorb and carry oxygen

C. Reduction in blood flow

D. Cells unable to absorb oxygen

2. How does air temperature affect critical Mach number (Mcrit)?

A. Increases with higher temperatures

B. Decreases with higher temperatures

C. No effect on critical Mach number

D. Varies depending on altitude

3. What are manga sticks used for in aviation?

A. Fuel quantity measuring devices located beneath the wings

B. Navigation aids for pilots

C. Structural support for wing sections

D. Weather monitoring devices

4. What does the acronym IMSAFE stand for in relation to pilot health?

A. Illness, Medications, Stress, Alcohol, Fatigue, Eating

B. Illness, Medicine, Sleep, Alcohol, Fatigue, Environment

C. Illness, Medicine, Stress, Aerodynamics, Fatigue, Eating

D. Illness, Medications, Safety, Alcohol, Fatigue, Energy

5. What is the required audio gram for a pilot maintaining a category 1 medical certificate?

A. Only when requested

B. Once every 5 years

C. Annually after age 40

D. As required

6. What is required for a 43-year-old pilot maintaining a category 1 medical certificate while flying single-pilot VFR in a commercial operation?

A. A medical exam every 6 months, an ECG every 12 months, and an audio gram as required

B. A medical exam every year and a full physical every 5 years

C. A medical exam every 3 months without additional tests

D. A medical exam every 6 months with no further tests needed

7. Which condition increases induced drag?

A. Decreased air density

B. Increased weight

C. Increased true airspeed

D. Decreased wing area

8. Low aspect ratio wings result in:

A. Decrease in drag

B. Increase in induced drag

C. Increase in parasite drag

D. Increase in lift efficiency

9. What is the fuel-to-air ratio typically associated with turbojet combustion processes?

A. 10:1

B. 12:1

C. 15:1

D. 18:1

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

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

Explanations

1. Anaemic hypoxia affects the body by what means?

A. Insufficient oxygen reaching the lungs

B. The blood being unable to absorb and carry oxygen

C. Reduction in blood flow

D. Cells unable to absorb oxygen

Anaemic hypoxia occurs when the blood's capability to carry oxygen is impaired, typically due to a deficiency of hemoglobin or alterations in its structure or function. In this scenario, even if the lungs are functioning properly and the oxygen is available, the blood lacks the ability to effectively absorb and transport that oxygen to the tissues. This condition can arise from various factors, such as low hemoglobin levels due to anemia, carbon monoxide poisoning, or even certain medical conditions that affect hemoglobin's ability to bind oxygen. Consequently, the underlying issue is not the availability of oxygen in the environment or lungs, but rather the blood's inability to transport it effectively, making option B the correct response. Other options describe different mechanisms of hypoxia. The first option refers to issues with lung function, which might involve conditions like respiratory diseases that prevent sufficient oxygen from reaching the bloodstream. The third option pertains to circulatory issues that might restrict blood flow, affecting oxygen delivery to tissues. Finally, the fourth option concerns the ability of cells to utilize oxygen, which is unrelated to the oxygen-carrying capacity of the blood itself but rather deals with cellular metabolism.

2. How does air temperature affect critical Mach number (Mcrit)?

A. Increases with higher temperatures

B. Decreases with higher temperatures

C. No effect on critical Mach number

D. Varies depending on altitude

The critical Mach number (Mcrit) is defined as the lowest Mach number at which airflow over some part of the aircraft reaches the speed of sound. Understanding its relationship with air temperature is crucial in aerodynamics and aviation dynamics. Air temperature indeed affects the speed of sound in the atmosphere. As temperature increases, the speed of sound also increases because sound waves travel faster in warmer air. The critical Mach number is calculated based on the speed of sound, and since it defines the Mach number at which local flow reaches that speed, higher temperatures actually lead to a higher speed of sound. When the temperature rises, for a given true airspeed, the Mach number will be lower than the critical Mach number derived at lower temperatures because the baseline changes due to the higher sound speed. Consequently, the critical Mach number itself does not increase or decrease independently; it varies with the conditions that affect the speed of sound. Thus, the characterization of critical Mach number having no effect from temperature changes can be misleading. Significant changes in air temperature will impact the Mach number relative to the local speed of sound, and therefore influence the critical Mach number experienced by the aircraft in flight conditions.

3. What are manga sticks used for in aviation?

A. Fuel quantity measuring devices located beneath the wings

B. Navigation aids for pilots

C. Structural support for wing sections

D. Weather monitoring devices

Manga sticks are specifically designed to measure fuel quantity in aviation, and they are typically located beneath the wings of the aircraft. These devices indicate the amount of fuel that is present in the tanks by providing a visual reference, which is crucial for pilots to ensure that the aircraft has sufficient fuel for flight operations and complies with safety regulations. The use of manga sticks helps in maintaining accurate fuel management, allowing for more precise flight planning and monitoring of fuel burn during operations. Thus, this function is fundamental in ensuring the safe and efficient operation of an aircraft.

4. What does the acronym IMSAFE stand for in relation to pilot health?

A. Illness, Medications, Stress, Alcohol, Fatigue, Eating

B. Illness, Medicine, Sleep, Alcohol, Fatigue, Environment

C. Illness, Medicine, Stress, Aerodynamics, Fatigue, Eating

D. Illness, Medications, Safety, Alcohol, Fatigue, Energy

The acronym IMSAFE is an important mnemonic used by pilots to assess their fitness for flight, focusing on various health factors that could affect their performance. The first component, "Illness," prompts pilots to evaluate whether they are suffering from any medical conditions that could impair their ability to fly safely. "Medications" refers to any drugs a pilot might be taking that could influence their cognitive or motor functions. "Stress" encompasses both personal and professional pressures that can affect concentration and decision-making. "Alcohol" addresses the need to ensure that alcohol consumption is well within safe limits (as per regulations, generally not within eight hours of flying). "Fatigue" involves the assessment of both physical and mental tiredness, which can significantly impact flight safety. Finally, "Eating" considers the importance of proper nutrition and hydration in maintaining alertness and overall health during flight operations. This combination in option A captures the essential elements for pilots to consider, ensuring they are in the right state of mind and body to operate an aircraft safely.

5. What is the required audio gram for a pilot maintaining a category 1 medical certificate?

A. Only when requested

B. Once every 5 years

C. Annually after age 40

D. As required

The requirement for an audiogram for a pilot holding a category 1 medical certificate is based on the need for ongoing assessment of hearing ability, which is critical for safe operation of an aircraft. The regulation stipulates that an audiogram is necessary as required, meaning it may not be a mandatory requirement for all pilots at regular intervals but instead is determined based on individual circumstances. If a pilot exhibits signs of hearing issues or if there is any doubt about their hearing ability, an audiogram would be required to ensure they meet the necessary standards. This approach ensures that pilots can adequately perceive auditory signals and communications, which are essential for flight safety. In this context, the other options do not fully align with the regulations. For instance, suggesting that audiograms are only required when requested does not capture the proactive aspect of monitoring a pilot's hearing. Similarly, the options indicating specific time frames, such as every 5 years or annually after age 40, imply a routine standard that does not account for the individual assessments required by regulations. This ensures that any pilot who may be at risk of hearing loss is evaluated as necessary, maintaining the highest safety standards in aviation.

6. What is required for a 43-year-old pilot maintaining a category 1 medical certificate while flying single-pilot VFR in a commercial operation?

A. A medical exam every 6 months, an ECG every 12 months, and an audio gram as required

B. A medical exam every year and a full physical every 5 years

C. A medical exam every 3 months without additional tests

D. A medical exam every 6 months with no further tests needed

For a 43-year-old pilot maintaining a category 1 medical certificate while flying single-pilot VFR in a commercial operation, it is essential to meet the specific medical examination requirements mandated by aviation regulations. The requirements state that a pilot keeping a category 1 medical certificate must undergo a medical exam every 6 months when over 40 years of age. Alongside this, there is a requirement for an electrocardiogram (ECG) every 12 months, which serves as a cardiovascular health evaluation, ensuring that the pilot is fit to fly and does not have any underlying health issues that may impair flying safety. Additionally, an audiogram, which tests hearing ability, is needed as required, especially since the pilot's capability to communicate effectively is crucial for both safety and operational effectiveness in a commercial flying environment. These comprehensive checks ensure that the pilot maintains a high standard of medical fitness, considering the rigorous demands and responsibilities associated with single-pilot commercial flight operations. In contrast, other options either do not meet the necessary frequency of examinations and tests or do not incorporate the additional testing requirements stipulated for pilots of this age and category.

7. Which condition increases induced drag?

A. Decreased air density

B. Increased weight

C. Increased true airspeed

D. Decreased wing area

Induced drag is a type of drag that occurs as a byproduct of lift production. It increases with an increase in the angle of attack, which is generally associated with increased weight. When the weight of an aircraft increases, it requires a higher angle of attack for the wings to generate the necessary lift to maintain level flight. As the angle of attack increases, the induced drag also increases due to the creation of greater vortices at the wingtips which disrupt the airflow over the wings. In this context, when considering the influence of weight on induced drag, a heavier aircraft demands a higher lift coefficient, which occurs at a higher angle of attack and results in more induced drag. Therefore, the positive correlation between increased weight and induced drag is a fundamental aspect of aerodynamics that highlights how load factors can impact flight performance.

8. Low aspect ratio wings result in:

A. Decrease in drag

B. Increase in induced drag

C. Increase in parasite drag

D. Increase in lift efficiency

Low aspect ratio wings are characterized by a shorter wingspan relative to their chord length. This design influences various aerodynamic properties of the aircraft, most notably regarding induced drag. Induced drag is a type of drag that is a byproduct of lift generation – as lift increases, so does induced drag. With low aspect ratio wings, the airflow over the wing becomes more disturbed, resulting in a greater vortex formation at the wingtips. These vortices increase the overall induced drag due to the increased lift-induced pressure differential, leading to a higher angle of attack necessary for the same amount of lift compared to higher aspect ratio wings. Therefore, the relationship between low aspect ratio wings and the increase in induced drag is clear: As their design inherently leads to more interference effects, it ultimately results in increased energy losses and drag associated with maintaining lift.

9. What is the fuel-to-air ratio typically associated with turbojet combustion processes?

A. 10:1

B. 12:1

C. 15:1

D. 18:1

The fuel-to-air ratio typically associated with turbojet combustion processes is around 15:1. This ratio indicates the amount of fuel consumed relative to the mass of air entering the combustion chamber, and it plays a crucial role in optimizing the efficiency and performance of the engine. In turbojet engines, the combustion process requires precise fuel-to-air mixing to ensure complete combustion while managing emissions. A ratio of 15:1 allows for an effective combustion process that maximizes thrust while minimizing soot and unburned fuel. As the fuel-to-air ratio increases, the combustion efficiency can actually decrease if the mixture becomes too rich, leading to incomplete combustion and potential engine performance issues. An understanding of this ratio is essential for predicting the behavior of turbojet engines under various operating conditions, ensuring that performance meets the requirements of various flight profiles.

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.