

Army Space Cadre Basic Course Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

- 1. What type of radar is classified as an active sensor used by the SSN?**
 - A. Infrared Radar**
 - B. Curvature Radar**
 - C. Active Radars**
 - D. Reflective Radar**
- 2. What is the most efficient two-burn maneuver to move from LEO to GEO orbit in the same place?**
 - A. Hohmann Transfer**
 - B. Bi-Impulsive Transfer**
 - C. Patchwork Transfer**
 - D. Delta V Maneuver**
- 3. How many satellites are required for a fully operational GPS constellation?**
 - A. 20 minimum**
 - B. 22 minimum**
 - C. 24 minimum**
 - D. 26 minimum**
- 4. What is the greatest effect on Low Earth Orbit (LEO) spacecraft during a period of increased solar activity?**
 - A. Increased Radiation**
 - B. Atmospheric Drag**
 - C. Magnetic Interference**
 - D. Signal Disruption**
- 5. Which country has the largest Cyber Warrior program?**
 - A. United States**
 - B. Russia**
 - C. China**
 - D. India**

- 6. What does the Space Surveillance Network (SSN) maintain?**
- A. A database of weather satellites only**
 - B. A catalog of man-made objects in space**
 - C. A list of upcoming space missions**
 - D. A record of all space debris incidents**
- 7. What foreign satellite navigation system does China utilize?**
- A. GALILEO**
 - B. NAViC**
 - C. GLOSNASS**
 - D. BeiDOU**
- 8. Which two companies provide lift systems for the EELV program?**
- A. Boeing and Lockheed Martin**
 - B. Northrop Grumman and SpaceX**
 - C. SpaceX and United Launch Alliance**
 - D. Blue Origin and Sierra Nevada Corporation**
- 9. Which of the following is considered a permanent impairment in space control?**
- A. Deceive**
 - B. Disrupt**
 - C. Degrade**
 - D. Deny**
- 10. What allows Nanosats to operate effectively in crowded airspace?**
- A. Small size**
 - B. High cost**
 - C. Permanence**
 - D. Weight**

Answers

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

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Explanations

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1. What type of radar is classified as an active sensor used by the SSN?

- A. Infrared Radar**
- B. Curvature Radar**
- C. Active Radars**
- D. Reflective Radar**

Active radars are classified as active sensors because they emit their own signal, which then travels to a target, reflects off it, and returns to the radar receiver. This process allows active radars to gather information about the location, speed, and behavior of objects in the operational environment, which is crucial for the functionalities of the SSN (Submarine, Ships, or similar platforms). These radar systems play an essential role in tracking and targeting, providing real-time data that enhance situational awareness and operational effectiveness. In contrast, other types of sensors listed do not fit the definition of active sensors: infrared systems detect thermal energy instead of emitting signals, curvature radars do not have a specific classification in the context of active sensing, and reflective radar typically refers to either passive systems or specific radar configurations not categorized as active. Thus, the classification of active radars stands out in its capability and functionality within the context of military operations.

2. What is the most efficient two-burn maneuver to move from LEO to GEO orbit in the same place?

- A. Hohmann Transfer**
- B. Bi-Impulsive Transfer**
- C. Patchwork Transfer**
- D. Delta V Maneuver**

The Hohmann Transfer is a highly efficient maneuver for transitioning from a Low Earth Orbit (LEO) to a Geostationary Orbit (GEO) using two propulsion burns. This technique involves the use of two engine burns: the first burn increases the spacecraft's velocity, allowing it to escape LEO and enter an elliptical orbit that approaches GEO. The second burn occurs at the apogee of this elliptical orbit, circularizing the orbit to achieve a stable GEO. The efficiency of the Hohmann Transfer stems from its use of the least amount of propulsion and fuel to achieve the desired altitude change, relying on the geometry of the orbits involved. It optimally uses the kinetic and potential energies at different points of the trajectory, making it the preferred method for such transfer maneuvers. In contrast, other methods, such as bi-impulsive transfers, may use more complex trajectories or more than two burns, which can lead to higher fuel consumption or longer transit times. Patchwork transfers may not be specifically defined within typical maneuver strategies and can imply various transfer techniques that may not emphasize fuel efficiency. Delta V maneuvers refer to changes in velocity but do not specify a defined transfer method or trajectory, which makes them less suitable for the

3. How many satellites are required for a fully operational GPS constellation?

- A. 20 minimum**
- B. 22 minimum**
- C. 24 minimum**
- D. 26 minimum**

The correct answer is based on the operational requirements set forth for the Global Positioning System (GPS) constellation. A fully operational GPS system requires a minimum of 24 satellites to provide continuous global coverage for users. This figure allows for adequate redundancy to ensure that at least four satellites are in view from any location on Earth at any given time. Having 24 satellites deployed in six orbital planes, with each plane having four satellites, enables the system to maintain accurate positioning and timing services globally. This arrangement ensures that users can obtain a three-dimensional fix (latitude, longitude, and altitude) as well as precise time information, which is critical for various applications, including navigation and military operations. While options suggesting fewer satellites may suffice for limited coverage or specific applications, they do not meet the comprehensive operational needs required for global positioning. Thus, 24 satellites are essential to ensure that the GPS can function effectively under various conditions and across different geographic areas, providing dependable service worldwide.

4. What is the greatest effect on Low Earth Orbit (LEO) spacecraft during a period of increased solar activity?

- A. Increased Radiation**
- B. Atmospheric Drag**
- C. Magnetic Interference**
- D. Signal Disruption**

The greatest effect on Low Earth Orbit (LEO) spacecraft during a period of increased solar activity is increased radiation. During solar events such as solar flares or coronal mass ejections, the Sun emits a higher-than-normal level of energetic particles and radiation that can impact spacecraft. These particles can penetrate the spacecraft environment and potentially harm onboard electronics, disrupt sensor readings, and even pose risks to the health of astronauts if applicable. Increased radiation in LEO can lead to phenomena such as single-event upsets in computer systems, degradation of solar panels, and the need for enhanced shielding on satellites. While atmospheric drag is a concern in LEO due to the thinning atmosphere at higher altitudes, the impact related to solar activity primarily revolves around radiation levels. In contrast, while residual atmospheric drag is a consistent factor affecting LEO satellites, it does not significantly increase solely during periods of solar activity. Magnetic interference could also occur but is generally less impactful than the immediate effects of heightened radiation on spacecraft functionality. Signal disruption is a possible consequence of increased solar activity, but it is predominantly an effect of radiation interference rather than being the primary influence during solar spikes.

5. Which country has the largest Cyber Warrior program?

- A. United States**
- B. Russia**
- C. China**
- D. India**

The option indicating China as having the largest Cyber Warrior program is supported by various factors, particularly the country's significant investment in cyber capabilities and its centralized governmental approach to cyber operations. China's robust program is underpinned by a formalized strategy that integrates national security objectives with cyber capabilities. The Chinese government has prioritized the development of its cyber forces, creating a comprehensive organization that includes units like the People's Liberation Army (PLA) Cyber Forces. These units are not only large in number but are also well-resourced, featuring extensive training programs and advanced technology to conduct offensive and defensive operations in cyberspace. Additionally, China's cyber strategy is part of a broader military modernization effort, encapsulated in policies such as the "Military-Civil Fusion" strategy, which encourages cooperation between military and civilian technological advancements. This structured and resource-rich approach allows China to leverage its manpower and intellectual resources effectively, contributing to a substantial Cyber Warrior program. In comparison, while other countries like the United States and Russia also have significant cyber capabilities, they may not match the scale and strategic integration exemplified by China's program. India, although growing its cyber defense strategies, does not possess a program comparable in size or official state backing to that of China at this time.

6. What does the Space Surveillance Network (SSN) maintain?

- A. A database of weather satellites only**
- B. A catalog of man-made objects in space**
- C. A list of upcoming space missions**
- D. A record of all space debris incidents**

The Space Surveillance Network (SSN) plays a critical role in tracking and cataloging man-made objects in space, which includes active satellites, decommissioned satellites, rocket bodies, and space debris. The SSN is vital for ensuring space situational awareness, which helps prevent collisions in space and supports satellite operations. By maintaining a comprehensive catalog of these objects, the SSN provides data that is essential for military operations, space science, and commercial satellite management. The other options do not accurately represent the primary mission of the SSN. While weather satellites are part of the overall space environment, the SSN's focus extends far beyond just weather-related objects. Additionally, a list of upcoming space missions and records of space debris incidents might be valuable information but fall outside of the core function of cataloging all man-made objects in space. Thus, the answer highlighting the catalog of man-made objects encapsulates the essential purpose and functionality of the Space Surveillance Network.

7. What foreign satellite navigation system does China utilize?

- A. GALILEO**
- B. NAViC**
- C. GLOSNASS**
- D. BeiDOU**

China utilizes the BeiDou satellite navigation system, which is a critical part of its national strategy for enhancing military and civilian navigation capabilities. BeiDou provides global coverage and supports various applications, including transportation, disaster relief, and precision agriculture. It began operations in 2000 and has evolved into a full-fledged global navigation system. By employing its own navigation system, China can operate independently of foreign systems and maintain greater control over the accuracy and reliability of the navigation data for both civilian use and military operations. In understanding the context of the other options, GALILEO is the European Union's satellite navigation system, NAViC is India's regional navigation system, and GLONASS is Russia's equivalent system. None of these systems are utilized by China, emphasizing the significance of BeiDou as a national asset for strategic interests.

8. Which two companies provide lift systems for the EELV program?

- A. Boeing and Lockheed Martin**
- B. Northrop Grumman and SpaceX**
- C. SpaceX and United Launch Alliance**
- D. Blue Origin and Sierra Nevada Corporation**

The Evolved Expendable Launch Vehicle (EELV) program primarily utilizes the capabilities of the United Launch Alliance (ULA) and SpaceX for its lift systems. ULA, formed as a partnership between Boeing and Lockheed Martin, develops rockets like the Atlas V and Delta IV, which have been critical to EELV missions. SpaceX, with its Falcon 9 and Falcon Heavy rockets, has been increasingly involved in national security launches as part of the EELV program. This dual capability enhances the U.S. government's access to space, providing reliable launch services for a variety of payloads. The collaboration between these companies supports national defense interests and commercial space objectives. Thus, recognizing ULA as one of the providers alongside SpaceX is essential in understanding the current landscape of launch systems under the EELV program.

9. Which of the following is considered a permanent impairment in space control?

- A. Deceive**
- B. Disrupt**
- C. Degrade**
- D. Deny**

A permanent impairment in space control refers to a sustained and lasting effect that hinders or obstructs the effective use of space assets and capabilities. The concept of impairing space control involves actions that impact the operational effectiveness of these capabilities over an extended period. The choice of "degrade" as the answer aligns with this definition because it involves reducing the effectiveness or efficiency of space assets. When space control is degraded, it means that the ability to utilize those assets has been diminished in a way that is not easily reversible. This sustained impairment can affect the ability to conduct operations effectively and can lead to long-term issues in space dominance. In contrast, the other options pertain to temporary or situational actions. To "deceive" generally involves creating false information or impressions to mislead adversaries but does not permanently impair space capabilities. "Disrupt" often refers to interrupting operations or functions temporarily. "Deny" involves blocking access or the ability to operate in a certain area but can be regained once the disruptive influence is removed. Therefore, among these choices, "degrade" best fits the criteria for a permanent impairment in space control, signifying a lasting reduction in operational effectiveness.

10. What allows Nanosats to operate effectively in crowded airspace?

- A. Small size**
- B. High cost**
- C. Permanence**
- D. Weight**

The ability of Nanosats to operate effectively in crowded airspace primarily stems from their small size. This compact design allows them to maneuver easily among other satellites and debris in orbit without requiring extensive clearance space. Their smaller footprint means they can be deployed in areas where larger satellites might face challenges, effectively utilizing available orbital slots. Additionally, because they can be packed more densely, Nanosats can operate within the existing guidelines and regulatory frameworks designed for satellite deployment, which further enhances their operability in crowded environments. The other options—high cost, permanence, and weight—do not directly contribute to their effectiveness in denser orbital regions. High cost may limit deployment strategies, while permanence is not a defining feature of their effectiveness in shared orbital space. Weight, although somewhat relevant, is not as critical as size in determining the operational flexibility of Nanosats amidst larger satellite systems. Thus, the small size is a crucial advantage that enables successful navigation and operation in crowded airspace.