
GS Foundation Program 2024 | D10 | Benchmark Assignment #114

Subjective Questions:

Q.1) Present a brief account of various security forces deployed to protect India's terrestrial and maritime borders. Also, bring out various challenges faced by border security forces and suggest measures to effectively address them. (15 marks, 250 words)

Objective Questions:

Q.1) The increasing amount of carbon dioxide in the air is slowly raising the temperature of the atmosphere, because it absorbs

- a) The water vapour of the air and retains its heat.
- b) The ultraviolet part of the solar radiation.
- c) All the solar radiations.
- d) The infrared part of the solar radiation.

Q.2) Graphene is frequently in news recently. What is its importance?

1. It is a two-dimensional material and has good electrical conductivity.
2. It is one of the thinnest but strongest materials tested so far.
3. It is entirely made of silicon and has high optical transparency.
4. It can be used as 'conducting electrodes' required for touch screens, LCDs and organic LEDs.

Which of the statements given above are correct?

- a) 1 and 2 only
- b) 3 and 4 only
- c) 1, 2 and 4 only
- d) 1, 2, 3 and 4

Q.3) Organic Light Emitting Diodes (OLEDs) are used to create digital display in many devices. What are the advantages of OLED displays over Liquid Crystal displays?

1. OLED displays can be fabricated on flexible plastic substrates.
2. Roll-up displays embedded in clothing can be made using OLEDs.
3. Transparent displays are possible using OLEDs.

Select the correct answer using the code given below

- a) 1 and 3 only
- b) 2 only
- c) 1, 2 and 3
- d) None of the above statements is correct

Q.4) Rainbow is produced when sunlight falls on drops of rain.
Which of the following physical phenomena are responsible for this?

1. Dispersion
2. Refraction
3. Internal reflection

Select the correct answer using the codes below.

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

Q.5) Consider the following phenomena:

1. Size of the sun at dusk.
2. Colour of the sun at dawn
3. Moon being visible at dawn
4. Twinkle of stars in the sky
5. Polestar being visible in the sky

Which of the above are optical illusions?

- a) 1, 2 and 3
- b) 3, 4 and 5
- c) 1, 2 and 4
- d) 2, 3 and 5

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Subjective Questions:

Q.1) Present a brief account of various security forces deployed to protect India's terrestrial and maritime borders. Also, bring out various challenges faced by border security forces and suggest measures to effectively address them.

Approach: Introduce by briefing on India's borders and various challenges. In body, mention various security forces deployed to protect India's terrestrial and maritime borders, along with their mandate. Mention various challenges faced by border security forces and suggest measures to effectively address them. Conclude mentioning the need to focus on the latest technology.

India's land border covers around **15,106 km** and **maritime border around 7,516 km**. The varied **geographical terrain, climatic conditions** and **hostile neighbors** make its borders **complex** and border management challenging.

Various security forces are deployed to protect India's land and maritime borders are described below:

A) Terrestrial borders: Under **Central Armed Police Force** following units are entrusted with managing terrestrial borders:

1. **Assam Rifles**- Indo-Myanmar border.
2. **Border Security Force**- Indo-Pakistan and Indo-Bangladesh borders.
3. **Indo-Tibetan Border Police**- India-China-Nepal border.
4. **Sashashtra Seema Bal**- Indo-Nepal and Indo-Bhutan borders.

B) Maritime borders: **Indian Coast Guards (ICG)** is a **lead intelligence agency for maritime borders** and is responsible for coastal security in territorial waters. It **ensures the safety and protection** of artificial islands, offshore terminals, installations and other structures and devices in maritime zones.

Following are the **challenges faced by border security forces** in terrestrial and maritime borders:

1. **Geographic terrain:** Indian borders run through diverse terrain including **deserts, marshes, plains and mountains**. The **terrain, climate** and **porosity of borders** poses a challenge to forces in its effective management of the borders.
2. **Lack of infrastructure:** Critical infrastructure such as **roads, observation towers, bunkers, border flood lights etc.** are lacking. Security forces lack **hi-tech equipment** such as **sensors, detectors, cameras, ground-based radar systems, etc.** and are **ill-equipped** to handle border management given poor intelligence capabilities.
3. **Lack of coordination:** The deployment of **multiple forces overseen by different organizations** leads to lack of coordination, poor intelligence and even conflicts. For instance, **SSB** guards the **Sikkim border** and **Assam Rifles** guards the **Arunachal Pradesh, Nagaland, Manipur and Mizoram borders**. Further, coordination with the army and police force in Kashmir is another challenge.

4. **Non-parity with the army** in terms of facilities and salaries discourages forces. Further, these forces are **headed by IPS** officers, who are seen as **outsiders** to the force, and there is no system for regular personnel of the CAPF to reach the top level.
5. Long working hours, **poor work life balance, low pay, poor training** etc. results in **clashes** between officers and men, **frustration** and even **suicide** in some extreme cases.

To overcome the challenges mentioned above, following **measures** are needed **to make the security apparatus more effective**:

1. **Use of technology** (drones, laser fence, CCTV camera, radar systems etc.) **to ease round the clock surveillance** through difficult border terrain; weapon modernization.
2. **Agreement on basic guiding principles and SOPs** is required among forces. Increasing **CBMs** (Comprehensive Border Management) and communication linkages are must to avoid unnecessary confrontation and escalation is needed.
3. **Infrastructure** along with border must be improved. **Rail connectivity** along with **road connectivity** must be provided for quick mobilization.
4. Better work life balance, focus on **mental and psychological health**, better **training** institutes and **pay parity** with the army have to be established.
5. **Grooming officers from entry level** so that suitable candidates for the top post can emerge from within the force.

Keeping a strong vigilance on borders is important for any nation's security. To achieve synergy in efforts and operation of different border guarding forces the idea of **unified border protection force** can be explored.

Objective Questions:

Q.1) The increasing amount of carbon dioxide in the air is slowly raising the temperature of the atmosphere, because it absorbs

- a) The water vapour of the air and retains its heat.
- b) The ultraviolet part of the solar radiation.
- c) All the solar radiations.
- d) The infrared part of the solar radiation.

Ans) d

Exp) Option d is correct

Molecules of carbon dioxide (CO₂) can absorb energy from infrared part of solar radiations and re-emit it. The re-emitted energy travels out in all directions and heats up the atmosphere.

In addition, Carbon dioxide can stay in atmosphere for centuries.

Q.2) Graphene is frequently in news recently. What is its importance?

1. It is a two-dimensional material and has good electrical conductivity.
2. It is one of the thinnest but strongest materials tested so far.
3. It is entirely made of silicon and has high optical transparency.
4. It can be used as 'conducting electrodes' required for touch screens, LCDs and organic LEDs.

Which of the statements given above are correct?

- a) 1 and 2 only
- b) 3 and 4 only
- c) 1, 2 and 4 only
- d) 1, 2, 3 and 4

Ans) c

Exp) Option c is correct.

Graphene is a one-atom-thick layer of carbon atoms (not silica) arranged in a hexagonal lattice. It is the building-block of Graphite. Graphene is the thinnest compound known to man at one atom thick, the lightest material known, the strongest compound discovered (between 100-300 times stronger than steel).

In the field of **optics, transparency** is the physical property of allowing light to pass through the material without appreciable scattering of light.

Graphene has high optical transparency and can uniformly absorb light across the visible and near-infrared parts of the spectrum and thus it is potentially suitable for use in spin transport.

Q.3) Organic Light Emitting Diodes (OLEDs) are used to create digital display in many devices.

What are the advantages of OLED displays over Liquid Crystal displays?

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Select the correct answer using the code given below

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- b) 2 only
- c) 1, 2 and 3
- d) None of the above statements is correct

Ans) c

Exp) Option c is correct.

All the statements are correct regarding the advantages of OLEDs over LEDs.

Q.4) Rainbow is produced when sunlight falls on drops of rain.

Which of the following physical phenomena are responsible for this?

1. Dispersion
2. Refraction
3. Internal reflection

Select the correct answer using the codes below.

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

Ans) d

Exp) Option d is correct.

When sunlight falls on the drops of rain formation of a Rainbow occurs in the sky. These droplets work as a prism for the rays coming from the sun. When the sunlight gets through these droplets, it results in refraction and dispersion in seven colours known as VIBGYOR. Then it goes to total internal reflection. This happens due to combined phenomena of **Dispersion, Refraction, and Total Internal reflection** in the atmosphere.

Statement 1 is correct. Dispersion is the process of splitting lights into different colours.

Example: Dispersion done by Prism. Each individual droplet of water acts as a tiny prism that both disperses the light and reflects it back to our eye.

Statement 2 is correct. Dispersion is the process of splitting lights into different colours. Since water is denser than air, light is refracted as it enters the drop.

Statement 3 is correct. Some of the light will reflect off the back of the drop if the angle is larger than the critical angle (48° for water). Total Internal reflection is the phenomenon that occurs based on 2 conditions: -

- 1) When light moves from a denser medium to a less dense medium.
- 2) When the angle of incidence is greater than the critical angle.

Q.5) Consider the following phenomena:

1. Size of the sun at dusk.
2. Colour of the sun at dawn
3. Moon being visible at dawn
4. Twinkle of stars in the sky
5. Polestar being visible in the sky

Which of the above are optical illusions?

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- b) 3, 4 and 5
- c) 1, 2 and 4
- d) 2, 3 and 5

Ans) c

Exp) Option c is correct.

An optical illusion is a visual stimulus that is perceived by the eyes and then comprehended by the brain in a way that is different from reality.

Most of the stars are shining with a steady light. The movement of air (sometimes called turbulence) in the atmosphere of Earth causes the starlight to get slightly bent as it travels from the distant star through the atmosphere down to us on the ground. The twinkling of a star is due to atmospheric refraction of starlight. The starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index.

This means that some of the light reaches us directly and some gets bent slightly away. To our eyes, this makes the star seem to twinkle.