Unit-3

**1. Vision and Mission of National Civil Aviation**

\*\*Vision:\*\*

To establish a safe, secure, efficient, and sustainable civil aviation system that contributes to the economic growth and social development of the nation, while ensuring global connectivity and environmental responsibility.

\*\*Mission:\*\*

To promote and regulate the civil aviation sector in a manner that ensures safety, enhances operational efficiency, fosters innovation, and provides affordable and accessible air travel to all citizens, while maintaining environmental sustainability and global competitiveness.

**2. Objectives of National Civil Aviation**

1. \*\*Safety and Security:\*\* Ensure the highest standards of safety and security in all aspects of civil aviation operations.

2. \*\*Infrastructure Development:\*\* Develop and modernize aviation infrastructure to support growing demand and enhance connectivity.

3. \*\*Regulatory Framework:\*\* Establish a robust regulatory framework that promotes fair competition, consumer protection, and industry growth.

4. \*\*Economic Growth:\*\* Contribute to the national economy by fostering a competitive aviation sector that attracts investment and creates jobs.

5. \*\*Sustainability:\*\* Promote environmentally sustainable practices in aviation operations to minimize the sector's carbon footprint.

6. \*\*Global Connectivity:\*\* Enhance international connectivity to facilitate trade, tourism, and cultural exchange.

7. \*\*Consumer Satisfaction:\*\* Ensure affordable, reliable, and high-quality air travel services for all passengers.

### Four Values of National Civil Aviation

1. \*\*Safety:\*\* The paramount value, ensuring that all aviation operations are conducted with the highest safety standards to protect passengers, crew, and aircraft.

2. \*\*Efficiency:\*\* Striving for operational excellence to maximize resource utilization, reduce costs, and improve service delivery.

3. \*\*Sustainability:\*\* Commitment to environmental stewardship by adopting green technologies and practices to reduce the environmental impact of aviation.

4. \*\*Inclusivity:\*\* Ensuring that the benefits of civil aviation are accessible to all segments of society, including remote and underserved regions.

or

The core values of national civil aviation are fundamental principles that guide the operations and development of aviation systems. While specific values might differ slightly from country to country, these key values are widely recognized:

1. **Safety**: Ensuring the highest level of safety for passengers, crew, and aircraft through stringent regulations, training, and continuous improvements in safety protocols.
2. **Security**: Protecting civil aviation from unlawful interference, including terrorism, hijacking, and other threats, to ensure the security of passengers, crew, and infrastructure.
3. **Efficiency**: Maximizing the effective use of resources, including airspace, airports, and air traffic management, to provide timely and cost-effective services.
4. **Sustainability**: Committing to environmentally responsible practices, such as reducing carbon emissions, using sustainable aviation fuels, and minimizing noise pollution.

**4. National Civil Aviation Policy**

The National Civil Aviation Policy (NCAP) is a comprehensive framework designed to guide the development and regulation of the civil aviation sector in a country. It typically addresses issues such as safety, security, infrastructure development, economic regulation, environmental sustainability, and consumer protection. The policy aims to create a conducive environment for the growth of the aviation industry, enhance connectivity, and promote economic development.

5. **Importance of National Civil Aviation Policies**

1. \*\*Regulatory Framework:\*\* Provides a clear and consistent regulatory framework that ensures safety, security, and fair competition.

2. \*\*Infrastructure Development:\*\* Guides the development of aviation infrastructure, including airports, air traffic management systems, and related facilities.

3. \*\*Economic Growth:\*\* Encourages investment in the aviation sector, leading to job creation, increased tourism, and enhanced trade opportunities.

4. \*\*Global Competitiveness:\*\* Enhances the country's competitiveness in the global aviation market by promoting best practices and innovation.

5. \*\*Consumer Protection:\*\* Ensures that passengers receive high-quality services and are protected from unfair practices.

6. \*\*Environmental Sustainability:\*\* Promotes the adoption of sustainable practices to minimize the environmental impact of aviation.

**6. Importance of National Civil Aviation**

1. \*\*Economic Contribution:\*\* The aviation sector contributes significantly to the national economy through direct, indirect, and induced impacts, including job creation, tourism, and trade.

2. \*\*Connectivity:\*\* Enhances domestic and international connectivity, facilitating the movement of people and goods.

3. \*\*Social Development:\*\* Provides access to remote and underserved regions, promoting social inclusion and economic development.

4. \*\*National Security:\*\* Plays a critical role in national security by supporting defense operations and emergency response.

5. \*\*Global Integration:\*\* Facilitates global integration by connecting the country to international markets and cultural exchanges.

**7. Addressing Economic Viability Issues of Airports**

The National Civil Aviation Policy must address the economic viability of airports by:

1. \*\*Public-Private Partnerships (PPP):\*\* Encouraging PPP models to attract private investment and improve operational efficiency.

2. \*\*Tariff Regulation:\*\* Implementing a fair and transparent tariff regulation mechanism to ensure that airport charges are reasonable and competitive.

3. \*\*Non-Aeronautical Revenue:\*\* Promoting the development of non-aeronautical revenue streams, such as retail, hospitality, and real estate, to enhance financial sustainability.

4. \*\*Regional Connectivity:\*\* Supporting regional connectivity schemes to increase passenger traffic and improve the viability of smaller airports.

5. \*\*Cost Efficiency:\*\* Encouraging cost-efficient operations and management practices to reduce operational expenses.

**8. 5/20 Rule**

The 5/20 Rule was a regulation in India's civil aviation policy that required airlines to have at least five years of domestic flying experience and a fleet of 20 aircraft before they could operate on international routes. The rule was intended to ensure that only well-established and financially stable airlines could operate internationally.

**9. Detailed Discussion on the 5/20 Rule**

The 5/20 Rule was introduced to protect the interests of domestic airlines and ensure that they had sufficient experience and resources before venturing into international operations. However, the rule was criticized for creating barriers to entry and limiting competition. In 2016, the rule was replaced by the 0/20 Rule, which removed the five-year experience requirement but retained the requirement of having 20 aircraft. This change was aimed at promoting growth and competition in the aviation sector.

**10. Challenges Facing India's Civil Aviation Sector**

1. \*\*Infrastructure Constraints:\*\* Limited airport capacity and inadequate infrastructure in smaller cities and towns hinder the growth of the sector.

2. \*\*High Operational Costs:\*\* High fuel prices, taxes, and airport charges increase operational costs for airlines, affecting their profitability.

3. \*\*Regulatory Hurdles:\*\* Complex and restrictive regulations can create barriers to entry and limit competition.

4. \*\*Financial Health of Airlines:\*\* Many airlines in India face financial difficulties, leading to bankruptcy or mergers, which can reduce competition and consumer choice.

5. \*\*Skilled Workforce Shortage:\*\* There is a shortage of skilled professionals, including pilots, engineers, and air traffic controllers, which can impact the quality and safety of aviation services.

6. \*\*Environmental Concerns:\*\* The aviation sector is under increasing pressure to reduce its environmental impact, including carbon emissions and noise pollution.

7. \*\*Regional Connectivity:\*\* Despite efforts to improve regional connectivity, many remote and underserved regions still lack adequate air services.

8. \*\*Safety and Security:\*\* Ensuring the highest standards of safety and security remains a critical challenge, requiring continuous investment in technology and training.

In conclusion, the National Civil Aviation Policy plays a crucial role in shaping the development and regulation of the aviation sector. Addressing the challenges and leveraging the opportunities in the sector requires a comprehensive and forward-looking approach that balances safety, efficiency, sustainability, and inclusivity.

**1 1. \*Enlist Civil Aviation Benefits\***

Civil aviation offers numerous benefits, including:

- \*Economic Growth\*: Boosts trade, tourism, and investment.

- \*Job Creation\*: Provides employment in airlines, airports, and related industries.

- \*Global Connectivity\*: Facilitates international travel and trade.

- \*Emergency Response\*: Enables rapid delivery of aid during disasters.

- \*Cultural Exchange\*: Promotes understanding and collaboration across cultures.

- \*Technological Advancement\*: Drives innovation in aerospace and related fields.

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**1 2. \*Describe Civil Aviation's Significant Social Benefit\***

Civil aviation significantly enhances \*social connectivity\* by bringing people closer, fostering cultural exchange, and enabling access to remote areas. It promotes education and healthcare by facilitating the movement of professionals and resources. Additionally, it strengthens family ties and friendships by making long-distance travel faster and more accessible.

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**1 3. \*Short Note on the Economic Benefit of Civil Aviation\***

Civil aviation is a cornerstone of the global economy, contributing significantly to GDP through direct, indirect, and induced impacts. It supports industries like tourism, trade, and logistics, creating millions of jobs worldwide. Airports and airlines generate revenue, while improved connectivity attracts foreign investment and boosts regional development.

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**14. \*Modernizing Aviation to Maximize Its Benefits\***

Modernizing aviation involves:

- \*Digital Transformation\*: Implementing advanced technologies like AI, IoT, and blockchain for efficient operations.

- \*Sustainable Practices\*: Adopting eco-friendly fuels and reducing carbon emissions.

- \*Infrastructure Upgrades\*: Expanding and modernizing airports to handle increasing traffic.

- \*Safety Enhancements\*: Using advanced systems for better safety and security.

- \*Policy Reforms\*: Streamlining regulations to encourage innovation and investment.

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**15. \*Significance of the Root Dispersal Guideline in ensuring Balanced Growth across region in civil aviation.**

The **Route Dispersal Guidelines (RDGs)** are crucial in ensuring balanced growth across regions in civil aviation. These guidelines are implemented to achieve better connectivity of air transport services in different regions of the country. Here are some key points on their significance:

1. **Enhanced Connectivity**: RDGs ensure that underserved and remote regions receive adequate air services, promoting regional connectivity and accessibility.
2. **Balanced Development**: By mandating airlines to operate a certain percentage of flights on less profitable routes, RDGs help in the balanced development of aviation infrastructure across the country.
3. **Economic Growth**: Improved air connectivity can boost local economies by facilitating tourism, trade, and investment in remote areas.
4. **Social Inclusion**: RDGs contribute to social inclusion by providing people in remote regions with better access to essential services, education, and employment opportunities.
5. **Strategic Importance**: Ensuring connectivity to remote and border areas can have strategic and security benefits for the country

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**16. \*National Civil Aviation Root Categories\***

The National Civil Aviation Policy typically includes:

- \*Infrastructure Development\*: Building and upgrading airports.

- \*Safety and Security\*: Implementing stringent safety measures.

- \*Regulatory Framework\*: Establishing policies for airlines and airports.

- \*Sustainability\*: Promoting green aviation practices.

- \*Skill Development\*: Training professionals for the aviation industry.

- \*Regional Connectivity\*: Enhancing access to remote areas.

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**17. \*Comparison of Airport Development Models\***

- \*State Government Airports\*:

- \*Pros\*: Focus on public welfare, affordable services.

- \*Cons\*: Bureaucratic delays, limited funding.

- \*Private Sector Airports\*:

- \*Pros\*: High efficiency, modern facilities.

- \*Cons\*: Higher costs, profit-driven.

- \*Public-Private Partnership (PPP) Airports\*:

- \*Pros\*: Balanced approach, shared risks, and resources.

- \*Cons\*: Complex agreements, potential conflicts.

\*Operational Efficiency\*: Private and PPP airports often outperform state-run airports due to better management and investment.

\*Economic Viability\*: PPP models strike a balance between profitability and public service, making them more sustainable.

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**1 8. \*Impact of Safety Regulations & Complaints on Airport Performance\***

- \*Positive Impact\*: Strict safety regulations enhance passenger trust and reduce accidents, improving overall performance.

- \*Negative Impact\*: Excessive regulations can increase operational costs and delays.

- \*Complaints\*: Addressing complaints improves service quality but may strain resources if not managed effectively.

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**19. \*Greenfield Airport Policy\***

A \*Greenfield Airport Policy\* focuses on constructing new airports in previously undeveloped areas. Key aspects include:

- \*Site Selection\*: Identifying locations with high growth potential.

- \*Environmental Clearance\*: Ensuring minimal ecological impact.

- \*Funding\*: Attracting public and private investments.

- \*Infrastructure\*: Building state-of-the-art facilities.

- \*Regional Development\*: Boosting local economies through improved connectivity.

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**20. \*State Ground Goal Policy\***

A \*State Ground Goal Policy\* outlines a state's objectives for ground infrastructure supporting aviation, such as:

- \*Road and Rail Connectivity\*: Linking airports to cities.

- \*Logistics Hubs\*: Developing cargo facilities.

- \*Sustainability\*: Promoting eco-friendly ground operations.

- \*Public Transport\*: Enhancing access to airports for passengers.

- \*Economic Zones\*: Creating business hubs near airports to drive growth.

This policy ensures seamless integration of aviation with other transport systems, maximizing economic and social benefits.

**UNIT-2**

1. What is the goal of Airport system planning? Discuss the factors that need to be

considered during the planning process.

2. Describe the airport classification.

3. Describe the various components of the Airfield area.

4. What are the various objectives of the airport master plan?

5. Discuss the various criteria for Airport Site Determination and Considerations.

6. Explain the factors affecting the selection of a site for the Airport

7. Write a short note on the following:

a) Runway Configurations

b) Taxiway Configurations

c) Planning and Design of the Terminal Area

8. Discuss the Crosswind component and effects.

9. Discuss the type of Aircraft Parking.

10. Enlist the various factors affecting runway orientation.

Let's break down these airport planning and design questions.

**1. Goal of Airport System Planning & Factors Considered:**

The primary goal of airport system planning is to create a safe, efficient, and economically viable network of airports that meets current and future air transportation demands. This involves considering:

\* Demand Forecasting: Estimating future passenger and cargo traffic to determine the required capacity.

\* Economic Impact: Assessing the airport's contribution to the local and regional economy, including job creation and business activity.

\* Environmental Impact: Evaluating the airport's effect on air and noise pollution, water resources, and wildlife. Mitigation strategies are crucial.

\* Financial Feasibility: Determining the costs of development and operation, and securing funding.

\* Community Input: Engaging with local residents and businesses to address concerns and incorporate their feedback.

\* Safety and Security: Prioritizing safety in all aspects of design and operation, and implementing robust security measures.

\* Accessibility: Ensuring easy access to the airport for all users, including those with disabilities.

\* Integration with other Transportation Modes: Connecting the airport seamlessly with ground transportation systems, such as roads, rail, and public transit.

\* Technological Advancements: Incorporating new technologies to improve efficiency, safety, and passenger experience.

\* Land Use Planning: Coordinating airport development with surrounding land use to minimize conflicts.

\* Regulatory Requirements: Adhering to all applicable local, state, and national regulations.

**2. Airport Classification:**

Airports can be classified in various ways:

\* By Size/Activity: Hub airports, large/medium/small hubs, non-hub primary airports, general aviation airports.

\* By Ownership: Publicly owned, privately owned.

\* By Function: Commercial service airports, general aviation airports, reliever airports.

\* By Type of Aircraft Served: Based on the size and type of aircraft they can accommodate (e.g., small planes, wide-body jets).

\* By International/Domestic: International airports, domestic airports.

**3. Components of the Airfield Area:**

The airfield encompasses all the areas within the airport boundary used for aircraft operations:

\* Runways: The primary surfaces for aircraft takeoff and landing.

\* Taxiways: Paved pathways connecting runways to terminals, hangars, and other areas.

\* Aprons: Areas where aircraft are parked for loading, unloading, refueling, and maintenance.

\* Hangars: Buildings for aircraft storage and maintenance.

\* Navigational Aids (NAVAIDs): Electronic systems that provide guidance to aircraft during takeoff, landing, and en route.

\* Lighting: Runway, taxiway, and approach lighting systems.

\* Drainage Systems: Managing stormwater runoff.

\* Safety Areas: Areas surrounding runways and taxiways designed to enhance safety.

**4. Objectives of an Airport Master Plan:**

An airport master plan provides a long-term framework for airport development:

\* Define Future Needs: Forecast aviation demand and identify the facilities required to meet that demand.

\* Optimize Land Use: Plan the efficient use of airport property.

\* Guide Development: Provide a roadmap for phased development of facilities.

\* Secure Funding: Justify the need for funding and attract investment.

\* Coordinate with Stakeholders: Engage with airlines, government agencies, and the community.

\* Minimize Environmental Impact: Address environmental concerns and incorporate sustainability principles.

\* Ensure Safety and Efficiency: Prioritize safety and operational efficiency.

**5. Criteria for Airport Site Determination:**

\* Availability of Land: Sufficient land area for current and future needs.

\* Accessibility: Easy access to the airport from major transportation routes.

\* Proximity to Population Centers: Convenient access for passengers.

\* Topography and Geology: Suitable terrain for construction.

\* Environmental Impact: Minimizing environmental disruption.

\* Airspace: Clear airspace for aircraft operations.

\* Obstacles: Free from obstructions that could interfere with flight paths.

\* Wind Conditions: Favorable wind patterns for aircraft operations.

\* Noise Impact: Minimizing noise exposure to surrounding communities.

\* Cost of Development: Economic feasibility of construction.

**6. Factors Affecting Airport Site Selection:**

These are similar to the site determination criteria, but with more emphasis on the comparative analysis of different potential sites:

\* Land Acquisition Costs: Cost of acquiring the necessary land.

\* Construction Costs: Costs associated with grading, paving, and building construction.

\* Environmental Mitigation Costs: Costs of mitigating environmental impacts.

\* Accessibility Costs: Costs of building roads and other access infrastructure.

\* Community Impact: Impact on local residents and businesses.

\* Future Expansion Potential: Potential for future growth and development.

**7. Short Notes:**

a) Runway Configurations:

Runway configurations are determined by wind patterns, traffic volume, and available land. Common configurations include:

\* Single Runway: Suitable for airports with moderate traffic.

\* Parallel Runways: Used at busier airports to increase capacity.

\* Intersecting Runways: Can handle varying wind directions but may create congestion.

\* Open-V Runways: Used where there are strong crosswinds.

b) Taxiway Configurations:

Taxiways are designed to provide safe and efficient movement of aircraft between runways and other airport facilities. Configurations include:

\* Grid System: A network of interconnected taxiways.

\* Loop System: A circular taxiway system.

\* Stub Taxiways: Short taxiways leading to aprons or hangars.

c) Planning and Design of the Terminal Area:

The terminal area is the interface between air and ground transportation. Planning and design considerations include:

\* Passenger Flow: Efficient movement of passengers through the terminal.

\* Baggage Handling: Efficient baggage processing systems.

\* Security Checkpoints: Effective security screening.

\* Amenities: Restaurants, shops, and other passenger services.

\* Gate Capacity: Sufficient gates to accommodate aircraft.

\* Accessibility: Facilities for passengers with disabilities.

\* Future Expansion: Potential for future growth and expansion.

**8. Crosswind Component and Effects:**

Crosswind is wind blowing perpendicular to the runway. Its effects include:

\* Aircraft Drift: Crosswind can cause aircraft to drift off the runway centerline.

\* Control Challenges: Pilots need to use control inputs to counteract the crosswind.

\* Landing Difficulty: Crosswinds can make landings more challenging, especially for smaller aircraft.

\* Runway Orientation: Runways are often oriented to minimize crosswind effects.

**9. Types of Aircraft Parking:**

\* Nose-in Parking: Aircraft parked with their nose facing the terminal.

\* Nose-out Parking: Aircraft parked with their nose facing away from the terminal.

\* Angle Parking: Aircraft parked at an angle to the terminal.

\* Pushback Parking: Aircraft pushed back from the terminal by a tug.

**10. Factors Affecting Runway Orientation:**

\* Prevailing Wind Direction: Runways are ideally oriented so that aircraft can take off and land into the wind.

\* Crosswind Component: Minimizing crosswind effects.

\* Terrain: The topography of the surrounding area.

\* Obstacles: Avoiding obstructions in the approach and departure paths.

\* Airspace: Coordination with other air traffic.

\* Noise Abatement: Minimizing noise impact on surrounding communities.

**UNIT-1**

Why air services are not available in the nearby regions of the Himalayas?

Enlist no-fly zones at 2M with justification.

What is an airfield?

Define airport.

Define air transportation.

Modes of transportation.

Note down modes of transportation.

What is a runway and hangar?

Development of air transport with a timeline:

Global level

Indian context

1927: Civil Aviation

1938: Registration system started

1946: License board was introduced

1948: Air India Limited was established

Difference between Act & Regulation

Enlist site selection facets.

Factors affecting network expansion for airport region.

Important criteria to be considered for planning of airfield area.

Analyze environmental or social issues during airport planning.

Let's address your questions about air services, no-fly zones, and airport planning.

**1.Why are air services limited in the Himalayas?**

Several factors contribute to the limited availability of air services in the Himalayan region:

\* Terrain: The mountainous terrain makes it challenging to build and operate airports. Limited flat land, steep slopes, and high altitudes pose significant engineering hurdles.

\* Weather: The Himalayas are known for unpredictable and severe weather conditions, including strong winds, heavy snowfall, fog, and low visibility. These conditions can make flying dangerous and frequently lead to flight cancellations.

\* Airspace Restrictions: Some areas in the Himalayas may have airspace restrictions due to military or other sensitive operations.

\* Low Population Density: In many parts of the Himalayas, the population density is relatively low, which can make it difficult to justify the cost of establishing and maintaining air services. The demand might not be sufficient to make the routes economically viable.

\* High Operating Costs: Operating aircraft in mountainous terrain and challenging weather conditions increases operating costs, including fuel consumption, maintenance, and pilot training.

\* Safety Concerns: The combination of difficult terrain, unpredictable weather, and limited infrastructure increases the risk of accidents.

**2.No-Fly Zones (at 2 million feet - please note this altitude is extremely high and not commonly used for no-fly zones):**

No-fly zones are areas where aircraft are prohibited from flying. Common justifications and examples (though not at 2 million feet, which is far beyond typical aircraft operational altitudes):

\* Military Installations: Protecting sensitive military bases and areas.

\* Government Buildings: Ensuring the security of government facilities.

\* Nuclear Power Plants: Preventing potential attacks on critical infrastructure.

\* Restricted Airspace: Areas with hazardous activities or sensitive environments.

\* Presidential or VIP Travel: Temporary no-fly zones for security reasons.

Note: 2 million feet is far above the typical cruising altitude of commercial airliners and even most military aircraft. No-fly zones are usually established at much lower altitudes.

**3.Definitions:**

\* Airfield: A general term for an area of land or water used for the landing and takeoff of aircraft. It may or may not have facilities like terminals or hangars.

\* Airport: An airport is an airfield with facilities for passengers, cargo, aircraft maintenance, and other services. It's a more comprehensive term than airfield.

\* Air Transportation: The movement of passengers and cargo by aircraft.

**4.Modes of Transportation:**

\* Land: Road, Rail

\* Water: Sea, River

\* Air: Aircraft

\* Other: Pipeline, Cable

**5.Runway and Hangar:**

\* Runway: A designated area on an airfield or airport specifically prepared for the landing and takeoff of aircraft.

\* Hangar: A building used for storing, repairing, and maintaining aircraft.

**6.Development of Air Transport:**

\* Global Level: The Wright brothers' first flight in 1903 marked the beginning. World Wars spurred rapid technological advancements. The jet age in the mid-20th century revolutionized air travel, making it faster and more accessible. Continued advancements in aircraft design, navigation, and air traffic control have led to increased efficiency and safety.

\* Indian Context:

\* 1927: Civil aviation activities began.

\* 1938: A registration system for aircraft was introduced.

\* 1946: A licensing board for pilots and other aviation personnel was established.

\* 1948: Air India Limited was founded. (Nationalization and subsequent privatization have shaped the Indian aviation landscape.)

**7.Act vs. Regulation:**

\* Act: A law passed by a legislature. It sets out the broad framework and principles.

\* Regulation: Rules created by government agencies to implement and enforce the provisions of an Act. They provide more specific details and procedures.

**8.Site Selection Facets:**

\* Availability of land

\* Accessibility

\* Proximity to population centers

\* Topography and geology

\* Environmental impact

\* Airspace

\* Obstacles

\* Wind conditions

\* Noise impact

\* Cost of development

**9.Factors Affecting Network Expansion for Airport Region:**

\* Demand forecasting

\* Economic growth

\* Connectivity to other destinations

\* Competition from other airports

\* Government policies

\* Availability of infrastructure

\* Airline strategies

**10.Criteria for Airfield Area Planning:**

\* Runway length and orientation

\* Taxiway layout

\* Apron design

\* Safety areas

\* Navigational aids

\* Lighting

\* Drainage

\* Security

**11.Environmental and Social Issues During Airport Planning:**

\* Noise pollution

\* Air pollution

\* Water pollution

\* Land use changes

\* Displacement of communities

\* Impact on wildlife

\* Traffic congestion

\* Visual impact

\* Socioeconomic impacts (positive and negative)

Analyzing these issues requires environmental impact assessments, social impact assessments, and community engagement to develop mitigation strategies and ensure sustainable airport development.