

School of Business**Bachelor of Business Administration
Semester End Examination - Jun 2024****Duration : 180 Minutes
Max Marks : 100****Sem IV - D1UB404T - Environment Issues in Aviation Industry**General Instructions*Answer to the specific question asked**Draw neat, labelled diagrams wherever necessary**Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Identify the potential long-term effects of exposure to airport noise on human health and well-being. K3(3)
- 2) Examine the significance of ground support equipment (GSE) emissions in the overall emission profile of airports. K4(4)
- 3) Identify the steps involved in developing and implementing a comprehensive noise abatement program at an airport. K3(6)
- 4) Explain the advantages of implementing Air traffic management system to reduce taxiway queuing emissions. K6(6)
- 5) Discuss the challenges faced by (DGCA) in implementing the CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) scheme? K6(6)
- 6) Case let: Aviation biofuel, when blended with conventional jet fuel, offers lower sulphur content and potential reductions in air pollution. The ASTM D7566 certification permits the use of approved biofuel blends on all aircraft. However, scaling up production for commercial use in India remains a challenge. Mangalore Refinery and Petrochemicals Ltd is constructing the country's first plant, expected to be operational by early 2025, with a capacity of 7,000 tonnes per year. But achieving even a 1% blending of Sustainable Aviation Fuel (SAF) in India would require approximately 60,000 tonnes per year.
Based on above answer the following:
 1. Examine the environmental benefits of scaling up Sustainable Aviation Fuel (SAF) production in India. (4marks)
 2. Analyse how can India's aviation industry collaborate with government agencies and private sector partners to overcome production constraints of SAF.(4marks)
- 7) Caselet: Transition to Paperless Boarding in the Airline Industry K3(9)
As airlines increasingly push for digital boarding passes, some passengers express anxiety over relying solely on their smartphones. Despite the convenience and cost-saving benefits for airlines, some travelers prefer the security of a printed boarding

pass. However, with the introduction of DIGIYATRA in India, the boarding process has become entirely paperless.

Logical Questions:

1. Should airlines completely do away with paper boarding passes? How can airlines balance the transition to digital boarding while accommodating passengers' preferences for paper?(3marks)

2. Identify how can technology be leveraged to enhance the digital boarding process? (3marks)

3. What challenges are specific to implementing paperless boarding initiatives like DIGIYATRA in India? (3marks)

8)

Caselet: Progress of Noida Airport Construction Despite Pollution Concerns

K3(9)

Construction of the upcoming Noida Airport is progressing rapidly to meet the operational deadline set for the next calendar year. Despite extreme pollution levels in the National Capital Region (NCR),the airport project has been exempted from these restrictions due to its critical infrastructure status. As a result, work on key components such as the air traffic control tower and runway paving continues without any stop. The airport authorities remain committed to ensuring the airport becomes operational on schedule.

Based on above answer the following Questions:

1. Is it justified to grant permission for the Noida Airport construction to proceed despite the prevailing pollution concerns and the implementation of measures like the Graded Response Action Plan (GRAP)?(3 marks)

2. What are the potential environmental impacts of allowing construction activities for the Noida Airport to continue amidst extreme pollution levels in the NCR? How can these impacts be mitigated or minimized? (3 marks)

3. How will the timely completion assist in the overall development process of Noida Airport's infrastructure? (3 marks)

9)

Caselet: Implementing Electric Green Taxi Systems (EGTS) for Airlines Green Taxi, Inc., based in Dallas, Texas, is pioneering the development of Electric Green Taxi Systems (EGTS) to provide significant fuel savings for airlines, leading to both financial and environmental benefits. Several major airlines are engaging in discussions with GTI to integrate this technology into their fleets, recognizing its economic, operational, and environmental viability. With airlines facing financial challenges and striving to achieve sustainability goals, exploring alternative taxi methods like EGTS has become increasingly crucial. Logical

K5(10)

Questions:

1. How does the implementation of EGTS contribute to significant fuel savings for airlines? (4)

2. What strategies can be employed to encourage airlines to adopt EGTS technology into their fleets? (3)

3. How might the utilization of EGTS impact frequent delays experienced by airlines during taxi times? (3)

10)

K4(12)

Case Study: Leveraging 3D Printing for Emission Reduction in Aircraft Design

In response to the need to reduce carbon emissions in the aerospace sector, Airbus has started an innovative approach by integrating 3D printing technology into aircraft manufacturing processes. By replacing conventional aircraft components with lighter 3D-printed counterparts, Airbus has achieved substantial weight reductions of up to 70%. This weight reduction translates into significant emission savings throughout an aircraft's operational lifespan, aligning with sustainability goals.

The adoption of 3D printing by Airbus not only results in lighter parts but also entails a drastic reduction in raw material usage by up to 90%. This efficiency contributes to minimizing resource depletion while also lowering carbon emissions.

Moreover, the carbon-friendly nature of 3D printing, compared to traditional machining methods, underscores its pivotal role in fostering sustainable manufacturing practices within the aerospace industry. Airbus perceives 3D printing not only as a means to reduce emissions but also as a cornerstone for driving digitalization in aircraft production, further enhancing efficiency and innovation in pursuit of a greener future.

Based on above answer the following questions:

1. Analyse How weight reduction in aircraft contribute to emission reduction, and why is it significant for sustainability efforts?(3 marks)

2. Examine the environmental benefits of using 3D printing technology to manufacture aircraft parts compared to traditional machining methods. (3 marks)

3. What role does 3D printing play in the digitalization of the aerospace industry, and how does it support decarbonization efforts? (3 marks)

4. Discuss the potential challenges and limitations associated with the widespread adoption of 3D printing in aircraft manufacturing for emission reduction purposes. (3 marks)

11)

Case Study: Electric aircraft: A long-term potential solution to achieving zero-emission aviation

K6(12)

While synthetic SAFs(Sustainable aviation Fuels) hold the potential to be a zero-emission solution, they are very expensive compared to traditional jet fuel. Therefore, SAFs alone won't enable the industry to reach aggressive carbon reduction goals so the overall solution must include true zero-emission propulsion systems.

For short-haul flights and urban air mobility, a focus on electric propulsion can enable a more sustainable mode of transport for the aerospace industry. While not a short-term solution currently, electric propulsion promises to provide affordable and energy-efficient mobility across various commercial, civil, and defense

uses. Using eVTOL (electric Vertical Take-off and Landing) aircraft that are usually short-range (currently up to 600 km), aircraft manufacturing companies could use electric propulsion for passenger travel or delivery of goods. Six in 10 industry leaders believe that electric propulsion will be a more sustainable and environmentally friendly solution compared to the current modes of aerial mobility.

However, several challenges must be overcome before the industry can see widescale adoption of eVTOL aircraft. Regulations—especially regarding the allocation of airspace (lower altitudes to higher altitudes)—could challenge eVTOL aircraft's potential for exponential growth.

Based on the above answer the following questions:

1. Discuss the key advantages of electric propulsion technology for achieving zero-emission aviation? (3marks)
2. Elaborate how electric aircraft, such as eVTOLs, contribute to addressing sustainability challenges in urban transportation? (3marks)
3. Discuss the regulatory barriers that hinder the widescale adoption of electric propulsion flights. What steps can be taken to overcome these hurdles? (3marks)
4. What are the potential applications of electric propulsion aircraft beyond passenger and cargo mobility? How can these applications contribute to sustainability efforts?(3marks)

12)

Case Study: Challenges in Implementing Sustainable Aviation Fuels (SAFs) for Airlines As the commercial airline industry emerges from the COVID-19 pandemic, there is a heightened focus on reducing climate change-inducing emissions. To combat this, airlines are exploring the use of biofuels and synthetic fuels as alternatives to traditional fossil fuels. The production of SAFs is currently limited and expensive, making it financially challenging for airlines to incorporate these fuels into their operations on a large scale. Moreover, the availability of biofuels and synthetic fuels is constrained by supply chain limitations, including sourcing raw materials, refining processes, and distribution networks. Additionally, while SAFs have the potential to reduce carbon emissions, they still emit carbon dioxide when burned for flight. Addressing these challenges is crucial for airlines to transition to more sustainable fuel options and reduce their environmental impact. It will be a uphill battle for the airline companies to implement these changes and ensure the cost benefits associated are optimum. Based on above discussions, give your valuable suggestions on the potential risks and challenges with Bio-fuels.

K5(15)

Questions:

1. How do the cost and affordability of Sustainable Aviation Fuels (SAFs) impact airlines' decisions to adopt these fuels? (4)
2. What are the primary supply chain constraints faced by airlines in sourcing and distributing SAF's? (3)
3. In what ways can airlines collaborate with stakeholders across the aviation industry to overcome technical and logistical challenges associated with achieving net-zero emissions through the use of SAFs? (8)