GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Business

Master of Business Administration MBA Dual Specialization
Mid Term Examination - Mar 2024

Duration : 90 Minutes
Max Marks : 50

Sem IV - MBAV6012 - Aircraft Maintenance Management

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) Explain the significance of base maintenance checks (A, B, C, D) in ensuring the safety and airworthiness of commercial aircraft. Provide a detailed explanation of each maintenance check . K5 (5)

2) Identify the key components of an "A" check for commercial aircraft maintenance. K3 (6)

3) Case of Aerotech MRO: AeroTech MRO ensures that all aircraft entrusted to its care undergo thorough maintenance procedures in compliance with industry standards and regulations. K4 (8)

As part of the maintenance process, AeroTech MRO is responsible for conducting an aircraft weighing procedure to determine its weight and balance characteristics accurately.

During the weighing process, AeroTech MRO encounters several challenges and considerations that require careful attention to ensure the accuracy and reliability of the measurements.

These challenges include:

1. Environmental Factors: The weighing procedure is scheduled to take place outdoors due to space constraints within AeroTech MRO's facilities.
2. Equipment Calibration: AeroTech MRO's maintenance team must verify the calibration of the scales and ensure they are functioning correctly before commencing the weighing procedure.
3. Fluid Levels: The aircraft's oil and coolant tanks must be properly filled before weighing to account for their weight as part of the aircraft's empty weight.
4. Tare Weight Calculation: AeroTech MRO's maintenance team must accurately calculate and record the tare weight to ensure the integrity of the weighing measurements.

Questions:

1. Analyse how can AeroTech MRO mitigate these challenges to ensure reliable weight and balance data?(4 marks)
2. As a member of AeroTech MRO's maintenance team, identify what specific steps would you recommend addressing the challenges encountered during the aircraft weighing procedure?(4 marks)

4) Production planning for TAP MRO:TAP Maintenance & Engineering's aircraft components maintenance shops are responsible for repairing and maintaining thousands of different aircraft accessories annually. A percentage of units arrive with customer-required deadlines set by the planning department. Team leaders distribute units to technicians based on their skills and workload, aiming to ensure timely processing and meet objectives. However, decision-making often relies on the experience and intuition of team leaders, leading to challenges in guaranteeing on-time delivery of aircraft components. Managing stock levels is crucial to quickly return aircraft to service, but balancing stock levels with costs is essential. When stock falls below safety levels, alarms prompt the stock controller to replenish supplies. Improving the planning process to repair components faster and more systematically could reduce the need for excess stock while maintaining desired service levels.

K3 (9)

Based on the above discussion planning for maintenance answer the following questions:

1. Discuss the role of specialized technician groups and the challenges associated with assigning units based on skills and workload.(3 Marks)
2. Identify the challenges faced by TAP Maintenance & Engineering in ensuring on-time delivery of aircraft components(3 Marks)
3. How does TAP Maintenance & Engineering balance the need for maintaining stock levels with cost considerations?(3 marks)

5) Case of Landing gear management:Aircraft landing gear, encompassing wheels, brake systems, and associated components, constitute critical elements of aviation safety and operational efficiency. This case study delves into the intricate maintenance requirements and considerations associated with aircraft landing gear, exploring the challenges faced by airlines and the strategies employed to ensure safety and reliability. K5 (10)

ATA Chapter 32 outlines the maintenance requirements for landing gears, wheels, and brake systems, emphasizing the significance of stress and wear management throughout the aircraft's operational lifespan. Maintenance activities encompass routine lubrication, defect repairs, and periodic shop visits for overhauls.

Original equipment manufacturer (OEM) component maintenance manuals (CMMs) guide maintenance activities, highlighting repair options during overhaul and replacement mandates. Line and base maintenance activities necessitate regular inspections to identify defects and ensure continued integrity, often involving engineering, plating, NDT, painting, and assembly tasks.

Landing gear overhauls are typically scheduled every 10 years, with a total life limit set by the OEM at 60,000-70,000 flight cycles (FC). Overhaul workscopes entail comprehensive inspections, component replacements, and defect corrections to restore components to standard design conditions.

Exchange programs offer expedited solutions for landing gear maintenance, minimizing aircraft downtime during maintenance checks. Options include spare unit provisions or direct exchanges, with vendors ensuring back-to-birth traceability and compliance with relevant standards.

Landing gear maintenance costs are comprehensively understood within the overhaul workscope, covering routine tasks, labor, tooling, consumables, and overheads. Additional costs may arise from non-routine tasks, service bulletin requirements, and airworthiness directives.

Based on the above answer the following questions:

1. Why is ATA Chapter 32 crucial for aircraft safety and operational efficiency ?(2)
2. Discuss the maintenance requirements associated with aircraft landing gear, including routine tasks, defect repairs, and overhaul processes.(2)
3. How do original equipment manufacturer (OEM) guide maintenance activities during in-service operations and overhaul processes?(2)
4. Explain the significance of exchange programs in minimizing aircraft downtime during landing gear maintenance checks.(2)
5. Analyze the cost considerations associated with landing gear maintenance. How can airlines optimize landing gear maintenance costs while ensuring safety and reliability.(2)

6) Future of MSG in aviation:With the introduction of MSG-3 maintenance programs, maintenance tasks are managed individually, offering airlines greater flexibility in customizing maintenance to fit their operational requirements. In Alternative 1, a traditional block C check and five-year check are depicted, consuming 29 days of maintenance ground time over a five-year period. Alternative 2 presents a split A and C check concept, also requiring 29 days of maintenance ground time over the same period. Alternative 3 introduces a heavy C check concept necessitating 36 days of maintenance downtime in five years. Finally, Alternative 4 showcases a single task-oriented maintenance concept, consuming only 14 days of maintenance downtime over the same period. Assuming a $50,000 per day figure for the A320, significant cost savings are realized. One critique of Alternative 4 is its perceived effectiveness mainly when the aircraft is new; however, with accumulated experience, extending such a maintenance program into a second maintenance cycle is plausible. Implementing the single task-oriented maintenance concept requires a meticulous examination of each maintenance task in the program, considering its unique characteristics. Modern maintenance programs typically comprise over two thousand maintenance tasks effective for the fleet's entire economic life. In a case study focusing on an airline's Airbus A340 A/C fleet, the comparison between the airline's daily distribution of maintenance tasks and those directed by the manufacturer reveals a concentration of maintenance workload during letter checks like "A" and "C." During non-letter check days, maintenance actions are minimal, allowing for regular aircraft operation. The "A" check study for the Airbus A340 fleet in the case study involves specific assumptions and parameters, such as a 600 FH interval for "A" checks, a daily fleet utilization rate of 12 FH, and a workload allocation of 85 man hours for a complete day of ground time, reduced to 20 man hours during overnight or line checks. With a leasing cost of $10,000 per day and a commercial loss of $70,000 per day due to aircraft non-operation, the daily total loss is $60,000. However, employing the Single Task-Oriented Maintenance Concept for "A" checks allows for a meticulous evaluation of each maintenance task, ensuring none exceeds 20 man hours, thereby eliminating the need for additional maintenance letter checks. This results in significant cost savings of 45 days and $2,700,000 over a 10-year period. K6 (12)

Based on the above answer the following:

a) In the context of MSG-3 maintenance programs, how do Alternative 3's heavy C check concept and Alternative 4's single task-oriented maintenance concept differ in terms of their impact on maintenance downtime . (4)

b) In the case study of the Airbus A340 A/C fleet, what factors should airlines consider when transitioning from traditional maintenance programs to a single task-oriented maintenance concept for "A" checks. (4)

c) discuss the trade-offs between the rigid letter check system and the single task-oriented maintenance concept in terms of operational efficiency and cost savings for the airline company. (4)