

AVIATION MAINTENANCE ENGINEERING

ENAS 351

Lecture : 3
Tutorial : 1
Practical : 0

Year : III
Part : II

Course Objectives:

The objective of this course is to provide knowledge relevant to aviation maintenance engineering and relevant regulations as well as best practices. After completion of this course the students will be able to understand the intricate technical details of the working of an airline and aviation regulator.

- 1 Need of Maintenance (4 hours)**
 - 1.1 Maintenance and its type
 - 1.2 Roles of engineer and mechanic
 - 1.3 Reliability
 - 1.4 Redesign
 - 1.5 Failure rate patterns
 - 1.6 Maintenance considerations
 - 1.7 Maintenance program establishment

- 2 Development of Maintenance Program (4 hours)**
 - 2.1 Maintenance steering group (MSG 1, 2, 3)
 - 2.2 Process oriented maintenance
 - 2.3 Task oriented maintenance
 - 2.4 Maintenance program documents
 - 2.5 Maintenance interval
 - 2.6 Changing basic maintenance intervals

- 3 Aviation Industry Certification Requirement (4 hours)**
 - 3.1 Aircraft certification
 - 3.2 Delivery inspection
 - 3.3 Operator certification
 - 3.4 Personnel certification
 - 3.5 Aviation maintenance certification
 - 3.6 Aviation industry interaction

- 4 Documentation for Maintenance (2 hours)**
 - 4.1 Manufacturer's documentation
 - 4.2 Regulatory documentation

- 4.3 Airline generated documentation
- 4.4 ATA document standard
- 4.5 Technical policies and procedures manual (TPPM)

5 Maintenance and Engineering Organization (4 hours)

- 5.1 Organization of maintenance and engineering FAA and EASA
 - 5.1.1 Organizational structure
 - 5.1.2 General grouping (CAMO and AMO)
 - 5.1.3 Manager level function: Technical services, overhaul shops, material, maintenance program, aircraft maintenance
 - 5.1.4 Organization structure and the TPPM
 - 5.1.5 Variation from the typical organization
- 5.2 Maintenance program (AMP)
 - 5.2.1 Maintenance program outlined
 - 5.2.2 Summary of FAA and EASA requirements
 - 5.2.3 Additional maintenance program requirement

6 Engineering and Production Planning (4 hours)

- 6.1 Introduction
 - 6.1.1 Mechanics and engineering
 - 6.1.2 Engineering department and its function
 - 6.1.3 Engineering order preparation
- 6.2 Production planning and control (PPC)
 - 6.2.1 Function
 - 6.2.2 Production planning
 - 6.2.3 Production control
 - 6.2.4 Other scheduled work
 - 6.2.5 Feedback for planning

7 Technical Publication and Training (3 hours)

- 7.1 Technical Publication
 - 7.1.1 Functions of technical publication
 - 7.1.2 Airline libraries
 - 7.1.3 Control of publications
 - 7.1.4 Document distribution
- 7.2 Technical Training
 - 7.2.1 Training organization
 - 7.2.2 Airlines maintenance training
 - 7.2.3 Maintenance resource management
 - 7.2.4 Airframe manufacturer's training courses
 - 7.2.5 Supplemental training

- 8 Aircraft Maintenance Management (2 hours)**
- 8.1 Aircraft maintenance management structure
 - 8.2 Role of management
 - 8.3 Manager of aircraft maintenance
 - 8.4 Front line supervisor/management
 - 8.5 Manager for overhaul shops
- 9 Line and Hangar Maintenance (7 hours)**
- 9.1 Line Maintenance
 - 9.1.1 Functions that control maintenance
 - 9.1.2 Maintenance control center (MCC)-Responsibilities
 - 9.1.3 Line maintenance operation
 - 9.1.4 Aircraft logbook
 - 9.1.5 Ramp and terminal operation
 - 9.1.6 Line station activities
 - 9.1.7 Maintenance crew skill requirement
 - 9.2 Hangar Maintenance
 - 9.2.1 Organization of hangar maintenance
 - 9.2.2 Problem areas in hangar maintenance
 - 9.2.3 Hangar maintenance activity- C check
 - 9.2.4 Morning meetings
 - 9.2.5 Support and overhaul shops
 - 9.2.6 Ground support equipment (GSE)
 - 9.2.7 Outsourcing of shop maintenance work
 - 9.2.8 Shop data collection
- 10 Material Support (2 hours)**
- 10.1 Organization and function of material
 - 10.2 Material management
 - 10.3 Support function of material
 - 10.4 Other material function
- 11 Quality Assurance and Control (2 hours)**
- 11.1 Requirement of quality assurance (QA)
 - 11.2 Quality audits
 - 11.3 ISO 9000 quality standard
 - 11.4 Other function of QA
 - 11.5 Quality control organization
 - 11.6 FAA and EASA differences
 - 11.7 QC inspection qualification
 - 11.8 Basic inspection policies

12 Reliability and Maintenance Safety (3 hours)

- 12.1 Reliability
 - 12.1.1 Types of reliability
 - 12.1.2 A reliability program
 - 12.1.3 Elements of reliability program
 - 12.1.4 Other functions of reliability program
 - 12.1.5 Administration and management of the reliability program
- 12.2 Maintenance Safety
 - 12.2.1 Industrial safety
 - 12.2.2 Safety regulation (SMS)
 - 12.2.3 Maintenance safety program
 - 12.2.4 General responsibilities of safety
 - 12.2.5 General safety rules
 - 12.2.6 Reporting

13 Systems Engineering (2 hours)

- 13.1 Systematics versus system approach
- 13.2 Systems engineering
- 13.3 Definitions
- 13.4 System interface control
- 13.5 System optimization

14 Extended Twin Engine Operations (ETOPS) (2 hours)

- 14.1 Background
- 14.2 Deviation from the 60 minute rules
- 14.3 ETOPS maintenance versus conventional maintenance
- 14.4 ETOPS for Non-ETOPS Airplanes
- 14.5 Polar operations (FAA and EASA)
- 14.6 Polar areas

Tutorial (15 hours)

- 1. NCAR modules
- 2. ICAO annexes
- 3. Comparison of FAA, NCAR and EASA regulations
- 4. ICAO SARPs
- 5. Aircraft maintenance manuals
- 6. Maintenance planning documents
- 7. Airworthiness directive and service bulletins

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Mark distribution*
1,2 and 3	12	12
4,5 and 6	10	12
7,8 and 9	12	12
10 and 11	4	12
12,13 and 14	7	12
Total	45	60

* There may be minor deviation in marks distribution.

References

1. Federal Aviation Administration. (2023). Advisory circulars. Federal Aviation Administration, U.S. Department of Transportation.
2. European Union Aviation Safety Agency. (2023). Continuing airworthiness regulations: Part-M, Part-145, Part-21, and Part-66. European Union Aviation Safety Agency.
3. International Civil Aviation Organization. (2025). Annex 19 to the Convention on International Civil Aviation: Safety management. International Civil Aviation Organization.
4. Civil Aviation Authority of Nepal. (2020). Nepal Civil Aviation Requirements (NCAR) Part-66, Part-145, and Part-147. Civil Aviation Authority of Nepal.
5. International Civil Aviation Organization. (2022). Annex 8 to the Convention on International Civil Aviation: Airworthiness of aircraft. International Civil Aviation Organization.
6. International Civil Aviation Organization. (2018). Annex 2 to the Convention on International Civil Aviation: Rules of the air. International Civil Aviation Organization.