

1. Title	Digital techniques and electronic instrument systems II (Avionics Repair and Maintenance)
2. Code	EMAMBX441A
3. Range	The knowledge is needed for a wide range of aircraft repair and maintenance works, especially in avionics, e.g. applicable to aircrafts, analysis, machineries, airworthiness, airframes, avionics, materials, tests, documentation, safety, health and tools etc.
4. Level	4
5. Credit	4
6. Competency	<u>Performance Requirement</u>
	<p>6.1 Knowledge</p> <ul style="list-style-type: none"> ◆ Able to understand the electronic instrument systems <ul style="list-style-type: none"> • Typical systems arrangements and cockpit layout of electronic instrument systems. ◆ Able to understand the numbering systems <ul style="list-style-type: none"> • Numbering systems: binary, octal and hexadecimal. • Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa. ◆ Able to understand the data conversion <ul style="list-style-type: none"> • Analogue Data, Digital Data. • Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types. ◆ Able to understand the data buses <ul style="list-style-type: none"> • Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications. ◆ Able to understand the logic circuits

- Identification of common logic gate symbols, tables and equivalent circuits
- Applications used for aircraft systems, schematic diagrams.
- Interpretation of logic diagrams.
- ◆ Able to understand the basic computer structure
 - Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM).
 - Computer technology (as applied in aircraft systems).
 - Computer related terminology.
 - Operation, layout and interface of the major components in a micro computer including their associated bus systems.
 - Information contained in single and multiaddress instruction words.
 - Memory associated terms.
 - Operation of typical memory devices.
 - Operation, advantages and disadvantages of the various data storage systems.
- ◆ Able to understand the microprocessors
 - Functions performed and overall operation of a microprocessor.
 - Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.
- ◆ Able to understand the multiplexing
 - Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

- ◆ Able to understand the Integrated Circuits
 - Operation and use of encoders and decoders.
 - Function of encoder types.
 - Uses of medium, large and very large scale integration.
- ◆ Able to understand the fibre optics
 - Advantages and disadvantages of fibre optic data transmission over electrical wire propagation.
 - Fibre optic data bus.
 - Fibre optic related terms.
 - Terminations.
 - Couplers, control terminals, remote terminals.
 - Application of fibre optics in aircraft systems.
- ◆ Able to understand the electronic displays
 - Principles of operation of common types of displays used in modern aircraft, including
 - Cathode Ray Tubes, Light Emitting Diodes and
 - Liquid Crystal Display.
- ◆ Able to understand the electrostatic sensitive devices
 - Special handling of components sensitive to electrostatic discharges.
 - Awareness of risks and possible damage, component and personnel anti-static protection devices.
- ◆ Able to understand the software management control

- Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.
- ◆ Able to understand the electromagnetic environment
 - Influence of the following phenomena on maintenance practices for electronic system:
 - EMC - Electromagnetic Compatibility
 - EMI - Electromagnetic Interference
 - HIRF - High Intensity Radiated Field
 - Lightning / lightning protection.
- ◆ Able to understand the typical electronic / digital aircraft systems
 - General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In
 - Test Equipment) testing such as:
 - ACARS - ARINC Communication Addressing and Reporting System
 - ECAM - Electronic Centralised Aircraft Monitoring
 - EFIS - Electronic Flight Instrument System
 - EICAS - Engine Indication and Crew Alerting System
 - FBW - Fly by Wire
 - FMS - Flight Management System
 - GPS - Global Positioning System
 - IRS - Inertial Reference System
 - TCAS - Traffic Alert Collision Avoidance System

	<p>6.2 Theoretical and practical aspects</p> <ul style="list-style-type: none"> ◆ Able to apply the digital techniques and electronic instrument systems knowledge in the aircraft maintenance. <p>6.3 Professional approach</p> <ul style="list-style-type: none"> ◆ Able to understand the principal elements of the subjects. ◆ Able to understand the general knowledge of the theoretical and practical aspects of the subjects. ◆ Able to apply the knowledge in the aircraft maintenance task. ◆ Able to understand the detailed knowledge of the theoretical and practical aspects of the following subjects. <ul style="list-style-type: none"> • Electronic Instrument Systems ◆ Able to combine and apply the separate elements of knowledge in a logical and comprehensive manner.
7. Assessment Criteria	<p>The integral outcomes requirement of this UoC are:</p> <ul style="list-style-type: none"> (i) Able to understand the theory of the subjects and interrelationships with other subjects. (ii) Able to give a detailed description of the subject using theoretical fundamentals and specific examples. (iii) Able to understand and be able to use mathematical formulae related to the subject. (iv) Able to read, understand and prepare sketches, simple drawings and schematics describing the subject. (v) Able to apply the knowledge relating to avionics repair and maintenance in a practical manner using manufacturer's instructions. (vi) Able to interpret results from various sources and measurements and apply corrective action where appropriate.

8. Remarks	Ref: HKAR-66 Module 5: Digital techniques and electronic instrument systems
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