-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number-	**2230010** **-Session-1990-91**
-Superclass-	**ZE**
-Title-	**AERONAUTICAL FUNDAMENTALS**

-DESCRIPTION-

Purpose	An introductory module suitable for students following a career in the aircraft industry, designed to provide a base from which a more detailed course of study may be followed into the areas of aircraft systems and the theory of flight.
Preferred Entry Level	No formal entry requirements
Outcomes	The student should: 1. explain the main roles and uses of aircraft; 2. outline the physiological effects of altitude and operating environment on the occupants of an aircraft; 3. identify the main sub-assemblies and principal and auxiliary control surfaces of an aircraft; 4. outline basic flight theory; 5. describe basic aircraft systems.
Assessment Procedures	Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified for each Outcome. The following abbreviations are used below: PC Performance Criteria IA Instrument of Assessment

Note: The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory.)

OUTCOME 1 **EXPLAIN THE MAIN ROLES AND USES OF AIRCRAFT**

PCs

(a) The military, commercial and private roles of aircraft are listed.
(b) The main uses of aircraft within each of the main roles are stated.

IA Structured Question

The student should be asked to list the 3 main roles and then to state 2 uses of aircraft within each of these roles.

Satisfactory achievement of this Outcome will be demonstrated by the student providing a correct response.

OUTCOME 2 **OUTLINE THE PHYSIOLOGICAL EFFECTS OF ALTITUDE AND OPERATING ENVIRONMENT ON THE OCCUPANTS OF AN AIRCRAFT**

PCs

(a) The effect of a change in altitude on air pressure, density, temperature and humidity is described qualitatively.
(b) The effects of changes in air pressure, temperature, density and humidity, and acceleration forces on the human body are described.
(c) The physiological changes described include discomfort, difficulty in breathing, increased reaction time, and reduction in vision.

IA Structured Question

The student will be set a question in which he/she will be presented with a given situation and asked for the effects on pressure, density, temperature, humidity and force, and the corresponding effects on an occupant of the aircraft.

An example of a suitable situation would be an aircraft at an altitude above 8000 feet, accelerating rapidly.

Satisfactory performance will be a response which meets PC (a), (b) and (c).

OUTCOME 3 **IDENTIFY THE MAIN SUB-ASSEMBLIES AND PRINCIPAL AND AUXILIARY CONTROL SURFACES OF AN AIRCRAFT**

PCs

(a) The sub-assemblies identified include fuselage, wings and empennage.
(b) The primary control surfaces identified include ailerons, elevators, rudder and flaps.
(c) The auxiliary control surfaces identified include trim tabs.

IA Structured Question

The student should be presented with diagrams of aircraft on which to label each of the parts referred to in PC (a), (b) and (c).

Satisfactory completion of this Outcome will be demonstrated by the student correctly identifying each of the parts referred to in PC (a), (b) and (c).

OUTCOME 4 **OUTLINE BASIC FLIGHT THEORY**

PCs

(a) The lift, drag, weight and thrust forces acting on an aircraft in flight are identified.
(b) The three axes about which movement of an aircraft occurs are matched with type of movement.
(c) The design parameters of wings are correctly listed.

IA Structured Questions

The student should be presented with three incompletely labelled diagrams. The student should complete the diagrams by identifying:

(i) The four forces: lift, drag, weight and thrust;
(ii) The three axes and the movement which occurs about each: longitudinal (roll), lateral (pitch), normal (yaw);
(iii) Wing design parameters: span, chord, thickness, aspect ratio, angle of incidence (angle of attack) and rigging angle of incidence.

Satisfactory completion of this Outcome will be demonstrated by the student correctly completing the three diagrams.

OUTCOME 5 **DESCRIBE BASIC AIRCRAFT SYSTEMS**

PCs

(a) Basic aircraft systems are correctly listed.

(b) The inputs, outputs and function of two systems are described using a black box approach.

IA Structured Questions

(a) The student should be presented with simple, incomplete diagrams of 2 aircraft systems which require labelling. The 2 systems should be chosen from the following:

Propulsion;
Fuel;
Hydraulic;
Electrical;
Pneumatic;
Environmental.

(b) The remaining 4 systems should be listed.

Satisfactory completion of this Outcome will be demonstrated by the student correctly completing the block diagrams and listing the remaining systems.

The following sections of the descriptor are offered as guidance. They are not mandatory.

CONTENT/CONTEXT

Corresponding to the Learning Outcomes 1-5:

1. Military, commercial and private roles of aircraft and their uses within each of these roles e.g.

   Military - fighter, transport, bomber, reconnaissance, refuelling
   Commercial - passenger carrying (large and small), freight, cargo, crop spraying etc.
   Private - gliding, hang gliding, training, pleasure, aerobatics etc.

2. The effects of altitude on pressure, density, temperature, humidity. The effects on the human body of decreased pressure and density, increased and decreased temperature and humidity. The effects of increased and decreased force due to gravity.

3. Identification of fuselage, mainplane, tailplane, fin, landing gear and power plant.
   Identification of ailerons, elevators and rudder.
   Identification of leading and trailing edge flaps, airbrakes, trim tabs.

4. The forces acting on an aircraft in flight; lift, drag, weight and thrust and their position. Identification of the three axes about which movement occurs; Longitudinal (roll), Lateral (pitch), normal (yaw) and associated control of that movement. The identification of span, chord, thickness, aspect ration, angle of incidence and angle of attack. Examples of how these vary for different designs of aircraft.

5. Identification of the six main systems and their functions and operating principles, (propulsion, fuel, hydraulic, electrical, pneumatic and environmental). Examples of simple and complicated applications.

SUGGESTED LEARNING AND TEACHING APPROACHES

Wherever possible the use of aircraft models, pictures and video clips of aircraft should be used to identify attributes and design features.

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