**Subject No 54  Flight Navigation - IFR**

Each subject has been given a subject number and each topic within that subject a topic number. These reference numbers will be used on ‘knowledge deficiency reports’ and will provide valuable feedback back to the examination candidate.

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<td>54.2</td>
<td><strong>Maps and Charts</strong></td>
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<td>54.2.2</td>
<td>List the aeronautical charts used in New Zealand for operations under IFR and VFR.</td>
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<td>54.2.4</td>
<td>Identify the information published in the legends of aeronautical charts and in the CHART Symbols section of the AIPNZ Vol 2 &amp; 3.</td>
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<td>54.2.6</td>
<td>Explain the meaning of abbreviations and codes used in Operational Data for aerodromes in the AIPNZ.</td>
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<td>54.2.8</td>
<td>Interpret information published on aerodrome Instrument Approach charts.</td>
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<td>54.2.10</td>
<td>Demonstrate proficiency in determining distances on IFR enroute charts using the linear scales printed separately on the charts, and using the latitude scale along meridians.</td>
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<td>54.2.12</td>
<td>Describe how magnetic tracks are presented on enroute charts.</td>
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<td>54.2.14</td>
<td>Explain what is meant by:</td>
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<td></td>
<td>(a) ADEP;</td>
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<td>(b) ADES;</td>
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<td>(c) RNAV;</td>
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<td>(d) Waypoint;</td>
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<td></td>
<td>(e) SID.</td>
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<td>54.2.16</td>
<td>Define the following terms presented on enroute charts:</td>
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<td>(a) Minimum enroute altitude (MEA);</td>
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<td></td>
<td>(b) Minimum reception altitude (MRA);</td>
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<td></td>
<td>(c) Minimum safe altitude (MSA);</td>
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<td></td>
<td>(d) Route operating limitations (ROL);</td>
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<td></td>
<td>(e) Minimum flight altitude (MFA);</td>
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<td></td>
<td>(f) Compulsory reporting point;</td>
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<td>(g) Non-compulsory reporting point;</td>
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<td></td>
<td>(h) Exact reporting point;</td>
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<td></td>
<td>(i) Non-exact reporting point;</td>
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<td>(j) VOR change-over point.</td>
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Sub Topic | Syllabus Item
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54.2.18 | With regard to Standard Routes, describe in detail the:
(a) function of the routes;
(b) associated standard route clearance system;
(c) manner in which standard routes are highlighted on enroute charts;
(d) meaning of codes allocated to individual standard routes;
(e) documents where standard routes are published.
54.2.20 | With regard to uncharted routes, state the:
(a) document, and section, where the routes are published;
(b) code allocated to the routes;
(c) meaning of symbols (e.g. asterisks).
54.2.22 | Using a protractor, describe how non-published magnetic tracks can be drawn on enroute charts.
54.2.24 | Describe how different classes and types of airspace can be identified on enroute charts.
54.2.26 | With regard to the World Geodetic System 1984 datum, state:
(a) where this datum is published;
(b) the symbol used to denote the datum.
54.2.28 | Describe the information contained in the following charts, tables and diagrams published in the AIPNZ VOL 2 & 3, and explain compliance procedures associated with:
(a) VOR/DME MRA Sector charts;
(b) 25 DME Minimum Sector Altitude diagrams;
(c) Standard Instrument Departure (SID) diagrams;
(d) Visual arrival charts;
(e) Standard Arrival Route (STAR) charts;
(f) Ground movements charts;
(g) Instrument T/O procedure chart – rate of climb table;
(h) IFR alternate aerodrome minima table.
54.4 | Flyight Planning
54.4.2 | For the preparation of a flight plan, determine:
(a) route details, including reporting points and turning points;
(b) climb performance data including minimum climb gradients associated with
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published departure procedures;

(c) descent performance data including rate of descent required to arrive at a position at a stipulated altitude, or to comply with published arrival procedures;

(d) fuel consumption details during climb, cruise, descent, and during diversion (if different);

(e) cruising level(s) considering topography and meteorological considerations;

(f) ATC and Noise Abatement requirements;

(g) speed limitations, if applicable;

(h) requirement for, and availability of, alternate(s);

54.4.4 Through calculation or determination, prepare an IFR flight plan which contains the following details:

(a) point of departure including minimum departure altitude or departure instructions, if applicable;

(b) rate of climb required to comply with published climb gradient;

(c) location and altitude of top of climb and top of descent;

(d) each sector of the flight identified as From/To;

(e) point of arrival including minimum procedure commencement altitude, if applicable;

(f) the altitude of each sector including mean climb and mean descent altitude;

(g) each sector distance;

(h) outside air temperatures for the calculation of TAS during climb, cruise and descent;

(i) the wind velocity used for climb, cruise and descent, including split climb and split descent;

(j) TAS for each sector;

(k) Track (in °M) of each sector;

(l) Heading (°M), groundspeed and time for each sector;

(m) climb, cruise and descent details of a diversion;

(n) total fuel load required including provision for diversion, reserve and contingency fuel.

54.6 Navigation

54.6.2 Define:

(a) drift, drift angle, drift allowance (aka drift correction);
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(b) track error, closing angle, total correction;
(c) magnetic and true bearing;
(d) radial;
(e) position line;
(f) fix;
(g) area of probability (“cocked hat”).

54.6.4 Through the use of the navigation computer and mathematical means, solve problems involving:

(a) the triangle of velocity;
(b) the 1 in 60 rule;
(c) time/speed/distance;
(d) time/fuel used/fuel consumption rate;
(e) height/time/distance/rate of climb/rate of descent.

54.6.6 Interpret meteorological information for IFR take-off minima.

54.6.8 Based on information derived from currently used ADF, VOR and DME displays, and from GPS instrumentation if approved, determine or calculate:

(a) navigation aspects associated with published departure procedures;
(b) magnetic headings required to maintain, or regain, required magnetic tracks;
(c) determination of magnetic tracks to specified point(s);
(d) CAS/TAS, drift and groundspeed;
(e) estimated times of arrival at destination or intermediate positions;
(f) requirements with respect TOC/TOD and rate of climb/rate of descent;
(g) wind velocity;
(h) position in terms of a radial, magnetic or true bearing and distance to or from a navigation aid;
(i) alteration in magnetic heading to make good a position or track;
(j) fuel consumption, and operational details or requirements resulting from fuel flow information;
(k) navigation aspects associated with published arrival procedures;
(l) holding time over a navigation aid before diversion flight must be commenced.

54.6.10 Describe the principles involved in obtaining an accurate fix.
Sub Topic | Syllabus Item
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54.6.12 | Describe the information that should be displayed by ADF/ VOR/ DME instrumentation to confirm position in relation to:
(a) a navigation aid or aids; or
(b) a magnetic track.

54.6.14 | Using the transfer of position lines procedure (in °M), determine a new position, given:
(a) an initial position;
(b) a track required from that position;
(c) a magnetic heading, or information to determine a magnetic heading;
(d) a TAS, or information to determine TAS;
(e) distance(s), or information to determine distance(s);
(f) ADF, VOR and/or DME information at specific times to calculate and plot position lines.

NOTE: The new position may be required to be expressed in terms of lat/long, or as a bearing and distance from or to a navigation aid.

54.6.16 | Having established a new position using the transfer of position line procedure, calculate or determine any or all of the following:
(a) drift;
(b) track error;
(c) wind velocity;
(d) correction to heading to make good a point or a track;
(e) estimated time of arrival at a point of a track.

54.6.18 | Determine:
(a) the type or class of airspace in which an IFR flight is operating;
(b) ATC aspects when operating IFR in controlled and uncontrolled airspace.

54.6.20 | Interpret meteorological information for IFR approach minima.

54.6.22 | Interpret, describe and explain the procedures involved during precision and non-precision instrument approaches.

54.6.24 | Describe the procedures associated with published missed approaches.