Subject No 20 Meteorology

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 feed back to the examination candidate.

Sub Topic	Syllabus Item
20.2	**The Atmosphere**
20.2.2	State the composition of the Atmosphere.
20.2.4	Explain the presence and importance of water vapour in the atmosphere.
20.2.6	Explain the relationship between water vapour content and atmospheric temperature.
20.2.8	Describe the effect of: (a) latitude and altitude on water vapour presence; (b) changes to the state of water on the weather.
20.2.10	Explain the manner in which water vapour is added to, and subtracted from the atmosphere.
20.2.12	Explain: (a) the process of formation, and characteristics of carbon dioxide; (b) how oceans and plant life add and subtract carbon dioxide to and from the atmosphere.
20.2.14	Explain: (a) how and where atmospheric ozone is generally formed and where it most commonly accumulates; (b) the effect of the ozone layer on solar radiation.
20.2.16	Describe the importance and effects of salt, dust and other solid particles in the atmosphere.
20.2.18	Interpret a graph of temperature versus altitude from the earth's surface to the stratopause, and explain why the shape of the curve is different in the troposphere compared to the stratosphere.
20.2.20	Describe the following features of the troposphere: (a) approximate vertical extent at low, middle and high latitudes; (b) average temperature lapse rate; (c) pressure lapse rate; (d) molecular mass compared to the total in the atmosphere;

Sub Topic	Syllabus Item
	(e) weather and turbulence.
20.2.22	Define ‘tropopause’.
20.2.24	Define ‘insolation’.
20.2.26	Explain how the temperature/pressure lapse rates generally determine the temperature and altitude of the tropopause.
20.2.28	Describe the relationship between tropopause height and tropopause temperature at various latitudes.
20.2.30	Explain why different angles of insolation produce differences in air density, and variations in tropopause height.
20.2.32	Explain the processes of:
	(a) insolation and warming of the atmosphere;
	(b) absence of insulation and cooling of the atmosphere.
20.2.34	Describe the following features of the stratosphere:
	(a) vertical extent;
	(b) predominant means of heating;
20.2.36	Explain why the stratosphere is generally devoid of cloud and weather.
20.4	**Atmospheric pressure**
20.4.2	Define ‘atmospheric pressure’.
20.4.4	State:
	(a) the unit of pressure;
	(b) the unit of pressure commonly use in meteorology.
20.4.6	Describe the principles of operation:
	(a) of the mercury barometer;
	(b) of the aneroid barometer.
20.4.8	Define ‘pressure lapse rate’.
20.4.10	Explain the relationship between air temperature and pressure lapse rate.
20.4.12	State the average pressure lapse rate in the lower troposphere and explain how this rate changes at higher altitudes.
20.4.14	Define ‘isobar’.
20.4.16	Define ‘wind velocity’.

Sub Topic	Syllabus Item
20.4.18	State the basic rules that apply to isobars, and explain their use.
20.4.20	Define: (a) anticyclone (or 'high'); (b) depression (or 'low'); (c) ridge of high pressure; (d) trough of low pressure; (e) col.
20.4.22	With respect to pressure systems, describe: (a) high and low level convergence; (b) high and low level divergence.
20.4.24	Explain how subsidence and ascent of air influence the type of weather commonly associated with pressure systems.
20.4.26	Describe the circulation and speed of the wind commonly associated with: (a) anticyclones and ridges of high pressure; (b) depressions and troughs of low pressure; (c) cols.
20.4.28	Identify the general direction of movement of pressure systems in the mid latitudes of both hemispheres.
20.4.30	Define 'diurnal' and 'semi-diurnal' variations, and (a) describe the semi-diurnal variation of pressure; (b) state the latitudes where the semi-diurnal variation of pressure has significance; (c) explain the phenomena often associated with a departure from the semi-diurnal variation of pressure in those latitudes.
20.4.32	Define 'pressure gradient'.
20.4.34	Explain the: (a) causes of pressure gradient; (b) relationship between isobars and pressure gradient.
20.4.36	Describe the meaning and consequences of 'steep' and shallow' pressure gradients.

Sub Topic	Syllabus Item
20.4.38	List the assumed conditions on which the International Standard Atmosphere (ISA) is based.
20.4.40	Explain the need for, and application of, the ISA for aviation.
20.4.42	Determine the temperature and pressure lapse rates in the ISA.
20.4.44	Given an ISA related temperature at an altitude, convert this to °C ambient, and given an ambient temperature °C at an altitude, convert this to ISA temperature.
20.4.46	Explain why an altimeter requires a subscale adjustment.
20.4.48	Define and apply: (a) altitude; (b) height; (c) QNH; (e) QFE; (f) QNE.
20.4.50	Determine altimeter indications, and/or altitude of aircraft, when subscale settings are incorrect.
20.6	**Temperature and heat exchange processes**
20.6.2	Define ‘temperature’.
20.6.4	Identify the effect of changes in temperature on volume, density, state of matter, and gasses.
20.6.6	State the units of measurement of temperature.
20.6.8	State the usual height at which the surface air temperature is measured.
20.6.10	Define ‘radiation’ (as this applies to meteorology).
20.6.12	Explain the effect of emitting or receiving radiation on the temperature of a body or gas.
20.6.14	Explain the relationship between the temperature of an emitting substance and the: (a) associated electromagnetic energy wavelength/frequency; (b) type of radiation (spectrum).
20.6.16	Describe the characteristics of solar radiation.
20.6.18	State the atmospheric constituents that absorb, reflect or scatter all, or part of, solar radiation.

Sub Topic	Syllabus Item
20.6.20	Define: (a) sky radiation; (b) global solar radiation.
20.6.22	List and explain the three main factors that influence the amount of solar energy received by the earth.
20.6.24	Describe the characteristics of terrestrial radiation.
20.6.26	Explain the relationship between solar radiation, terrestrial radiation and warming/cooling of the atmosphere.
20.6.28	List the substances that absorb terrestrial radiation, and explain the consequence of this absorption on global air temperature.
20.6.30	Define 'atmospheric window'.
20.6.32	Define 'energy budget'.
20.6.34	Describe the process of conduction.
20.6.36	Describe the process of convection.
20.6.38	Define 'sensible heat'.
20.6.40	Define 'latent heat'.
20.6.42	Describe 'diurnal variation of surface air temperature'.
20.6.44	Explain the effects of the following factors on the diurnal variation of surface air temperature: (a) type of surface; (b) oceans and other large water areas; (c) water vapour; (d) cloud; (e) the wind.
20.6.46	Define 'specific heat'.
20.6.48	Interpret the curves of the diurnal variation of surface air temperature over a 24 hour period which reflects the factors listed in 20.6.44.
20.6.50	Describe the basic principles and methods through which heat transfer takes place globally.

20.6.52 Describe the main characteristics of the following climates:

(a) oceanic;

(b) maritime;

(c) continental.

20.8 Atmospheric moisture

20.8.2 Define:

(a) condensation;

(b) evaporation;

(c) precipitation;

(d) melting;

(e) freezing;

(f) sublimation;

(g) deposition;

(h) adiabatic process;

(i) super saturation.

20.8.4 Describe and explain the condensation process and the main methods through which condensation occurs.

20.8.6 Describe the function of condensation nuclei in the condensation process.

20.8.8 Describe the deposition process.

20.8.10 Describe the evaporation process.

20.8.12 Explain what is meant by 'partial pressure' of a gas.

20.8.14 Explain what is meant by 'saturation vapour pressure of moist air'.

20.8.16 Describe the effect of ice surfaces, and high atmospheric temperatures, on the saturation vapour pressure of moist air.

20.8.18 Explain the function of latent heat in the condensation and evaporation processes.

20.8.20 Describe how temperature, water content of air, the wind, and atmospheric pressure influence the rate of evaporation.

20.8.22 State six processes through which water can alter its state and explain whether latent heat is required or given off in each case.

20.8.24 Explain the relationship between density of water, temperature and volume.

20.8.26 Explain what is meant by the terms:

(a) absolute humidity;

(b) humidity mixing ratio;

(c) saturation content;

(d) relative humidity.

20.8.28 Describe the relationship between absolute humidity, air temperature, and relative humidity.

20.8.30 Describe the diurnal variation of relative humidity.

20.8.32 Define 'dew point'.

20.8.34 Explain how water content and altitude influence the value of the dew point.

20.8.36 Describe the relationship between absolute humidity, air temperature, relative humidity and dew point.

20.8.38 Explain the method of operation of the:

(a) wet bulb/dry bulb hygrometer;

(b) hair hygrometer;

(c) lithium chloride element.

20.8.40 Describe the effect of moisture content on the density of air.

20.10 The wind

20.10.2 State the four forces that have a fundamental influence on the wind velocity.

20.10.4 Explain the principle of Coriolis force on moving air.

20.10.6 State the:

(a) variation of the magnitude of Coriolis force with latitude;

(b) direction of Coriolis force relative to the flow of air.

20.10.8 Explain the effect of Coriolis force and pressure gradient on the movement of air relative to the isobars.

20.10.10 Describe the inter-relation between pressure gradient, Coriolis force and centrifugal (cyclostrophic) force on the curvature of the isobars around high and low pressure systems in the Southern Hemisphere.

20.10.12 Define:

(a) gradient wind;

(b) geostrophic wind.

20.10.14 Explain how stability, wind strength and surface roughness affect the friction layer near the earth's surface.

20.10.16 Describe the vertical variation of wind speed and direction in the friction layer.

20.10.18 Describe the diurnal variation of the surface wind in the Southern Hemisphere.

20.10.20 Define:

(a) backing of the wind;

(b) veering of the wind.

20.10.22 Describe the change in wind velocity when climbing out of, or descending into, the friction layer.

20.10.24 With regard to the rotating cup anemometer:

(a) describe the principle of operation;

(b) state the function it performs;

(c) state the usual height at which the surface wind is measured.

20.10.26 State the approximate wind strength indicated by a 25-knot windsock when at 30°, 45°, 75°, and 90 degrees from the vertical.

20.10.28 Describe how an approximate wind direction can be determined from:

(a) ripples on water;

(b) wind lanes on water;

(c) wind shadow.

20.10.30 State Buys Ballot's law.

20.10.32 Describe the application of Buys Ballot's law on determining areas of high and low pressure, and on establishing possible errors in altimeter reading.

20.10.34 Define 'wind shear'.

20.10.36 Describe the effect of vertical and horizontal wind shear on aircraft operations.

20.12 Stability of air

20.12.2 Explain how the adiabatic process affects the temperature of rising and descending parcels of air.

20.12.4 Define:

(a) stable air;

(b) unstable air;

(c) neutrally stable/unstable air.

20.12.6 Describe the weather characteristics of:

(a) stable air;

(b) unstable air.

20.12.8 Describe how stable and unstable air affect flying conditions.

20.12.10 State the two main factors that determine whether air will be stable or unstable.

20.12.12 Describe what is meant by ‘environment lapse rate (ELR)’.

20.12.14 Using graphs:

(a) describe steep and shallow ELRs;

(b) define and describe ‘inversion’ and ‘isothermal layer’.

20.12.16 Define ‘adiabatic process’.

20.12.18 Define ‘dry adiabatic lapse rate’ (DALR).

20.12.20 State the value of the average DALR.

20.12.22 Interpret graphs comparing the DALR against altitude and temperature, and identify the temperature changes in rising and descending parcels of unsaturated air.

20.12.24 Comparing ELR against DALR, explain how the stability or instability of rising and descending 'dry' air can be determined.

20.12.26 Define ‘saturated adiabatic lapse rate’ (SALR).

20.12.28 State the value of the average SALR.

20.12.30 Explain why the SALR steepens with altitude.

20.12.32 Comparing ELR against SALR, explain how the stability or instability of rising and descending saturated air can be determined.

20.12.34 Explain what is meant by:

(a) ‘absolute stability’;

(b) ‘absolute instability’;

(c) ‘conditional stability (or instability)’.

20.12.36 Explain what is meant by ‘super adiabatic lapse rate’.

20.12.38 Define ‘rising condensation level’.

20.12.40 Given environment temperatures, dew points and mountain crest elevation:

(a) calculate the lifting condensation level or dew point;

(b) determine the stability of air;

(c) determine the type of cloud, if formed;

(d) determine the cloud top, if possible.

20.12.42 Define 'convective condensation level'.

20.12.44 Given an ELR and dew point:

(a) determine the convective condensation level;

(b) calculate the required surface temperature to produce cumuliform cloud;

(c) determine, if possible, cloud top height.

NOTE: The given factors and the required answers in 20.12.40 and 20.12.44 may be interchanged to present similar problem solving exercises.

20.12.46 Describe:

(a) convective stability;

(b) diurnal variation of stability.

20.14 Local winds

20.14.2 Describe the sea breeze process, and describe typical:

(a) timing of the occurrence;

(b) average strength of the wind;

(c) horizontal and vertical extent;

(d) associated cloud development;

(e) associated precipitation;

(f) effect on air temperature over the land;

(g) effect on the pressure gradient;

(h) associated wind shear problems;

(i) associated turbulence.

20.14.4 Describe the pseudo sea breeze.

20.14.6 Describe the land breeze process.

20.14.8 With regard to the land breeze process, explain the:

(a) timing of the occurrence;

(b) average strength of the wind;

(c) most likely season for the occurrence.

20.14.10 Describe the katabatic and anabatic wind processes.

20.14.12 With regard to katabatic and anabatic winds, explain the:

(a) timing of each occurrence;

(b) effect of the force of gravity;

(c) strength of the winds;

(d) effect of adiabatic warming and cooling;

(e) effect of moist valley air on cloud/fog formation.

20.14.14 Define:

(a) gusts (or gustiness);

(b) squalls.

20.14.16 Describe the fohn wind process.

20.14.18 With regard to the fohn wind, given environment temperatures, dew points and mountain crest elevations:

(a) determine the cloud base on the windward side;

(b) determine the cloud base on the lee side;

(c) determine the temperature at a stated lee side datum.

NOTE: The given factors and the required answers in 20.14.18 may be interchanged to present similar problem solving.

20.14.20 Describe the flight conditions associated with the fohn wind.

20.14.22 Describe the mountain wave (standing or lee wave) process.

20.14.24 Explain the factors that affect wavelength of mountain waves.

20.14.26 Explain the factors that affect amplitude of mountain waves.

20.14.28 Describe:

(a) the action of rotor zones with mountain waves;

(b) the cloud formations often associated with mountain waves;

(c) the flight conditions associated with mountain waves.

20.14.30 Explain the rotor streaming process.

20.14.32 Describe the flight conditions associated with rotor streaming.

20.16 Inversions

20.16.2 Define ‘inversion’.

20.16.4 Explain the effect of inversions on:

(a) formation and development of cloud;

(b) visibility;

(c) turbulence;

(d) relative humidity and dew point;

(e) stability of air.

20.16.6 Describe flight conditions in the presence of inversions.

20.16.8 Explain the factors involved with a:

(a) radiation inversion;

(b) turbulence inversion;

(c) subsidence inversion;

(d) frontal inversion.

20.18 Cloud

20.18.2 Describe the basic cloud formation process.

20.18.4 Describe:

(a) the main causes which can produce rising air, and formation of cloud;

(b) the relationship between stability of air and cloud type.

20.18.6 List two processes that can provide/enhance buoyancy of air.

20.18.8 List the factors that determine the rate at which falling waterdrops evaporate below cloud, and describe the variants of each factor.

20.18.10 Describe the relationship between air temperature, relative humidity, dew point, water content of cloud, and cloud base.

20.18.12 List the vertical dimensions of the three main cloud layers:

(a) in mid latitudes;

(b) in tropical latitudes.

20.18.14 Name, and describe the appearance and characteristics of:

(a) high cloud;

(b) middle cloud;

(c) low cloud.

20.18.16 Describe conditions to be expected with each type of cloud with respect to:

(a) turbulence;

(b) icing;

(c) precipitation.

20.18.18 Explain the formation and development of artificial cloud.

20.18.20 Explain what is meant by 'okta'.

20.18.22 In terms of cloud amount, explain the meaning of:

(a) SKC;

(b) FEW;

(c) SCT;

(d) BKN;

(e) OVC;

(f) fracto.

20.18.24 Describe how cloud and cloud base are reported.

20.18.26 Describe the principle of operation, and operational effectiveness of the:

(a) cloud searchlight;

(b) laser ceilometer.

20.18.28 Explain the main processes that contribute to cloud dispersal.

20.20 Precipitation

20.20.2 Describe the basic principles of water drop growth through:

(a) the Bergeron process;

(b) coalescence (or fusion).

20.20.4 Identify the factors that affect the rate of fall of water drops.

20.20.6 Describe the following types of precipitation:

(a) rain;

(b) drizzle;

(c) snow;

(d) sleet;

(e) hail.

20.20.8 Describe the character of precipitation:

(a) continuous;

(b) intermittent;

(c) showers.

20.20.10 Describe the rate of precipitation:

(a) light;

(b) moderate;

(c) heavy.

20.22 Visibility

20.22.2 Define (meteorological) ‘visibility’.

20.22.4 Explain what is meant by ‘transparency of air’.

20.22.6 Explain whether illumination from the sun or moon have an effect on visibility.

20.22.8 Describe the effects of the following on visibility distance:

(a) precipitation;

(b) fog or mist;

(c) haze;

(d) smoke;

(e) sea spray.

20.22.10 Describe the following factors affecting visibility range:

(a) colour background;

(b) white-out;

(c) sunlight and moonlight.

20.22.12 Explain the factors involved in ‘slant range’.

20.22.14 Define ‘Runway Visual Range (RVR).

20.22.16 Explain the effect of altitude on visibility.

20.22.18 Describe the principle of operation of the Handar visibility sensor.

20.24 Fog

20.24.2 Define ‘fog’.

20.24.4 Describe the principle of formation, required meteorological conditions, factors affecting extent of, timing, and dispersal of:

(a) radiation fog;

(b) advection fog;

(c) valley fog;

(d) upslope fog;

(e) cold and warm stream fog;

(f) steaming fog;

(g) frontal fog.

20.26 Fronts and depressions

20.26.2 Define ‘synoptic observation’.

20.26.4 Describe the Polar Front theory.

20.26.6 Define ‘airmass’.

20.26.8 List the airmass categories.

20.26.10 Describe each type of airmass and explain the likely weather conditions in New Zealand during warm and cold airstream advection.

20.26.12 Describe the concept of vorticity & associated convergence/divergence relating to weather systems.

20.26.14 Explain the characteristics of:

(a) mid latitude depressions;

(b) polar depressions.

20.26.16 Identify the manner in which fronts are shown on weather maps.

20.26.18 Describe the:

(a) cold, warm, stationary, occluded front;

(b) wind and weather sequence associated with each type of front;

(c) movement of fronts and pressure systems.

20.26.20 Describe the factors associated with:

(a) orographic depressions;

(b) the heat (or thermal) low.

20.28 Thunderstorms

20.28.2 Explain the conditions to be met for the development of thunderstorms.

20.28.4 Describe the:

(a) three stages of thunderstorms;

(b) regeneration of thunderstorms.

20.28.6 List the types of thunderstorm, and describe the:

(a) characteristics and development of each type;

(b) hazards associated with thunderstorms;

(c) precautions that can be taken by pilots to avoid or lessen the effects of thunderstorms.

20.28.8 Describe the processes involved in the formation of hail.

20.28.10 Explain the origin and development of tornadoes, and state the main hazards.

20.30 Icing

20.30.2 Explain the process of freezing and melting.

20.30.4 Define latent heat of fusion.

20.30.6 Describe the process involved in the formation of:

(a) clear (translucent or glaze) ice;

(b) rime (opaque) ice;

(c) hoar frost;

(d) freezing rain.

20.30.8 Explain the dangers (to aircraft) from ice accretion associated with the processes in 20.30.6 (a) - (d).

20.30.10 Explain the factors, which influence the rate of ice accretion.

20.30.12 Describe the following de-icing/anti-icing methods:

(a) mechanical;

(b) fluid;

(c) thermal.

20.30.14 Explain the process of carburetor icing.

20.30.16 State the maximum temperature range in which carburetor ice can form.

20.30.18 Explain how the accretion rate of carburetor icing is governed by:

(a) moisture content of air;

(b) throttle setting.

20.30.19 Describe the method commonly used in light aircraft to combat carburetor ice.

20.30.20 Explain:

(a) the process of engine intake icing for piston and turbine engine aircraft;

(b) the methods commonly used to combat intake icing.

20.30.22 Explain the:

(a) likelihood of ice accretion in the 10 main cloud types;

(b) type of ice to be expected in these cloud types;

(c) altitudes relative to the freezing level where rime or clear ice can be expected in the cloud types.

20.30.24 List the three classifications of icing and describe their effect on aircraft.

20.32 Turbulence

20.32.2 Define 'turbulence'.

20.32.4 Describe the cause(s), factors involved and techniques commonly used to avoid or minimise:

(a) thermal turbulence;

(b) mechanical turbulence, small-scale and large-scale;

(c) wind shear turbulence;

(d) wake turbulence.

20.32.6 Explain the characteristics of:

(a) light turbulence;

(b) moderate turbulence;

(c) severe turbulence.

20.34 Tropical meteorology

20.34.2 State the approximate latitude limits applicable to tropical meteorology.

20.34.4 In broad terms, describe the tropical Hadley cell.

20.34.6 Explain what is meant by:

(a) horse latitudes;

(b) doldrums.

20.34.8 Differentiate between the equatorial trough and the inter-tropical convergence zone (ITCZ).

20.34.10 Describe the:

(a) seasonal location of the equatorial trough and ITCZ;

(b) typical weather in an active and inactive ITCZ.

20.34.12 Explain the origin, common location and associated weather of the South Pacific Convergence Zone (SPCZ).

20.34.14 With regard to the trade winds, describe the:

(a) origin and mechanics (of the trade winds);

(b) approximate latitudinal and vertical limits;

(c) seasonal location and direction;

(d) commonly associated weather;

(e) winds and weather usually experienced above the trade winds;

(f) topographical influences (on the trade winds).

20.34.16 Define ‘monsoon’.

20.34.18 With regard to wet monsoons, describe the mechanics involved.

20.34.20 State the:

(a) major global monsoon regions;

(b) season during which the Australian monsoon is generally present.

20.34.22 List the requirements for the formation and development of tropical cyclones.

20.34.24 Explain the requirement for thermal energy in the development of tropical cyclones, and state the two main sources of this energy.

20.34.26 With regard to tropical cyclones, describe the horizontal and vertical extents, pressure and wind velocity tendencies, and other associated factors during the:

(a) formative stage;

(b) immature stage;

(c) mature stage;

(d) decaying stage.

20.34.28 Describe the weather conditions associated with tropical cyclones.

20.34.30 With regard to the Southern Oscillation, describe the principles of the Walker Circulation.

20.34.32 Explain the factors involved when the ENSO index results in the:

(a) El Nino events;

(b) La Nina events.

20.34.34 Describe how the El Nino and La Nina events influence the weather in New Zealand.

20.34.36 Describe what is meant by 'streamline analysis'.

20.34.38 Explain how isotachs and streamlines can be used to determine wind velocity.

20.34.40 Describe how areas of high and low pressure, convergence/divergence, and cols are depicted on streamline analysis charts.

20.36 The General Circulation

20.36.2 Explain what is meant by "The General Circulation".

20.36.4 Describe what is meant by "high zonal index" and "low zonal index" and explain their effects on the movement of weather systems in the troposphere.

20.36.6 State the common locations in the southwest Pacific Ocean where 'blocking anticyclones' tend to form.

20.36.8 Describe the characteristics of a blocking anticyclone.

20.36.10 Describe the weather in the east and west of New Zealand when a blocking anticyclone has formed to the immediate east of the country.

20.38 Hazardous meteorological conditions

20.38.2 Describe the effects on climbing and descending flight paths when low-level wind shear is experienced.

20.38.4 Explain the mechanics of a downburst.

20.38.6 Explain the mechanics of a microburst.

20.38.8 Explain the effects of downbursts and microbursts on aircraft operations.

20.38.10 Explain the effect of ice accretion on aircraft performance.

20.38.12 Differentiate between anti-icing and de-icing.

20.38.14 With regard to the rate of ice accretion, explain the effect of:

(a) airspeed (including helicopter rotor rpm);

(b) shape of aircraft components.

20.38.16 Explain why it is not advisable to operate aircraft in areas affected by volcanic

ash.

20.38.18 Describe the adverse effects of reduced visibility during VFR flight.

20.38.20 Identify four actions that could be taken by a pilot to reduce or avoid the effects of turbulence.

20.38.22 Identify the three main types of aquaplaning.

20.38.24 Describe the effects of aquaplaning during landing.

20.40 New Zealand climatology

20.40.2 Describe the effects of latitude, oceanic surroundings and topography on the climate of New Zealand.

20.40.4 Describe the effect of latitude and topography on cold fronts traveling over New Zealand.

20.40.6 In general terms, describe cloudiness, gustiness and turbulence at various parts of New Zealand during typical:

(a) northwest wind regimes;

(b) northeast wind regimes;

(c) southwest wind regimes;

(d) southeast wind regimes.

20.42 Meteorological services, reports and forecasts

20.42.2 Assess and interpret information presented on mean sea level analysis and prognosis weather charts covering the Southwest Pacific region.

20.42.4 Describe the general principles of operation of automatic weather stations and associated equipment including the modern visibility sensor and laser ceilometer and their limitations.

20.42.6 With respect to NZ domestic VFR operations, interpret, understand and assess information of all descriptions contained in:

(a) area forecast (ARFOR);

(b) meteorological reports (METAR/SPECI);

(c) trend forecasts (TTL);

(d) aerodrome forecasts (TAF);

(e) SIGMET;

(f) special aerodrome reports (SPAR);

(g) automatic terminal information service (ATIS);

(h) aerodrome and weather information broadcast (AWIB);

(i) basic weather reports (BWR);

(j) pilot reports.

20.42.8 Interpret, understand and assess weather information made available by television, Internet, newspapers, and radio.