

**APPENDIX 'B'**

**AVIATION METEOROLOGY**

**THE SYLLABUS OF AVIATION METEOROLOGY IS AS FOLLOWS :**

**1. Aviation Meteorology**

**1.1 The Atmosphere**

- a) Composition, extent, vertical division
- b) Temperature
  - vertical distribution of temperature
  - transfer of heat: solar and terrestrial radiation, conduction, convection, advection and turbulence
  - lapse rate, stability and instability
  - development of inversions, types of inversions
  - temperature near the earth's surface, surface effects, diurnal
  - variation, effect of clouds, effect of wind
- c) Atmospheric pressure
  - barometric pressure, isobars
  - pressure variation with height, contours (isohypses)
  - reduction of pressure to mean sea level, QFF
  - surface low/upper-air low, surface high/upper-air high-precipitation
- d) Atmospheric density : interrelationship of pressure, temperature and density
- e) International Standard Atmosphere (ISA)
- f) Altimetry
  - pressure altitude, true altitude
  - height, altitude, flight level
  - altimeter settings: QNH, QFE, 1013.25 hPa
  - effect of accelerated airflow due to topography

**1.2 Wind**

- a) Definition and measurement
- b) Primary cause of wind
  - primary cause of wind, pressure gradient, coriolis force, gradient wind
  - relationship between isobars and wind

- c) General circulation
  - general circulation around the globe
- d) Turbulence
  - Turbulence and gustiness, types of turbulence
  - origin and location of turbulence
- e) Variation of wind with height
  - variation of wind in the friction layer
- f) Local winds: Anabatic and katabatic winds, land and sea breezes, venturi effects
- g) Standing waves
  - origin of standing waves

### **1.3 Thermodynamics**

- a) Humidity
  - water vapour in the atmosphere
  - temperature / dew point, mixing ratio, relative humidity

### **1.4 Clouds and Fog**

- a) Clouds formation and description
  - cloud types, cloud classification
  - influence of inversions on cloud development
- b) Fog, mist, haze
  - radiation fog
  - advection fog
  - steaming fog
  - frontal fog
  - orographic fog

### **1.5 Precipitation**

- a) Development of precipitation
  - development of precipitation
  - types of precipitation
  - type of precipitation, relationship with cloud types

### **1.6 Airmasses and Fronts**

- a) Types of airmasses
  - description, factors, affecting the properties of an airmass
  - classification of airmasses, modifications of airmasses, areas of origin
- b) Fronts
  - boundaries between airmasses (fronts), general situation, geographic differentiation
  - warm front, associated clouds and weather
  - cold front, associated clouds and weather
  - Warm sector, associated clouds and weather
  - weather behind the cold front
  - occlusions, associated clouds and weather
  - stationary front, associated clouds and weather
  - movement of fronts and pressure systems, life cycle

### **1.7 Pressure Systems**

- a) Location of the principal pressure areas
- b) Anticyclone: Anticyclones, types, general properties, cold and warm anticyclones, ridges and wedges, subsidence
- c) Non frontal depressions
  - thermal, orographic – and secondary depressions, cold air pools, trough
- d) Tropical revolving storms

### **1.8 Climatology**

- a) Typical weather situations in mid-latitudes
  - westerly waves
  - high pressure area
  - uniform pressure pattern
- b) Local seasonal weather and wind

- SE & NE Monsoon, Pre-Monsoon, Northwester, Kalbaisakhi
- Western Disturbance

### **1.9 Flight Hazards**

- a) Icing
  - weather conditions for ice accretion, topographical effects
- b) Turbulence
  - effects on flight, avoidance
- c) Windshear
  - definition of windshear
  - weather conditions for windshear
  - effects on flight
- d) Thunderstorms
  - structure of thunderstorms, squall lines, life history, storm cells, electricity in the atmosphere, static charges
  - conditions for and process of development, forecast, location, type specification
  - Thunderstorm avoidance, ground/airborne radar, storm scope
  - development and effect of down bursts
  - development of lightning discharge and effect of lightning strike on aircraft and flight execution
- e) Low and high level inversions: Influence on aircraft performance
- f) Hazards in mountainous areas
  - influence of terrain on clouds and precipitation, frontal passage
  - vertical movements, mountain waves, windshear, turbulence, ice accretion
  - development and effect of valley inversions
- g) Visibility reducing phenomena
  - reduction of visibility caused by mist, smoke, dust, sand and precipitation
  - reduction of visibility caused by low drifting and blowing snow

**1.10. Meteorological Information**

- a) Observation
  - On the ground – surface wind, visibility and runway visual range, transmissometers; Clouds – type, amount, height of base and tops, movement; Weather – including all types of precipitation, air temperature, relative humidity, dew point, atmospheric pressure
  - aircraft observations and reporting, data link systems, PIREPS
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- b) Weather Charts
  - significant weather charts
  - surface charts
  - upper air charts
  - symbols and signs on analysed and prognostic charts
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- c) Information for Flight Planning
  - Aeronautical codes: METAR, TAF, SPECI, SIGMET, SNOWTAM, runway report
  - Meteorological broadcasts for aviation: VOLMET, ATIS, HFVOLMET, ACARS
  - Content and use of pre-flight meteorological documents
  - Meteorological briefing and advice
  - measuring and warning systems for low level windshear, inversion
  - Special meteorological warnings