AIRLINE TRANSPORT PILOTS LICENSE

(050 00 00 00 - METEOROLOGY)

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 01 00 00	**THE ATMOSPHERE**	
050 01 01 00	**Composition, Extent, Vertical Division**	
050 01 01 01	**Describe the vertical division of the atmosphere, based on the temperature variations with height:** – List the different layers and their main qualitative characteristics – Describe the troposphere – Define tropopause – Mention the main values of the standard (ISA) atmosphere up to the tropopause – Describe the proportions of the most important gases in the air in the troposphere – Describe the variations of the height and temperature of the tropopause from the poles to the equator – Describe the breaks in the tropopause along the limits of the main air masses – Indicate the variations of the tropopause height with the seasons and the variations of atmospheric pressure – Define stratosphere – Describe the main variations with height of the composition of the air in the stratosphere – Describe the ozone layer	
050 01 02 00	**Temperature** – Define air temperature	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– List the units of measurement of air temperature used in aviation meteorology	
050 01 02 01	**Vertical distribution of temperature**	
	– Mention general causes of the cooling of the air in the troposphere with increasing altitude, and of the warming of the air in the stratosphere	
	– Distinguish between standard temperature gradient, adiabatic, and saturated adiabatic lapse rates	
050 01 02 02	**Transfer of heat**	
	– Define radiation	
	– Describe qualitatively the solar radiation reaching the atmosphere	
	– Describe qualitatively the filtering effect of the atmosphere on solar radiation	
	– Describe qualitatively the terrestrial radiation	
	– Explain how terrestrial radiation is absorbed by some components of the atmosphere	
	– Explain the greenhouse effect due to clouds and some gases in the atmosphere	
	– Define and explain the process of conduction	
	– Explain the role of conduction in the cooling and warming of the atmosphere	
	– Define and explain the process of convection	
	– Name situations in which convection occurs	
	– Define and explain the process of advection	
	– Name situations in which advection occurs	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe transfer of heat by turbulence	
050 01 02 03	**Lapse rate, stability and instability**	
050 01 02 04	**Development of inversions, types of inversions**	
	– Explain the reasons for the formation of the following inversions:	
	– Ground inversion due to ground radiation	
	– Subsidence inversion	
	– Frontal inversion	
	– Inversion above friction layer	
	– Valley inversion	
	– Tropopause inversion	
050 01 02 05	**Temperature near the earths surface, surface effects, diurnal variation, effect of clouds, effect of wind**	
	– Explain the cooling and the warming of the air on the earth or sea surfaces	
	– Sketch the diurnal variation of the temperature of the air in relation with the radiation of the sun and of the earth	
	– Describe qualitatively the influence of the clouds on the warming and the cooling of the surface and the air near the surface	
	– Distinguish between the influence of low or high clouds, thick or thin clouds	
	– Explain the influence of the wind on the cooling and warming of the surfaces	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 01 03 00	**Atmospheric Pressure**	
050 01 03 01	**Barometric pressure, isobars**	
	– List the units of measurement of the atmospheric pressure used in aviation	
	– Describe the principle of the barometers:	
	– mercury barometer	
	– aneroïd barometer	
	– Describe isobars on the surface weather charts	
	– Define H, L, through, ridge, col	
050 01 03 02	**Explain the pressure variation with height**	
	– Describe qualitatively the variation of the barometric lapse rate	
	– Give an average value for the barometric lapse rate below 5.500m	
	– Give an average value for the barometric lapse rate above 5.500m	
050 01 03 03	**Explain the reduction of measured pressure to the mean sea level**	
	– Describe the principle of calculation for the QNH	
	– Define QFF	
	– Mention the use of QFF for surface weather charts	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 01 03 04	**Illustrate with a vertical cross section of isobaric surfaces a surface low pressure system, an upper air low pressure system, a surface high pressure system and an upper air high pressure system**	
050 01 04 00	**Atmospheric Density**	
050 01 04 01	**Describe the interrelationship between pressure, temperature and density** – Describe the distribution of the air density in the atmosphere. – Describe the effect of humidity on the density of air	
050 01 05 00	**International Standard Atmosphere (ISA)**	
050 01 05 01	**Explain the use of standardised values for the atmosphere** – List the main values of the ISA: – Mean sea level pressure, – Mean sea level temperature – The vertical temperature lapse rate up to the tropopause – Height and temperature of the tropopause – The composition of dry air within the troposphere, – List the standard pressure levels and equivalent standard flight levels – Calculate the standard temperature in degree Celsius for a given flight level – Determine a standard temperature deviation by the difference between the given outside air	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	temperature and the standard temperature	
050 01 06 00	**Altimetry**	
050 01 06 01	**Define 'pressure altitude', 'density altitude', and 'true altitude'**	
	– Explain qualitatively the influence of the air temperature on the distance between	
	– the ground and the level read on the altimeter	
	– two flight levels	
	– Determine with a rule of thumb the density altitude for a given flight level and a given ISA temperature deviation	
050 01 06 02	**Define height, altitude, pressure altitude and flight level**	
	– Name the altimeter settings associated to height, altitude and flight level	
	– Calculate the different values with given QNH and temperature	
	– height to altitude	
	– height to flight level	
050 01 06 03	**Give the ICAO definition of QNH, QFF, QFE and "standard altimeter setting"**	
	– Calculate the different readings on the altimeter when the pilot changes the altimeter setting	
	– Illustrate with a numbered example the changes of altimeter setting and the associated changes in reading when the pilot climbs through the transition altitude or descend through the transition level	
	– Derive the reading of the altimeter on the ground when the pilot uses the different settings	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 01 06 04	**Calculation of terrain clearance, lowest usable flight level, rule of thumb for temperature and pressure influences** – Calculate the terrain clearance, using the rule of thumb for the temperature and pressure influences – Calculate the terrain clearance, using the rule of thumb for the temperature and pressure influences	
050 01 06 05	**Effect of accelerated airflow due to topography** – Describe qualitatively how the effect of accelerated airflow due to topography affects altimetry	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 02 00 00	**WIND**	
050 02 01 00	**Definition and measurement of wind**	
050 02 01 01	**Define wind and state how it is measured** – Define wind – State the meteorological units of measurement for wind – Explain how wind velocity is measured in meteorology – State how wind data is indicated in the surface and upper level charts and in the TAF and METAR messages (Refer to 050 10 01 01)	
050 02 02 00	**The primary cause of wind**	
050 02 02 01	**Primary cause of wind, pressure gradient, coriolis force, gradient wind**	

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	– Explain how the pressure gradient force acts in relation to the pressure gradient	
	– Explain how the coriolis force acts in relation to the wind	
	– State the conditions necessary for the development of a geostrophic wind	
	– Explain the development of a geostrophic wind	
	– Indicate how the geostrophic wind flows in relation to the isobars and to the pressure gradient in the Northern and Southern hemispheres	
	– Analyse the effect (on the geostrophic wind speed) of changing latitude or air density	
	– Explain the gradient wind effect and indicate how the gradient wind differs from the geostrophic wind in cyclonic and anticyclonic circulation	
050 02 02 02	**Explain the relationship between isobars and wind**	
	– Explain the relationship between isobars and wind speed and direction	
050 02 02 03	**Explain the effects of convergence and divergence**	
	– Define atmospheric convergence and divergence	
	– Explain the effect (on wind speed and pressure) of convergence and divergence	
050 02 03 00	**The general global circulation**	
050 02 03 01	**Describe and explain the general global circulation**	
	– Sketch or indicate on a map the general global wind pattern for all latitudes at low level in January and July	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Name major low level wind systems in the mid latitudes	
	– Name major low level wind systems in the tropics	
	– Explain how upper winds are derived from the low level pressure pattern and the mean temperature distribution in the mid and upper troposphere	
	– Sketch or indicate on a map the general global wind pattern at high level	
	– Sketch or indicate on a map the westerly and easterly tropospheric winds	
050 02 04 00	**Define and explain turbulence**	
050 02 04 01	**Define turbulence and gustiness. List types of turbulence**	
	– State the aviation definition of turbulence	
	– List common types of turbulence	
050 02 04 02	**Explain the origins of turbulence. State where turbulence is usually found**	
	– Explain the formation of atmospheric turbulence	
	– Explain the formation of orographic turbulence	
	– Explain the formation of frontal turbulence	
	– Explain the formation of clear air turbulence	
	– State where turbulence will normally be found	
050 02 05 00	**Describe and explain the variation of wind with height**	
050 02 05 01	**Describe the variation of wind in the friction layer**	
	– Describe how the wind changes speed and direction descending through the friction layer in the northern	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	and southern hemispheres – Describe the airflow in turbulent and laminar friction layers – Describe how wind changes with height in turbulent and laminar friction layers – State the surface and airmass conditions that generate laminar and turbulent friction layers	
050 02 05 02	**Indicate the wind variation at fronts** – Explain the horizontal and vertical wind variation found at fronts – Compare the magnitude of wind variation at cold and warm fronts	
050 02 06 00	**Describe local winds**	
050 02 06 01	**Describe and explain anabatic and katabatic winds, land and sea breezes and venturi effects** – Describe and explain anabatic winds – Describe and explain katabatic winds – Describe and explain land and sea breezes – Describe and explain the venturi effect, convergence in valleys and mountain areas	
050 02 07 00	**Jet Streams**	
050 02 07 01	**Explain the origin of jet streams** – Explain the origin and development of jet streams	

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JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 02 07 02	**Description and location of jet streams**	
	– State the WMO definition of a jet stream	
	– State typical figures for the dimensions of jet streams	
	– Sketch or describe where jet streams are found in the troposphere in relation to the tropopause and to fronts	
	– Sketch or describe the isotachs in a cross section of a jet stream	
	– Indicate the areas of worst windshear and CAT	
	– Describe how jet streams are associated with fronts	
	– Sketch or describe the locations of jet streams at fronts and their relationship to areas of windshear	
050 02 07 03	**State names, heights and seasonal occurrences of jet streams**	
	– Name the types of jet streams found in the troposphere and in the stratosphere	
	– State the approximate latitudes, heights and seasonal movement of polar front jet streams	
	– State the approximate latitudes, heights and seasonal movement of sub tropical jet streams	
	– State the approximate latitudes, heights and seasonal movement of tropical easterly jet streams	
050 02 07 04	**Recognition of jet streams**	
	– State how jet streams may be recognized from their associated meteorological phenomena	
050 02 07 05	**Explain the cause of CAT. State where CAT is located and how forecast**	
	– Explain the formation of CAT	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– State where CAT is found, in association with jet streams and generally (Refer to 050 09 02 01) – Describe the distribution of CAT around jet stream cores – Describe where CAT will be found in the general airflow – Explain where CAT may be found at fronts – Explain where CAT may be found in the vicinity of thunderstorms – Explain where CAT may be found at troughs of low pressure – State how CAT is forecast	
050 02 08 00	**Describe standing waves**	
050 02 08 01	**Describe and explain the origin and formation of standing waves** – State the conditions necessary for the formation of standing waves – Describe the structure and properties of standing waves – Explain how standing waves may be identified by their associated meteorological phenomena – State the aviation hazards associated with standing waves	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 03 00 00	**THERMODYNAMICS**	

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JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 03 01 00	**Humidity**	
050 03 01 01	**Describe water vapour in the atmosphere**	
	? Define humid air	
	? Describe the significance of water vapor in the atmosphere for meteorology	
	? Indicate the sources of atmospheric humidity	
	? Describe the influence of water vapor on atmospheric processes	
050 03 01 02	**Define the temperature/dew point relationship, the mixing ratio and the relative humidity**	
	? Define mixing ratio	
	? Name the unit used in meteorology to express the mixing ratio	
	? Explain the factors influencing the mixing ratio	
	? Recognize the lines of equal mixing ratio on a simplified diagram (T,P)	
	? Define saturation mixing ratio	
	? Define saturation of air by water vapour	
	? Illustrate with a diagram (T,mixing ratio) the influence of the temperature on the saturation mixing ratio, at constant pressure	
	? Explain the influence of the pressure on the saturated mixing ratio	
	? Define dewpoint	
	? Illustrate the dew point concept with practical examples	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	? Recognize the dew point curve on a simplified diagram (T,P) ? Describe the relationship between temperature and dew point ? Estimate the relative humidity of the air from the difference between dew point and temperature ? Define relative humidity ? Explain the factors influencing the relative humidity at constant pressure ? Explain the evolution of relative humidity during the day ? Describe the relationship between relative humidity, the amount of water vapour, and the temperature ? Explain the evolution of relative humidity during a adiabatic process	
050 03 02 00	**Change of state of aggregation**	
050 03 02 01	**Define condensation, evaporation, sublimation, freezing, melting and latent heat** ? List the conditions for condensation ? Explain the condensation process ? Explain the nature of and the need for condensation nuclei ? Explain the effects of condensation on the weather ? List the conditions for freezing ? Explain the process of freezing ? Explain the nature of and the need for the freezing nuclei ? List the conditions for sublimation	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	? Explain the sublimation process ? Explain the nature of and the need for sublimation nuclei ? Describe the absorption or liberation of latent heat in each change of state of aggregation ? Explain the influence of atmospheric pressure, the temperature of the air and of the water or ice on the different change of state of aggregation ? Illustrate all the changes of state of aggregation with practical examples	
050 03 03 00	**Adiabatic processes**	
050 03 03 01	**Describe the adiabatic processes** ? Define adiabatic transformation ? Describe the adiabatic process of a non saturated rising or descending air particle ? Explain the variation of temperature during change of altitude ? Explain the evolution of the mixing ratio and of the relative humidity during changes of altitude ? Use the ”dry” adiabatic lines and mixing ratio on a simplified diagram (T,P) for a climbing or descending air particle ? Describe the adiabatic process of a saturated air particle ? Explain the variation of temperature with changing altitude ? Explain the difference of temperature gradient with non saturated air ? Explain influence of air temperature on the temperature gradient in saturated air	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	? Use the ”saturated” adiabatic lines on a simplified diagram (T,P) for a climbing or descending air particle ? Find the condensation level, or base of the clouds on a simplified diagram (T,P) ? Explain the static stability of the atmosphere with reference to the adiabatic lapse rates ? Define qualitatively and quantitatively : stability, conditional instability, and instability ? Explain with a sketch on a simplified diagram (T,P) the different possibilities of atmospheric stability: absolute stability, absolute instability, conditional instability ? Illustrate with a sketch of the adiabatic lapse rates and the vertical temperature profile of the atmosphere the effect of an inversion on the vertical motion of air ? Illustrate with a schematic sketch of the saturated adiabatic lapse rate and the vertical temperature profile the instability inside a cumuliform cloud ? Illustrate with a schematic sketch the formation of the subsidence inversion ? Illustrate with a schematic sketch the formation of Foehn	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 04 00 00	**CLOUDS AND FOG**	
050 04 01 00	**Cloud formation and description**	
050 04 01 01	**Cooling by adiabatic expansion by advection** – Explain cloud formation by adiabatic expansion – Determine the cloud base in a simplified diagram (temperature, pressure, humidity)	

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	– Explain the influence of relative humidity on the height of the cloud base	
	– Name the two ways of lifting in the atmosphere	
	– Name examples of forced lifting	
	– Name examples of free convection	
	– Illustrate in a thermodynamic diagram the meaning of convective Temperature	
	– Find the cloud base from a simplified T,P diagram	
	– Explain the formation of low clouds by cooling by advection	
050 04 01 02	**Define clouds types and clouds classification**	
	– Identify by shape: Cirrus (cirriform), Cumulus (cumuliform) and Stratus (stratiform) clouds	
	– Identify by shape and typical level the ten main cloud types	
	– Distinguish with definitions of heights (for midlatitudes) between low clouds, medium clouds, and high clouds	
	– Distinguish between ice clouds, mixed clouds and pure water clouds	
050 04 01 03	**Explain the influence of inversions on clouds development**	
	– Explain the influence of inversions on vertical movements in the atmosphere	
	– Explain the influence of an inversion on the formation of stratus clouds	
	– Explain the influence of ground inversion on the formation of fog	
	– Determine the top of a cumulus cloud caused by an inversion on a simplified diagram	

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	– Deduce the role of the tropopause inversion in the formation of clouds	
050 04 01 04	**Describe the flying conditions in each cloud type**	
	– Assess cirrus-type clouds (cirrus, cirrostratus, cirrocumulus) for icing, turbulence and flight visibility	
	– Assess convective clouds (cumulus and cumulonimbus) for icing, turbulence and flight visibility	
	– Assess medium level clouds (altocumulus and altostratus) by icing, turbulence and visibility	
	– Assess low level clouds (nimbostratus, stratus and stratocumulus) for icing, turbulence and visibility	
050 04 02 00	**Fog, Mist, Haze**	
050 04 02 01	**Explain the formation of fog, mist, and haze in general**	
	– Define fog, mist and haze with reference to ICAO standards of visibility range and relative humidity	
	– Name the factors contributing in general to the formation of fog and mist	
	– Name the factors contributing to the formation of haze	
	Explain the formation of radiation fog	
	– Explain the conditions for the development of radiation fog	
	– Describe the significant characteristics of radiation fog, and its vertical extent	
	– Summarise the conditions of the dissipation of radiation fog	
050 04 02 02	**Explain the formation of advection fog**	
	– Explain the conditions for the development of advection fog	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the different possibilities of advection fog formation over land, sea and coastal regions	
	– Describe significant characteristics of advection fog	
	– Explain the causes for dissipation of advection fog	
050 04 02 03	**Explain the formation of steaming fog**	
	– Explain the conditions for the development of steaming fog	
	– Describe significant characteristics of steaming fog	
	– Summarise the condition for the dissipation of steaming fog	
050 04 02 04	**Explain the formation of frontal fog**	
	– Explain the conditions for the development of frontal fog	
	– Deduce significant characteristics of frontal fog	
	– Summarise the conditions for the dissipation of frontal fog	
050 04 02 05	**Summarize the features of orographic fog**	
	– Explain the conditions for the development of orographic fog	
	– Deduce significant characteristics of orographic fog	
	– Summarise the conditions of the dissipation of orographic fog	
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050 05 00 00	**PRECIPITATION**	
050 05 01 00	**Development of precipitation**	
050 05 01 01	**Describe the development of precipitation**	
	– Summarise the outlines of the ”ice particle” (Bergeron-Findeisen) process	
	– Summarise the outlines of the coalescence process	
	– Distinguish between the two processes	
	– Distinguish between the way precipitation develops in the two processes	
	– Describe the atmospheric conditions that favor either process	
	– Explain the development of rain and drizzle	
	– Explain the development of snow	
	– Explain the development of hail	
050 05 02 00	**Types of precipitation**	
050 05 02 01	**Describe the types of precipitation and their relationship with cloud types**	
	– List and describe the types of precipitation given in the TAF and METAR codes	
	– Describe drizzle and rain	
	– State ICAO/WMO approximate diameters for cloud, drizzle and rain drops	
	– Describe snow grains and snow	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe ice pellets	
	– Describe graupel or soft hail	
	– Describe hail	
	– State approximate maximum recorded weights and diameters for hailstones	
	– Describe freezing precipitation	
	– Explain the mechanism for the formation of freezing precipitation	
	– Describe the weather conditions that give rise to freezing precipitation	
	– Distinguish between the types of precipitation generated in convective and stratiform cloud	
	– Assign typical precipitation types and intensities to different clouds	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 06 00 00	**AIRMASSES AND FRONTS**	
050 06 01 00	**Types of Airmasses**	
050 06 01 01	**Summarise and describe the factors affecting the properties of an airmass**	
	– Define an airmass	
	– List the environmental factors that affect the final properties of an air mass	
	– Explain the effect of land or sea source areas	
	– Explain the effect of land or sea tracks	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Explain the effect of passage over cold or warm surfaces	
050 06 01 02	**Summarise the classification of airmasses by areas of origin and by modification on track**	
	– State the classifications of air masses by temperature at source	
	– State the classifications of air masses by track	
	– Name the three areas of origin of the main airmasses that affect Europe	
	– Explain how maritime and continental tracks modify these air masses	
	– State the characteristics weather brought by each of these air masses	
	– Summarise European airmass weather	
	– Explain how air mass weather is affected by the season, the airmass track and by orographic and thermal effects over land	
050 06 02 00	**Describe and explain the weather conditions at fronts**	
050 06 02 01	**Boundaries between airmasses, general situation, geographic differentiation, fronts**	
	– Define a frontal surface and give a general and practical description of a front	
	– Name the global frontal systems	
	– State the approximate latitudes and geographic positions of the global frontal systems	
	– State the classification of fronts by temperature and stability	

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050 06 02 02	**Describe the warm front, with the associated clouds and weather**	
	– Define a warm front	
	– Contrast a warm ana-front with a warm kata-front	
	– Describe the cloud, weather, surface visibility and aviation hazards at a warm kata-front	
	– Describe the cloud, weather, surface visibility and aviation hazards at a warm ana-front	
	– Explain the seasonal differences in the weather at warm fronts	
	– Describe the structure, slope and width of a warm front	
	– Sketch a cross-section of a warm front, showing weather, cloud, tropopause heights, jet streams and aviation hazards	
050 06 02 03	**Describe the cold front, with the associated clouds and weather**	
	– Define a cold front	
	– Contrast a cold ana-front and a cold kata-front	
	– Describe the cloud, weather, surface visibility and aviation hazards at a cold kata-front	
	– Describe the cloud, weather, surface visibility and aviation hazards at a cold ana-front	
	– Explain the seasonal differences in the weather at cold fronts	
	– Describe the structure, slope and width of a cold front	
	– Sketch a cross-section of a cold front, showing weather, cloud, tropopause heights, jet streams and aviation hazards	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 06 02 04	**Describe the warm sector of a polar front depression, with the associated clouds and weather** – Define fronts and air masses associated with the warm sector of a polar front depression – Describe the cloud, weather, surface visibility and aviation hazards in a warm sector – Explain the seasonal differences in the weather in the warm sector – Sketch a cross-section of a warm sector, showing weather, cloud, tropopause heights, jet streams and aviation hazards – Sketch a plan of a warm sector and the cold and warm fronts and illustrate the changes of pressure, temperature and wind as the sector passes	
050 06 02 05	**Describe the weather immediately behind the cold front** – Describe the weather and the development of the surface pressure systems immediately behind the cold front of a polar front depression –	

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	– Sketch a cross-section of cold and warm occlusions, showing weather, cloud, tropopause heights, jet streams and aviation hazards	
	– In a sketch plan illustrate the development of an occlusion in a typical polar front depression, and the movement of the triple point	
050 06 02 07	**Describe stationary fronts with the associated clouds and weather**	
	– Define a stationary or quasi-stationary front	
	– Describe the cloud, weather, surface visibility and aviation hazards in a stationary or quasi-stationary front	
050 06 02 08	**Describe the movements of fronts and pressure systems and the life cycle of a mid latitude low**	
	– State the qualitative rules for predicting the direction of movement and the speed of movement fronts	
	– Explain the difference between the speed of movement of cold and warm fronts	
	– State the qualitative rules for predicting the direction of movement and the speed of movement of polar front depressions	
	– Describe qualitatively, with a sketch if required, the genesis, development and life cycle of a polar front depression	
	– Sketch and describe the initial stage	
	– Sketch and describe the mature stage	
	– Sketch a plan of the mature stage showing the position of the jet streams, the cloud masses and rain belts, linking this to Sections 02 02 to 02 07	
	– Sketch and describe the occluded or dying stage	

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050 07 00 00	**PRESSURE SYSTEMS**	
050 07 01 00	**Location of the principal pressure areas.**	
050 07 01 01	**Define or identify the location of the principal pressure areas.** – Identify or indicate on a map the principal global high pressure areas in January and July – Identify or indicate on a map the principal global low pressure areas in January and July – Explain how these pressure areas are formed – Explain how the pressure areas move with the seasons	
050 07 02 00	**Describe the formation and properties of anticyclones**	
050 07 02 01	**Anticyclones, types, general properties, cold and warm anticyclones, ridges and wedges, subsidence** – List the different types of anticyclone – Describe airmass subsidence, its effect on the environmental lapse rate, and the associated weather – Describe the formation of the different types of anticyclones – Describe the formation of warm anticyclones – Describe the formation of cold anticyclones – Describe the formation of temporary cold anticyclones, ridges and wedges of high pressure	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the properties of the different forms of anticyclones	
	– Describe the properties of and weather associated with warm anticyclones	
	– Describe the properties of and weather associated with cold anticyclones	
	– Describe the properties of and weather associated with ridges and wedges	
050 07 03 00	**Describe the formation and properties of non frontal depressions**	
050 07 03 01	**Describe the formation and properties of thermal, orographic and secondary depressions, cold air pools and troughs.**	
	– Describe the effect of low level convergence and divergence in producing areas of low and high pressure	
	– Describe the formation and properties of thermal depressions	
	– Describe the formation and properties of orographic depressions	
	– Describe the formation and properties of lee lows	
	– Describe the formation and properties of secondary depressions	
	– Describe the formation and properties of cold air pools	
	– Describe the formation and properties of troughs of low pressure	
050 07 04 00	**Describe the formation, properties, life cycle, movement and naming of tropical revolving storms (TRS).**	
050 07 04 01	**Describe the formation, development and properties of TRS**	
	– State the conditions necessary for the formation of TRS	

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	– Name the stages of development of a TRS	
	– Describe the life cycle of a TRS	
	– Explain how a TRS moves during its life cycle	
	– Describe the meteorological conditions in and near a TRS	
050 07 04 02	**State the areas of origin, names, location and times of occurrence of TRS.**	
	– List the areas of occurrence of TRS, and the WMO naming system that applies.	
	– State the expected times of occurrence of TRS in each of the source areas, as a general rule and according to specific regional climatology data	
	– State which source region has the highest incidence of TRSs	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 08 00 00	**CLIMATOLOGY**	
050 08 01 00	**Describe the characteristic weather of the main world climatic zones**	
050 08 01 01	**Describe the general seasonal circulation in the troposphere and lower stratosphere**	
	– Describe the general tropospheric and low stratospheric circulation (Refer to 050 02 03 01)	
	– Describe seasonal differences in the circulation	
	– Describe the formation of belts of surface low and high pressure on the earth	
050 08 01 02	**Describe the typical world climate pattern**	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the typical weather in: – The tropical rain climate – The dry climate – The mid-latitude climate – The sub-arctic climate – The snow climate – Explain how the seasonal movement of the sun generates the transitional climate zones – Describe the typical weather in: – The tropical transitional or Savannah climate – The temperate transitional or Mediterranean climate – State the typical locations of each major climatic zone – Identify or sketch on a map the January and July positions of the ITCZ, the sub-tropical high pressure systems, the continental cold high pressure systems and the mean lines of the polar fronts	
050 08 02 00	**Describe the major elements of Tropical Climatology**	
050 08 02 01	**Describe the cause and mechanism for the development of tropical rain showers. State typical figures for tropical temperatures, humidities and tropopause heights** – State the conditions necessary for the formation of tropical rain showers, Cb and thunderstorms – Explain the formation of convective cloud structures caused by dynamic convergence at the boundary of	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	the NE and SE trade winds and at the ITCZ generally	
	– State typical figures for tropical mean surface air temperatures and humidities, and heights of the zero degree isotherm	
	– State a typical height for the tropical tropopause	
050 08 02 02	**Describe the seasonal variations of weather and winds, and describe typical synoptic situations**	
	– Indicate on a map the ”trade winds” (Refer to 050 08 02 04), and describe the weather	
	– Indicate on a map the ”doldrums” and describe the weather	
	– Indicate on a sketch the ”horse latitudes” and describe the associated weather	
	– Indicate on a map the ”roaring forties” and describe the weather	
	– Indicate on a map the major monsoon winds (Refer to 050 08 02 04 for a description of the weather)	
050 08 02 03	**Intertropical Convergence Zone (ITCZ), weather in the ITCZ and general seasonal movement**	
	– Identify or indicate on a map the positions of the ITCZ in January and July	
	– Explain the seasonal movement of the ITCZ	
	– Describe the weather at the ITCZ	
	– Explain the variations in weather that are found at the ITCZ	
050 08 02 04	**Describe climatic elements relative to the tropical rain climate**	
	– Describe the major monsoon conditions	
	– Explain how the trade winds change character after a long track and become monsoon winds	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Explain the formation of the SW monsoon in West Africa, and describe the weather, stressing the seasonal differences – Explain the formation of the SW monsoon over India and describe the weather, stressing the seasonal differences – Explain the formation of the SW monsoon over the Far East, and describe the weather, stressing the seasonal differences – Explain the formation of the NE monsoon over India and describe the weather, stressing the seasonal differences – Explain the formation of the NE monsoon over the Far East and describe the weather, stressing the seasonal differences – Describe the formation and properties of sandstorms, – Indicate when and where outbreaks of cold polar air can enter sub- tropical weather systems – Name well known examples of polar air outbreaks – Describe the occurrence and effects of tropical revolving storms (Refer to 050 07 04 00**)**	
050 08 02 05	**Describe and explain the formation, global distribution and effect of easterly waves** – Describe and explain the formation of easterly waves and the associated weather – Describe and explain the global distribution of easterly waves – Explain the effect of easterly waves on the tropical weather systems	

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(050 00 00 00 - METEOROLOGY)

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 08 03 00	**Describe typical weather situations in the mid Latitudes**	
050 08 03 01	**Describe the formation of westerly waves and their effect on the climate zones**	
	– Describe and explain the formation of westerly waves	
	– Describe and explain the global distribution of westerly waves	
	– Explain the effect of westerly waves on the positions of the mid latitude weather systems	
050 08 03 02	**Describe the main mid latitude high pressure zones**	
	– Identify or sketch on a map the mid latitude high pressure regions	
	– Name the two main winter mid latitude cold high pressure regions	
	– Describe the weather associated with cold ridges in the polar air (Refer to 050 07 02 01)	
050 08 03 03	**Describe the weather associated with a uniform pressure pattern**	
	– Describe the weather associated with a uniform pressure pattern over continental Europe	
050 08 03 04	**Describe the weather associated with a cold pool**	
	– Describe the weather associated with a cold pool over continental Europe (Refer to 050 07 03 01)	
050 08 04 00	**Describe typical localised seasonal weather patterns and winds**	
050 08 04 01	**Describe the formation of, and weather associated with some well-known winds**	
	– Describe the classical mechanism for the development of Foehn winds	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the weather associated with Foehn winds	
	– Describe the mechanism for the development of large-scale warming winds such as the ”Chinook”	
	– Describe the characteristics of and weather associated with the ”Mistral”	
	– Describe the characteristics of and weather associated with the ”Bora”	
	– Describe the characteristics of and weather associated with the ”Sirocco”, the ”Ghibli” and the ”Khamsin”	
	– Explain the formation of tropical rain showers, called ”Sumatras”, in the Malacca Straits	
	– Explain and describe the weather associated with the ”Pampero”	
	– Describe the ”Harmattan” wind and associated visibility problems	
050 08 05 00	**Interpret and describe the aviation climatology of given routes from the information made available for crew and operators (NB: This topic may be removed in the revised Meteorology syllabus)**	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 09 00 00	**FLIGHT HAZARD**	
050 09 01 00	**Icing**	
050 09 01 01	**Explain the weather conditions for ice accretion, and the topographical effect**	
	– Summarise the general conditions under which ice accretion occurs on aircraft	
	– temperatures of outside air	
	– temperature of the cell	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– presence of supercooled water in clouds or rain – possibility of sublimation – Indicate the general weather conditions under which ice accretion in venturi carburetor occurs – Explain the general weather conditions under which ice accretion on aircraft cell occurs – Explain the formation of supercooled water in clouds and in rain – Explain qualitatively the relationship between the air temperature and the amount of supercooled water – Explain qualitatively the relationship between the type of cloud and the size and number of the droplets, in cumuliform and stratiform clouds – Indicate in which circumstances ice can form on an aircraft on the ground – temperature – humidity – precipitation – Explain in which circumstances ice can form on an aircraft in flight – inside clouds – in precipitation – outside clouds and precipitation – Describe the different factors influencing the intensity of icing	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– the temperature – the amount of supercooled water in a cloud or in precipitation – the speed of the aircraft – the shape (thickness) of the aircraft cell parts (wings, antennas, a.s.o.) – Explain the topographical effects on icing – explain the formation of larger water drops in stratiform orographic clouds	
050 09 01 02	**Define the types of ice accretion** – Define clear ice – Describe the conditions (air temperature, clouds, precipitation) of formation of clear ice – Describe the aspect of clear ice: appearance, weight, solidity – Explain the formation of the structure of clear ice with the release of latent heat during the freezing process. – Define rime ice, – Describe the conditions (air temperature, clouds, precipitation) for formation of rime ice – Describe the aspect of rime ice: appearance, weight, solidity – Define mixed ice – Describe the conditions (air temperature, clouds, precipitation) of formation of mixed ice – Describe the aspect of mixed ice: appearance, weight, solidity	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Define hoar frost. – Describe the conditions of formation of hoar frost – Describe the aspect of hoar frost	
050 09 01 03	**Evaluate the hazards of ice accretion, and recommended avoidance** – Define light, moderate and severe icing – Describe the hazards of icing for each type of ice accretion – effects on weight, balance, aerodynamics, performances, engines (pistons or jets) – effects on visibility, aircraft control, – effects on instrument readings, antennas – Describe the position of the dangerous zones of icing – in cold and warm front – in stratiform and cumuliform clouds – in the different precipitation types – Indicate the possibilities of avoidance – in the flight planning: weather briefing, choice of track and altitude – during the outside check – considering aircraft equipment: de-icing or anti-icing – during flight: recognition of the dangerous zones, choice of appropriate track and altitudes	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– use of weather radar	
050 09 02 00	**Turbulence**	
050 09 02 01	**Describe the effects on flight and turbulence avoidance** – Define light, moderate, severe and extreme turbulence – Describe the effects in flight of turbulence and wind shear – Describe avoidance of turbulence – Indicate how the pilot prepares his flight in order to avoids turbulent zones, with the information received in the weather briefing – Indicate how the pilot can select his track and level to avoid the following turbulent zones: – rough ground surfaces – relief – inversion layers – CB, TS zones – unstable air – Describe how the pilot can avoid turbulence during flight execution: – recognition of the position and risk of the turbulent zones, including turbulence caused by aircraft: (wake turbulence) – adjustment of airspeed, track and altitude – control of the aircraft at low altitude	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 09 02 02	**Describe the effect on flights caused by CAT around the jetstreams, in troughs and in disturbed airflow**	
050 09 03 00	**Windshear**	
050 09 03 01	**Define weather conditions for vertical windshear** – Describe weather conditions where vertical windshear can form	
050 09 03 02	**Define weather conditions for horizontal windshear** – Describe weather conditions where windshear can form (for vertical and horizontal windshear, mostly in combination) – Describe windshear formation in and around CB and supercells – Describe windshear in and around active cold fronts and squall lines – Describe windshear caused by relief – Describe windshear around inversions – Describe windshear around frontal surfaces – Describe windshear above the boundary layer – Describe windshear caused by sea breeze	
050 09 03 03	**Explain the effects of wind shear on flight.** – Describe qualitatively the effects of different types of windshear on flights – Describe windshear effect on the true airspeed,	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe windshear effect on the angle of incidence,.	
	– Describe cross windshear effect	
050 09 04 00	**Thunderstorms**	
050 09 04 01	**Describe the structure of thunderstorm, squall lines, life history, storm cells, electricity in the atmosphere, static charges.**	
	– Assess the average duration of a thunderstorm and its different stages	
	– Describe and sketch the structure of thunderstorms during their most active stage	
	– single cell	
	– supercell thunderstorm.	
	– Define the squall line	
	– weather situation where squall line can be formed	
	– weather conditions in squall lines	
	– occurrence	
	– Define the stages of the life history of a thunderstorm	
	– single cell: initial, mature and dissipating stage	
	– supercell: initial, supercell, tornado and dissipating stage	
	– Describe the electricity in the atmosphere, and static generared by thunderstorms	
	– Describe the basic outline of the electric field in the atmosphere,	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the generation of electrical potential differences in and around a thunderstorms cloud – Describe the "St. Elmo's fire " caused by the static charge of the aircraft, and the discharge of static	
050 09 04 02	**Summarise the conditions and the process of development, the forecast, locations and type specifications** – Describe the different types of thunderstorms, their location, conditions and process of development: – air mass thunderstorms – frontal thunderstorms – squall lines – supercell thunderstorm – orographic thunderstorms – Name the main meteorological signs used to forecast the development of thunderstorms – clouds – vertical temperature lapse rate	
050 09 04 03	**Describe thunderstorm avoidance , ground/airborne radar, stormscope** – Explain how the pilot can anticipate each type of thunderstorms – preflight weather briefing – observation in flight – use of specific meteorological information, and information given by ground weather radar – use of airborne radar	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– use of the stormscope (lightning detector)	
	– Explain avoidance of thunderstorms	
	– Summarise the flight hazards of a fully developed thunderstorms,	
	– Indicate on a sketch the most dangerous zones in and around a thunderstorm	
	– Recommend a general 'philosophy' of pilots in relation with thunderstorms,	
	– Describe practical examples of flight techniques used to avoid the hazards of thunderstorms	
050 09 04 04	**Describe the development and effects of downbursts.**	
	– Define the downburst	
	– Give the typical duration of a downburst	
	– Distinguish between macroburst and microburst.	
	– Describe the process of development of a downburst	
	– from a thunderstorm	
	– in a supercell	
	– around the frontal thunderstorm and squall lines	
	– Explain the appearance of a downburst	
	– Describe the effect of downburst	
	– Describe the different types of windshear which occur if penetrating a downburst	
050 09 04 05	**Describe the development of lightning discharges and the effect of lightning strike on aircraft**	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	and flight execution. – Describe the effect of lightning strike on aircraft and flight execution,	
050 09 05 00	**Tornadoes**	
050 09 05 01	**Describe occurrence of tornadoes** – Describe the tornado – Compare dimensions, conditions and properties of dust devils and tornadoes – Describe the formation of a tornado from a supercell thunderstorm – Estimate the typical features of a tornado, such as appearance, season, daytime, life time, speed of migration and wind speed – Compare the occurrence of tornadoes in Europe with the occurrence in other locations, especially in the United States of America.	
050 09 06 00	**Low and high level inversions**	
050 09 06 01	**Explain the influence of inversions on the aircraft performance.** – Compare the flight hazards during take-off and approach associated to a strong inversion alone and to a strong inversion combined with marked wind shear.	
050 09 07 00	**Stratospheric conditions**	
050 09 07 01	**Describe the tropopause influence on aircraft performance** – Summarise the advantage of stratospheric flights – List the influences of the phenomena associated with the tropopause – wind	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– temperature, air density – turbulence	
050 09 07 02	**Explain the effect of ozone, Radioactivity** – Describe the presence of ozone and radioactivity in the stratosphere – Compare atmospheric radioactivity with other (terrestrial) types of radioactivity. – Describe the dependence of atmospheric radioactivity on latitude and height. – Indicate the danger and the protections used for radioactivity on human flying in the stratosphere	
050 09 08 00	**Hazards in mountainous areas**	
050 09 08 01	**Describe the influence of a mountainous terrain on cloud and precipitation and fronts.** – Describe the Foehn effect – Describe the influence of mountainous area on a frontal passage	
050 09 08 02	**Describe the vertical movements, mountain waves, windshear, turbulence and ice accretion typical of mountain areas** – Describe the formation of an inversion associated with a windshear behind a chain of mountains – Indicate in a sketch of a chain of mountains the turbulent zones: – the mountain waves – the lee wave – the rotor – Explain the influence of relief on ice accretion	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 09 08 03	**Describe the development and effect of valley inversions.** – Describe the formation of valley inversion due to the katabatic winds – Describe the valley inversion formed by warm winds aloft – Describe the effects of a valley inversion for an aircraft in flight	
050 09 09 00	**Visibility reducing phenomena**	
050 09 09 01	**Describe the reduction of visibility caused by mist, smoke, dust, sand and precipitation** – Describe the appearance of the phenomena reducing visibility – mist or haze – smoke – dust – precipitation – sandstorms and low drifting sand	
050 09 09 02	**Describe the reduction of visibility caused by low drifting and blowing snow.**	
JAR-FCL REF NO	**LEARNING OBJECTIVES**	REMARKS
050 10 00 00	**METEOROLOGICAL INFORMATION**	
050 10 01 00	**Observation**	
050 10 01 01	**Describe the meteorological measurements for values on the ground level: surface wind, visibility and runway visual range, transmissometers**	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Define surface wind – List the ICAO units for the wind direction and speed used in the METAR – Define gusts, as given in the METARS – Distinguish wind given in the METAR and wind given by the control tower for take-off and landing – Define ground visibility – Define meteorological visibility – List the units used for meteorological visibility – Define runway visual range – Define RVR and the units of measurement – List the different possibilities to transmit information about RVR to pilots – Compare the meteorological visibility and RVR – Define vertical visibility – Explain briefly how and when it is measured – State how it is transmitted to pilots – Explain the principle of the transmissiometer measurements – Indicate where they are place on the airport – Indicate the means of observing clouds: type, amount, height of base and top, movements – List the clouds considered in the met reports, and how they are indicated in the METAR	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Define "octas" – Define "ceiling" – Define "cloud base" – List the units used for the information about the cloud base – Indicate the means of observation of the present weather, including all types of precipitation, air temperature, relative humidity, dewpoint, atmospheric pressure – Describe the precipitations to be found in TAFs ans METARs – Describe the principle of the most common hygrometer and psychrometer – Describe the principle of the two main types of barometer	
050 10 01 02	**Describe means of upper air observations.** – Describe and interpret the sounding by radiosonde give on a simplified T,P diagram	
050 10 01 03	**Describe the basic outlines of satellite observations and interpretation.** – Name the main uses of satellite pictures in aviation meteorology. – Define the different types of satellite imagery – Interpret qualitatively the satellite pictures in order to get useful information for the flights: – location of fronts – location of jet-streams – distinguish stratiform and cumuliform clouds	
050 10 01 04	**Describe the basic outlines of weather radar observations, ground and airborne, interpretations**	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Describe the basic principle and the type of information given by ground weather radar – Interpret ground weather radar images – Describe the basic principle and the type of information given by airborne weather radar – Describe the limits and the errors of airborne weather radar information – Interpret typical airborne weather radar images	
050 10 01 05	**Summarise aircraft observations and reporting, data link systems, ASDAR sounding, PIREPS.** – Describe, in general, the data link system – Describe the basic outlines of ASDAR (Aircraft to Satellite Data Relay) – Define AIREP or PIREP and PIREP SPECIAL – State the use of AIREP and PIREP in aviation meteorology	
050 10 02 00	**Weather charts**	
050 10 02 01	**Interpret the significant weather charts, tropopause, and maximum wind.** – List the different SWC – Decode the symbols and abbreviations used in the SWC, – front types with direction and speed of movement, – position and direction and speed of movement of pressure centres, – distribution, vertical extent and hazards of cloud formations, – significant weather phenomena, – freezing level,	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– position, direction, speed and height of jet streams, – distribution, height and degree of Clear Air Turbulence, – height of the tropopause, local tropopause minima and maxima, – Describe from a SWC the flight conditions along a defined flight route at a given flight level.	
050 10 02 02	**Describe and interpret surface weather charts.** – Recognize in surface weather charts weather systems in a surface weather chart, – axis of ridges and troughs, – fronts, – frontal side, warm sector and rear side of midlatitude lows, –	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– areas of cold and warm air, – areas with jet streams, – frontal side, warm sector and rear side of midlatitude lows. – Describe forecast upper wind and temperature charts – Determine from forecast wind and temperature charts and designated locations, if necessary by interpolation – the outside air temperature, – the ISA temperature deviation, – the wind direction and wind speed – Name the most common flight level corresponding to the constant pressure charts	
050 10 02 04	**Decode and interpret symbols and signs on analysed (synoptic) and prognostic charts.** – CB, thunderstorms – precipitations – different kind of fronts, squall line – isobars, trough axis – convergence line, intertropical convergence zone. – tropical revolving storm – standing waves – fog, mist, haze, smokes	

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(050 00 00 00 - METEOROLOGY)

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
050 10 03 00	**Information for flight planning.**	
050 10 03 01	**Describe and interpret aeronautical codes: METAR, TAF, SPECI, SIGMET, SNOWTAM, MOTNE runway report.** – Describe and interpret METAR and SPECI – Name the meaning of the abbreviation 'METAR' and 'SPECI' – List, in general, the cases when SPECI is issued – Describe the structure of a METAR and SPECI – Decode all the abbreviations used in the METAR and SPECI – Describe from a METAR flight hazards and their prognosted development. – Name the meaning of a TREND forecast – Describe the structure of a TREND forecast – Decode a TREND forecast – Describe and interpret TAF – Name the meaning of the abbreviation 'TAF'. – Describe the structure of a TAF, – Decode the time groups of a TAF, – Decode all the abbreviations used in the TAF. – Describe from a given TAF flight hazards and their prognosted development.	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– Define and interpret SIGMET – Name the meaning of the term SIGMET – List, in general, the cases when a SIGMET is issued – Decode a issued SIGMET written in clear language – Describe the SNOWTAM Runway Report – Decode, in eneral, the content of a SNOWTAM Runway Report as written in a METAR	
050 10 03 02	**Describe, in general, the meteorological broadcasts for aviation: VOLMET, ATIS, HF-VOLMET, ACARS.** – Summarize the content of a heard VOLMET report. – Decode and interpret the content of a VOLMET report – Summarize the content of a heard ATIS report. – Decode and interpret the content of a ATIS report – Name the meaning of ACARS – Compare, generally, the three weather broadcasts for aviation VOLMET, ATIS and ACARS.	
050 10 03 03	**Apply the content and use of pre-flight meteorological documents on a designated flight route.** – List the most important pre-flight meteorological documents to be used for pre-flight planning. – Name the importance of the different flight informations for the safety and efficiency of the flight – Describe from a compilation of pre-flight documents the useful weather information along a designated flight route at a designated flight altitude	

JAR-FCL REF NO	LEARNING OBJECTIVES	REMARKS
	– icing and turbulence zones, – CAT – thunderstorms, – jet streams, – significant clouds fields, – height of tropopause, with maxima and minima – fronts and their movement	
050 10 03 04	**Describe meteorological briefing and advice.** – List, in general, the information that a flight crew can receive from meteorological services – for preflight planning – during flight.	
050 10 03 04	**Describe measuring and warning systems for low level wind shear, inversion.** – Name two ground warning systems for low level wind shear – Describe the Low Level Wind Shear Alert System (LLWAS) – Describe the basic outlines of terminal doppler weather radar.	
050 10 03 05	**Describe measuring and warning systems for low level windshear, inversion**	
050 10 03 06	**Describe special meteorological warnings**	
050 10 03 07	**Describe, in general, information for computer flight planning**	

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(050 00 00 00 - METEOROLOGY)