APPENDIX 2.0 C TO SOUTH AFRICAN CIVIL AVIATION TECHNICAL STANDARDS (SA-CATS)

SYLLABUS OF THEORETICAL KNOWLEDGE FOR THE INSTRUMENT RATING (AEROPLANE) AND (HELICOPTER).

IMPORTANT NOTES TO THIS SYLLABUS:

1. This appendix specifies the theoretical subject matter required to be known for the Instrument Rating theoretical knowledge examinations.
2. Candidates may be examined on any of the elements included in this appendix that are applicable to the aircraft category licence sought and should be aware of the requirements of SA-CATS 61.01.10 (11)(d) and (e).
3. All compulsory aspects applicable to the respective aircraft category are marked with an "X."
   A mark in the category column "A" represents an aspect applicable to the aeroplane examination and a mark in the category column "H" represents an aspect applicable to the helicopter examination.
4. The column marked "REFERENCE" refers to the applicable section or part in the Regulations (CAR) or source document, when applicable. When a Technical Standard is referred to, this is indicated by the use of the acronym "CATS" or "TS." When a source document other than the Regulations is referred to in this column, this is indicated in plain words as a heading.
5. Candidates are expected to be familiar with all acronyms and abbreviations contained in Subpart 1.01.2 of the Regulations, but will not be directly evaluated on this aspect in the examinations.
6. Candidates are to ensure that they use the most recent amendments to the Regulations, Technical Standards and other technical documentation when preparing for the examinations.
7. The suggested study material to use for preparation for this examination is communicated by Aeronautical Information Circular (AIC) and also posted on the Authority's website where deemed appropriate. This study material is assumed to be the default source material used by candidates and is therefore not referred to in this syllabus. Where reference material clarity is required or additional source material is to be used for specific syllabus aspects, this is stipulated in the relevant portion of the syllabus. Candidates are nevertheless free to use any material they wish in order to ensure their comprehension of the mandated subject matter and to comply with the prescribed theoretical knowledge requirements.
8. Candidates should note that some of the suggested study material might refer to foreign operational, certification and legislative requirements e.g. EU-OPS, JAA-OPS, CS 23 and CS 25. Except where specifically indicated, candidates will not be assessed on such aspects during this examination. The underlying theory, however (which in most cases is identical in South African and international legislation), should be known and understood. Candidates are expected to differentiate between the underlying theoretical concepts which need to be known and the foreign requirements themselves, which need not be known. Such non-compulsory information might nevertheless still be interesting to a candidate for the purposes of personal enrichment and as an aid to general knowledge of aviation developments.
9. For examination study purposes, where any discrepancy exists between the information provided in the RSA AIP and the Regulations, the provisions of the latter shall be regarded as correct. Such a situation may occur naturally due to the delay present in the AIRAC cycle. Similarly, it may also occasionally occur that changes in the AIP are not reflected immediately in this Technical Standard due to the stringent time requirements involved in legislative changes. Such situations can be expected as the natural consequence of the SACAA's attempt to define the syllabus as closely as possible. In these circumstances (for example in the case of numbering changes), candidates are expected to resolve the temporary discrepancy by appropriate, logical cross-referencing between the syllabus and the AIP.
10. Refer to Appendix 2.0 A for the syllabus of theoretical knowledge for the commercial pilot licence.

CATS 61.11.3 TOPIC (i): METEOROLOGY

SYLLABUS ASPECT NUMBER	SYLLABUS ASPECT	AIRCRAFT CATEGORY APPLICABILITY	
		A	H
C.1.1	**THE ATMOSPHERE:**		
	a. Properties, composition and structure.	**X**	**X**

	b. ICAO International standard atmosphere (ISA).	**X**	**X**
	c. ISA deviation.	**X**	**X**
C.1.2	**ATMOSPHERIC PRESSURE:**		
	a. Definition	**X**	**X**
	b. Measurement and units in use (Pa, hPa/mb/inches mercury/millimetres mercury)	**X**	**X**
	c. QNH, QFE, and QNE/pressure altitude	**X**	**X**
	d. Pressure variation with height and diurnal variation	**X**	**X**
	e. Isobars	**X**	**X**
	f. Pressure gradient	**X**	**X**
	g. Low-pressure systems:		
	• Characteristics and related terminology	**X**	**X**
	• Typical cyclonic weather	**X**	**X**
	h. High-pressure systems:		
	• Characteristics and related terminology	**X**	**X**
	• Typical anti-cyclonic weather	**X**	**X**
	i. Cols and associated weather	**X**	**X**
C.1.3	**TEMPERATURE**		
	a. Units in use and conversion between units	**X**	**X**
	b. Heating of the atmosphere and heat transfer processes:		
	• Insolation	**X**	**X**
	• Radiation, conduction, convection	**X**	**X**
	c. Advection	**X**	**X**
	d. Diurnal variation of temperature	**X**	**X**
C.1.4	**HUMIDITY**		
	a. Atmospheric water and changes of state	**X**	**X**
	b. Latent heat	**X**	**X**
	c. Saturation, vapour pressure and dew point temperature	**X**	**X**
	d. Measurement of humidity:		
	• Absolute humidity	**X**	**X**
	• Relative humidity	**X**	**X**
C.1.5	**DENSITY**		
	a. Definition	**X**	**X**
	b. Factors affecting density:		

	• Temperature	X	X
	• Pressure	X	X
	• Altitude	X	X
	• Humidity	X	X
	c. Density altitude:		
	• Definition	X	X
	• Calculating density altitude	X	X
C.1.6	**ALTIMETRY**		
	a. Variation of atmospheric pressure levels with changing pressure and temperature.	X	X
	b. Calculations involving pressure and temperature corrections.	X	X
	c. Calculating true altitude.	X	X
C.1.7	**WIND**		
	a. Veering and backing.	X	X
	b. Wind direction and speed	X	X
	c. Formation of wind:		
	• Pressure gradient force	X	X
	• Coriolis effect	X	X
	• Geostrophic wind and Buys Ballot's law	X	X
	• Gradient wind	X	X
	• Surface wind	X	X
	• Diurnal variation of wind	X	X
	d. Upper winds:		
	• General global upper air circulation	X	X
	• Thermal winds	X	X
	• Jet stream winds	X	X
	• CAT (Clear Air Turbulence)	X	X
C.1.8	**CLOUDS**		
	a. Cloud observations and measurement:		
	• Cloud amount	X	X
	• Definitions of cloud ceiling and cloud base	X	X
	b. Cloud formation:		
	• Convective	X	X
	• Orographic	X	X

	• Frontal	X	X
	• Convergent	X	X
	• Turbulent	X	X
	c. Cloud classification	X	X
	d. Cloud types	X	X
	e. Flying conditions in the different types of clouds	X	X
C.1.9	**PRECIPITATION**		
	a. Types of precipitation	X	X
	b. Intensity of precipitation	X	X
	c. Continuity of precipitation	X	X
	d. Flying conditions in the different types of precipitation	X	X
C.1.10	**THUNDERSTORMS**		
	a. Formation conditions for development	X	X
	b. Classification:		
	• Convective	X	X
	• Orographic	X	X
	• Convergent	X	X
	• Frontal	X	X
	• Nocturnal	X	X
	c. Severe thunderstorms and Squall lines	X	X
	d. The three stages of thunderstorm development	X	X
	e. Hazards:		
	• Windshear and turbulence	X	X
	• Microbursts	X	X
	• Hail	X	X
	• Icing	X	X
	• Lightning	X	X
	f. Avoidance and penetration.	X	X
C.1.11	**ICE ACCRETION**		
	a. Airframe icing:		
	- Condition for formation and factors affecting its severity	X	X
	- Kinetic heating formula	X	X
	b. Types of icing:		

	• Clear (glaze) ice	X	X
	• Rime ice	X	X
	• Mixed ice	X	X
	• Freezing precipitation and rain ice	X	X
	e. Piston engine icing:		
	• Impact icing	X	X
	• Fuel icing	X	X
	f. Carburettor icing: cause, recognition, prevention	X	X
	g. Gas turbine engine icing.	X	X
	h. ICAO definitions for levels of icing:		
	• Light	X	X
	• Moderate	X	X
	• Severe	X	X
	i. Ice protection:		
	• Anti-icing and de-icing	X	X
	• Hazards	X	X
C.1.12	**TURBULENCE**		
	a. Definition, types and causes	X	X
	b. Mountain waves and associated turbulence:		
	• Conditions for formation and dangers	X	X
	• Visual detection of mountain waves	X	X
C.1.13	**VISIBILITY**		
	a. Definition and measurement	X	X
	b. Types of visibility restrictions and their definitions: mist, fog, haze, glare, smog, dust and sand	X	X
	c. Slant visibility	X	X
	d. Runway visual range (RVR):	X	X
	e. Definition and measurement	X	X
	f. Fog:		
	• Radiation fog	X	X
	• Advection fog	X	X
	• Frontal fog	X	X
	• Orographic (upslope)	X	X
	• Steam fog	X	X

C.1.14	**FRONTS**		
	a. Mid-latitude (temperate) cyclones.	**X**	**X**
	b. Cold fronts:		
	• Formation, characteristics and weather	**X**	**X**
	• Changes with the passage of the front	**X**	**X**
	• Flying conditions and penetration procedures	**X**	**X**
	c. Warm fronts:		
	• Formation, characteristics and weather	**X**	**X**
	• Changes with the passage of the front	**X**	**X**
	• Flying conditions and penetration procedures	**X**	**X**
C.1.15	**REGIONAL CLIMATOLOGY**		
	a. ITCZ: characteristics, weather and seasonal movement.	**X**	**X**
	b. General African climate and significant weather	**X**	**X**
C.1.16	**SOUTH AFRICAN WEATHER**		
	a. South African climate and climatic regions	**X**	**X**
	b. South African summer patterns	**X**	**X**
	c. South African winter patterns	**X**	**X**
	d. South African weather phenomena:	**X**	**X**
	• Mid-latitude (temperate) cyclones (frontal systems)	**X**	**X**
	• Hurricanes (Tropical cyclones).	**X**	**X**
	• Coastal lows	**X**	**X**
	• The South Westerly Buster	**X**	**X**
	• Easterly weather (the Guti)	**X**	**X**
	• The Cape Doctor	**X**	**X**
	• Cut-off lows and the Black South Easter	**X**	**X**
C.1.17	**METEOROLOGICAL INFORMATION**		
	a. Weather analysis:	**X**	**X**
	• Synoptic weather charts and symbols	**X**	**X**
	• Significant (prognostic) weather charts	**X**	**X**
	b. Upper winds and temperatures fixed time prognostic charts (South African and international)	**X**	**X**
	c. Interpretation of:		
	• METAR	**X**	**X**
	• TAF	**X**	**X**

	• SPECI	X	X
	• SIGMET/ AIRMET/ SPECIAL AIR REPORT	X	X
	d. Meteorological broadcast for aviation:		
	• ATIS	X	X
CATS 61.11.3 TOPIC (ii): RADIO NAVIGATION			
SYLLABUS ASPECT NUMBER	**SYLLABUS ASPECT**	**AIRCRAFT CATEGORY APPLICABILITY**	
		A	**H**
C.2.1	**VHF DIRECTION FINDER (VDF) / GROUND DIRECTIONAL FINDER:**		
	a. Principles	X	X
	b. Coverage and range	X	X
C.2.2	**NDB/ADF:**		
	a. Principles	X	X
	b. Presentation and interpretation	X	X
	c. Coverage and range	X	X
	d. Errors and accuracy	X	X
	e. Factors affecting range and accuracy	X	X
C.2.3	**VOR AND DOPPLER VOR**		
	a. Principles	X	X
	b. Presentation and interpretation	X	X
	c. Coverage and range	X	X
	d. Errors and accuracy	X	X
C.2.4	**DME**		
	a. Principles	X	X
	b. VOR/DME	X	X
	c. VORTAC	X	X
	d. Presentation and interpretation	X	X
	e. Coverage and range	X	X
	f. Errors and accuracy	X	X
	g. Factors affecting range and accuracy	X	X
C.2.5	**ILS**		

	a. Principles	**X**	**X**
	b. Presentation and interpretation	**X**	**X**
	c. Coverage and range	**X**	**X**
	d. Errors and accuracy	**X**	**X**
	e. Factors affecting range and accuracy	**X**	**X**
C.2.6	**AIRBORNE WEATHER RADAR**		
	a. Principles	**X**	**X**
	b. Presentation and interpretation	**X**	**X**
	c. Coverage and range	**X**	**X**
	d. Errors, accuracy and limitations	**X**	**X**
	e. Factors affecting range and accuracy	**X**	**X**
	f. Application to navigation	**X**	**X**
C.2.7	**SECONDARY RADAR AND TRANSPONDER**		
	a. Principles	**X**	**X**
	b. Modes and codes	**X**	**X**
	c. Presentation and interpretation	**X**	**X**
	d. Errors and accuracy	**X**	**X**
C.2.8	**GLOBAL NAVIGATION SATELLITE SYSTEM**		
	a. Principles	**X**	**X**
	b. Operation of NAVSTAR GPS	**X**	**X**

CATS 61.11.3 Topic (iii)
AIR LAW AND ALL WEATHER OPERATIONS

SYLLABUS ASPECT NUMBER	**SYLLABUS ASPECT**	**AIRCRAFT CATEGORY APPLICABILITY**	
		A	**H**
C.3.1	**SOUTH AFRICAN CIVIL AVIATION REGULATIONS**		
	a. Part 1.01.1 Definitions		
	- Adequate aerodrome	**X**	**X**
	- Aerodrome	**X**	**X**
	- Aerodrome operating minima	**X**	**X**
	- Aeronautical information publication	**X**	**X**
	- Aircraft flight manual	**X**	**X**

	- Aircraft operating manual	X	X
	- Airmanship	X	X
	- All weather operations	X	X
	- Alternate aerodromes	X	X
	- Altitude	X	X
	- Approach and landing operation with vertical guidance	X	X
	- BARO VNAV system	X	X
	- Category I (CAT I) operation	X	X
	- Category II (CAT II) operation	X	X
	- Category IIIA (CAT IIIA) operation	X	
	- Category IIIB (CAT IIIB) operation	X	
	- Category IIIC (CAT IIIC) operation	X	
	- Ceiling	X	X
	- Circling approach	X	
	- Class A, B, C, D, E, F, G airspace	X	X
	- Cloud break procedure	X	X
	- Cloud ceiling	X	X
	- Communication failure procedure	X	X
	- Competency	X	X
	- Controlled flight	X	X
	- Critical phase of flight	X	X
	- Current flight plan	X	X
	- Decision altitude/height	X	X
	- Electronic flight bag	X	X
	- En-route safe altitude	X	X
	- Estimated off-block time	X	X
	- Estimated time of arrival (IFR)	X	X
	- Expected approach time	X	X
	- Extended range operations	X	
	- Final approach	X	X
	- Final approach and take-off area		X
	- Final approach fix	X	X
	- Flight	X	X

	- Flight level	X	X
	- Flight time	X	X
	- General aviation operation	X	X
	- Full flight simulator	X	X
	- GNSS	X	X
	- GNSS incident	X	X
	- Ground visibility	X	X
	- Hazard	X	X
	- Height	X	X
	- Heliport operating minima		X
	- Human factors principles	X	X
	- Human performance	X	X
	- Initial approach fix	X	X
	- Initial approach segment	X	X
	- instrument approach and landing operation	X	X
	- Instrument approach procedure	X	X
	- Instrument flight time	X	X
	- Instrument ground time	X	X
	- Instrument time	X	X
	- Instrument meteorological conditions	X	X
	- Integrated aeronautical information package	X	X
	- Isolated aerodrome	X	X
	- Lateral navigation	X	X
	- Level	X	X
	- Low visibility procedures	X	X
	- Low visibility take-off	X	X
	- Manoeuvring area	X	X
	- Meteorological information	X	X
	- Meteorological service	X	X
	- Minimum descent altitude / height	X	X
	- Missed approach point	X	X
	- Missed approach procedure	X	X
	- Movement area	X	X

	- Navigation specification	X	X
	- Night	X	X
	- Non-precision approach	X	X
	- Notice to airmen	X	X
	- Obstacle clearance altitude / height	X	X
	- Operator	X	X
	- Owner	X	X
	- Performance based navigation	X	X
	- Precision approach	X	X
	- Precision approach and landing operation	X	X
	- Pressure altitude	X	X
	- Primary-means navigation system	X	X
	- Problematic use of psychoactive substances	X	X
	- Psychoactive substances	X	X
	- RAIM warning	X	X
	- Receiver Autonomous Integrity Monitoring	X	X
	- Required navigation performance	X	X
	- RNP Type	X	X
	- RNAV/BARO VNAV procedures	X	X
	- RNAV specification	X	X
	- RNP specification	X	X
	- RNP type	X	X
	- Runway	X	X
	- Runway-holding position	X	X
	- Runway incursion	X	X
	- Runway visual range	X	X
	- Safety pilot	X	X
	- Separate runways	X	X
	- SIGMET information	X	X
	- Special VFR flight	X	X
	- Suitable aerodrome	X	X
	- Supplemental-means navigation system	X	X
	- Take-off alternate aerodrome	X	X

	- Terminal arrival altitude	X	X
	- Threat	X	X
	- Threat management	X	X
	- Total estimated elapsed time	X	X
	- Total vertical error	X	X
	- Track	X	X
	- Traffic alert and collision avoidance system	X	X
	- Traffic avoidance advice	X	X
	- Transition altitude	X	X
	- Transition level	X	X
	- Vertical navigation	X	X
	- Visibility	X	X
	- Visual approach	X	X
	- Visual flight rules flight	X	X
	- Visual meteorological conditions	X	X
	b. PART 61: PILOT LICENSING		
	• **SUBPART 1: GENERAL**		
	- 61.01.8 Logging of flight time (Paragraphs: 9, 11, 12, 17, 18)	X	X
	- 61.01.9 Crediting of flight time and theoretical knowledge (Paragraphs: 12, 14, 15, 25)	X	X
	- 61.01.12 Flight simulation training device	X	X
	- 61.01.15 Training for acquiring licence, rating or validation	X	X
	• **SUBPART 11 INSTRUMENT RATING**		
	- 61.11.1 General	X	X
	- 61.11.2 Requirements	X	X
	- 61.11.4 Skills test	X	X
	- 61.11.5 Privileges and limitations of an instrument rating	X	X
	- 61.11.6 Period of validity	X	X
	- 61.11.7 Revalidation	X	X
	c. PART 91: GENERAL AVIATION AND OPERATING FLIGHT RULES		
	- 91.01.1 Applicability	X	X
	- 91.01.12 Use of time	X	X
	- 91.01.16 Psychoactive substances	X	X
	- 91.02.1 Crew composition and qualifications	X	X

	- 91.02.3 Crew member responsibilities	X	X
	- 91.02.4 Recency	X	X
	- 91.02.6 Laws, regulations and procedures	X	X
	- 91.02.7 Duties of PIC regarding flight preparation	X	X
	- 91.02.8 Duties of PIC regarding flight operations	X	X
	- 91.03.4 Air traffic service flight plan and associated procedures (Paragraph: 7)	X	X
	- 91.04.1 Use and installation of instruments and equipment	X	X
	- 91.04.5 Flight, navigation and associated equipment for aircraft operated under IFR	X	X
	- 91.04.6 Additional equipment for single-pilot operation under IMC or at night	X	X
	- 91.04.9 Equipment for operations in icing conditions	X	X
	- 91.04.15 Supplemental oxygen in case of pressurized aircraft	X	X
	- 91.04.28 Airborne collision avoidance system	X	X
	- 91.04.30 - Terrain awareness and warning systems (TAWS)	X	X
	- 91.04.31 RVSM operations	X	
	- 91.05.1 Communication equipment	X	X
	- 91.05.2 Navigation equipment	X	X
	- 91.05.3 Use of global navigation satellite system	X	X
	- 91.05.4 Operational criteria for use of RNAV/BARO VNAV systems	X	X
	- 91.06.9 Aircraft speed	X	X
	- 91.06.18 Compliance with rules of air and air traffic control clearances and instructions	X	X
	- 91.06.21 Visibility and distance from cloud *(Paragraphs: 1a, 2)*	X	
	- 91.06.21 Visibility and distance from cloud *(Paragraph: 1b)*		X
	- 91.06.22 Special VFR weather minima *(Paragraph: 1)*	X	
	- 91.06.22 Special VFR weather minima *(Paragraph: 2)*		X
	- 91.06.23 VFR flight determination and weather deterioration	X	X
	- 91.06.24 Compliance with IFR	X	X
	- 91.06.25 Aircraft equipment	X	X
	- 91.06.26 Change from IFR flight to VFR flight	X	X
	- 91.06.27 IFR procedures	X	X
	- 91.06.32 Minimum heights *(Paragraph: 3)*	X	X

	- 91.06.33 Semi-circular rule	X	X
	- 91.06.34 Aerodrome approach and departure procedures	X	X
	- 91.07.2 Minimum flight altitudes	X	X
	- 91.07.3 Use of aerodromes	X	X
	- 91.07.5 Aerodrome operating minima	X	X
	- 91.07.6 Threshold crossing height	X	X
	- 91.07.7 Pre-flight selection of aerodromes	X	X
	- 91.07.8 Planning minima for IFR flights	X	X
	- 91.07.9 Meteorological conditions	X	X
	- 91.07.12 Fuel supply	X	X
	- 91.07.15 Instrument approach and departure procedures	X	X
	- 91.07.25 Approach and landing conditions	X	X
	- 91.07.26 Approach ban	X	X
	- 91.07.31 Simulated instrument flight in aircraft	X	X
C.3.2	**SOUTH AFRICAN CIVIL AVIATION TECHNICAL STANDARDS**		
	SA-CATS 91 General Aviation and Operating Flight Rules		
	- TS 91.03.3 Aircraft Checklists	X	X
	- TS 91.04.28 Airborne Collision Avoidance System	X	X
	- TS 91.05.1 Communication equipment - *Paragraph: 5*	X	X
	- TS 91.05.2 Navigation equipment *(Paragraph: 1)*	X	X
	- TS 91.05.3 Use of global navigation satellite system	X	X
	- TS 91.06.16 Mandatory radio communications in controlled airspace *(Radio communication failure (RCF) procedures – General)* *(RCF procedures – IFR)*	X	X
	- TS 91.07.2 Minimum flight altitudes	X	X
	- TS 91.07.5 Aerodrome operating minima	X	X
	- TS 91.07.7 Preflight selection of aerodromes	X	X
	- TS 91.07.8 Planning Minima for IFR flights	X	X
	- TS 91.07.12 Fuel supply	X	X
C.3.3	**ICAO Document 8168 Procedures for Air Navigation Services – Volume I Flight Procedures**		
	a. Part I FLIGHT PROCEDURES — GENERAL		
	• **Section 1, Chapter 1 Definitions:**		
	- Aerodrome elevation	X	X
	- Airborne collision avoidance system (ACAS)	X	X

	- Altitude	X	X
	- Area navigation (RNAV)	X	X
	- Base turn	X	X
	- Circling approach.	X	X
	- Continuous descent final approach (CDFA)	X	X
	- Decision altitude (DA) or decision height (DH)	X	X
	- Descent fix	X	X
	- DME distance	X	X
	- Elevation	X	X
	- Final approach segment (FAS)	X	X
	- Flight Level (FL)	X	X
	- GBAS landing system (GLS)	X	X
	- Height	X	X
	- Holding fix	X	X
	- Holding procedure	X	X
	- Hot Spot	X	X
	- Initial approach fix (IAF)	X	X
	- Initial approach segment	X	X
	- Instrument approach procedure (IAP)	X	X
	- Intermediate approach segment	X	X
	- Intermediate fix (IF)	X	X
	- Localizer performance with vertical guidance (LPV)	X	X
	- Minimum descent altitude (MDA) or minimum descent height (MDH)	X	X
	- Minimum en-route altitude (MEA)	X	X
	- Minimum obstacle clearance altitude (MOCA).	X	X
	- Minimum sector altitude (different from the SA MSA)	X	X
	- Missed approach holding fix (MAHF)	X	X
	- Missed approach point (MAPt)	X	X
	- Missed approach procedure	X	X
	- Obstacle clearance altitude (OCA) or obstacle clearance height(OCH)	X	X
	- Procedure turn	X	X
	- Racetrack procedure	X	X
	- Reference datum height (RDH)	X	X

	- Required navigation performance (RNP)		**X**	**X**
	- Reversal procedure		**X**	**X**
	- Standard instrument arrival (STAR)		**X**	**X**
	- Standard instrument departure (SID)		**X**	**X**
	- Terminal Arrival Altitude (TAA)		**X**	**X**
	- Transition altitude		**X**	**X**
	- Transition layer		**X**	**X**
	- Transition level		**X**	**X**
	- Vertical path angle (VPA)		**X**	**X**
	- Visual manoeuvring (circling) area		**X**	**X**
	- Waypoint		**X**	**X**
	• **PART I Section 2** **General principles**			
	Chapter 1	General Information *Paragraphs: 1.1, 1.2*	**X**	**X**
	• **PART I Section 3** **Departure procedures**			
	Chapter 1	General criteria for departure procedures	**X**	**X**
	Chapter 2	Standard instrument departures	**X**	**X**
	Chapter 3	Omnidirectional departures	**X**	**X**
	Chapter 4	Published information for departures	**X**	**X**
	• **PART I Section 4** **Arrival and approach procedures**			
	Chapter 1	General criteria for arrival and approach procedures	**X**	**X**
	Chapter 2	Arrival Segment	**X**	**X**
	Chapter 3	Initial Approach Segment	**X**	**X**
	Chapter 4	Intermediate Segment	**X**	**X**
	Chapter 5	Final Approach Segment	**X**	**X**
	Chapter 6	Missed Approach Segment	**X**	**X**
	Chapter 7	Visual (Circling) Manoeuvring Area	**X**	**X**
	• **PART I Section 6** **Holding procedures**			
	Chapter 1	Holding Criteria	**X**	**X**
	Chapter 2	Obstacle Clearance	**X**	**X**
	• **PART I Section 8** **Procedures for use by helicopters**			
	Chapter 1	Introduction		**X**
	Chapter 2			**X**
	Chapter 3			**X**

	b. PART II - FLIGHT PROCEDURES — RNAV AND SATELLITE-BASED			
	• **Section 1 GENERAL**			
	Chapter 1	General information for RNAV systems	**X**	**X**
	Chapter 2	Terminal arrival altitude (TAA)	**X**	**X**
	Chapter 3	General information for basic GNSS	**X**	**X**
	Chapter 4 (4.1 to 4.2.3.1, 4.3.1)	General information for satellite-based augmentation system (SBAS)	**X**	**X**
	Chapter 5	General information for ground-based augmentation system (GBAS)	**X**	**X**
	• **Section 2 DEPARTURE PROCEDURES**			
	Chapter 1	Area navigation (RNAV) departure procedures for navigation systems using basic GNSS receivers	**X**	**X**
	Chapter 2	Area navigation (RNAV) departure procedures for satellite-based augmentation system (SBAS)	**X**	**X**
	Chapter 4	Area navigation (RNAV) departure procedures and RNP-based departure procedures	**X**	**X**
	• **Section 3 ARRIVAL AND NON-PRECISION APPROACH PROCEDURES**			
	Chapter 1 (1.1 to 1.4)	Area navigation (RNAV) arrival and approach procedures for navigation systems using basic GNSS receivers	**X**	**X**
	Chapter 2	Area navigation (RNAV) arrival and approach procedures based on DME/DME	**X**	**X**
	Chapter 3	Area navigation (RNAV) arrival and approach procedures based on VOR/DME	**X**	**X**
	Chapter 5	Area navigation (RNAV) arrival and approach procedures based on GBAS	**X**	**X**
	• **Section 4 APPROACH PROCEDURES WITH VERTICAL GUIDANCE**			
	Chapter 1 (Tables II-4-1-1 & Table II-4-1-2 not required to be memorized)	APV/BARO-VNAV approach procedures	**X**	**X**
	Chapter 2 (2.1.1, 2.2, 2.4.2)	Area navigation (RNAV) arrival and approach procedures based on SBAS	**X**	**X**
	• **Section 5 PRECISION APPROACH PROCEDURES**			
	Chapter 1	GBAS precision approach procedures	**X**	**X**
	• **Section 6 RNAV HOLDING**			
	Chapter 1 (only 1.1)	General	**X**	**X**
	• **Section 7 EN ROUTE**			
	Chapter 1 (1.2 only)	Area navigation (RNAV) and RNP-based en-route procedures	**X**	**X**
	c. PART III **Aircraft operating procedures**			
	Section 1	Altimeter setting procedures	**X**	**X**
C.3.4	**RSA Aeronautical Information Publication (AIP)**			

	ENR 1.4	ATS Airspace classification	**X**	**X**
	ENR 1.5	1.5.1 General	**X**	**X**
		1.5.2 Arriving Flights	**X**	**X**
		1.5.10 Departing flights General	**X**	**X**
		1.5.10.1 Noise abatement procedures	**X**	
	ENR 1.6	1.6.1 Primary Radar	**X**	**X**
		1.6.2 Secondary Surveillance Radar *(excl 1.6.2.3.4 & 1.6.2.3.5)*	**X**	**X**
	ENR 1.7	South African AIP ALTIMETER SETTING PROCEDURES *(excl 1.7.3 b.)*	**X**	**X**
	ENR 1.8	Regional Supplementary Procedures (excluding Example table under 1.8.1.2.7; Table 2 under 1.8.3; Minima under Tables 4 (Notes should be known); Minima under Table 5 (Notes should be known); Minima under Table 6 (Notes should be known); Table 7; Paragraph 1.8.4.5 Responsibility of Duty Airport Manager)	**X**	**X**
	AD section	Interpretation of information provided by the AIP Aerodrome (AD) section: • AERODROME • SID • STAR • ILS approach • VOR approach • NDB approach • RADAR TERRAIN CLEARANCE • RNAV / GNSS (Candidates should take note of the information in RSA AIP GEN section 2.2 for AIP abbreviations and section 2.3 for Chart symbols)	**X**	**X**
C.3.5	**JEPPESEN MANUAL**			
	Interpretation of information provided by the JEPPESEN manual: • AIRPORT • SID • STAR • ILS approach • VOR approach • NDB approach • AREA • RADAR MINIMUM ALTITUDE		**X**	**X**
C.3.6	**JEPPESEN HIGH / LOW ALTITUDE ENROUTE CHARTS**			
	a. Recognition and knowledge of:			
	- Air route structure		**X**	**X**
	- MEA, MOCA, MORA, Grid MORA		**X**	**X**
	- airspace structure and classification		**X**	**X**
	- communication frequencies		**X**	**X**

	- chart symbols	**X**	**X**
	- danger, restricted and prohibited airspace	**X**	**X**
	- en route holding patterns	**X**	**X**
	- aerodrome information	**X**	**X**
	- radio navigation facilities and frequencies	**X**	**X**
C.3.6	**ICAO ANNEX 14 – AERODROMES** **Volume I Aerodrome Design and Operations**		
	a. Definitions		
	- Barrette	**X**	**X**
	- Instrument runway (All types are to be known)	**X**	**X**
	- Primary runway(s)	**X**	**X**
	a. Chapter 2 Aerodrome data		
	- 2.2 Aerodrome reference point	**X**	**X**
	- 2.3 Aerodrome and runway elevation	**X**	**X**
	b. Chapter 5 Visual aids for navigation	**X**	**X**
	• **5.2 Markings**		
	- 5.2.1 General	**X**	**X**
	- 5.2.2 Runway designation marking	**X**	**X**
	- 5.2.3 Runway centre line marking	**X**	**X**
	- 5.2.4 Threshold marking (including displaced threshold marking)	**X**	**X**
	- 5.2.5 Aiming point marking	**X**	**X**
	- 5.2.6 Touchdown zone marking	**X**	**X**
	- 5.2.7 Runway side stripe marking	**X**	**X**
	- 5.2.8 Taxiway centre line marking	**X**	**X**
	- 5.2.10 Runway-holding position marking	**X**	**X**
	- 5.2.11 Intermediate holding position marking	**X**	**X**
	5.3 Lights		
	- 5.3.4 Approach lighting systems	**X**	**X**
	- 5.3.5 Visual approach slope indicator systems	**X**	**X**
	- 5.3.7 Runway lead-in lighting systems	**X**	**X**
	- 5.3.8 Runway threshold identification lights	**X**	**X**
	- 5.3.9 Runway edge lights	**X**	**X**
	- 5.3.10 Runway threshold and wing bar lights	**X**	**X**
	- 5.3.11 Runway end lights	**X**	**X**

	- 5.3.12 Runway centre line lights	**X**	**X**
	- 5.3.13 Runway touchdown zone lights	**X**	**X**
	- 5.3.16 Stopway lights	**X**	**X**
	- 5.3.17 Taxiway centre line lights	**X**	**X**
	- 5.3.20 Stop bars	**X**	**X**
	- 5.3.21 Intermediate holding position lights	**X**	**X**
CATS 61.11.3 Topic (iv): FLIGHT PERFORMANCE AND PLANNING			
SYLLABUS ASPECT NUMBER	**SYLLABUS ASPECT**	**AIRCRAFT CATEGORY APPLICABILITY**	
		A	**H**
C.4.1	**BASIC AERODYNAMIC THEORY:**		
	a. Definitions, terminology and concepts:		
	- Wing characteristics: Angle of attack, chord line, camber	**X**	**X**
	- Lift, weight, thrust	**X**	**X**
	- Graph: Coefficient of lift/ Angle of attack	**X**	**X**
	- Drag types: induced, profile, form, parasite, skin friction, interference	**X**	**X**
	- Ground effect	**X**	**X**
C.4.2	**PERFORMANCE TERMINOLOGY AND THEORY**		
	- Define “steady” flight	**X**	**X**
	- The forces during steady climbing and descending flight	**X**	**X**
	- The opposing forces during horizontal steady flight	**X**	**X**
	- The “thrust/power required" and "thrust/power available” graph curves	**X**	**X**
	- The effect of excess thrust and excess power on speed and/or climb performance	**X**	**X**
	- Climb angle and climb gradient	**X**	**X**
	- Flight path angle and flight path gradient	**X**	**X**
	- Descent angle and descent gradient	**X**	**X**
	- Service and absolute ceiling	**X**	
C.4.3	**RANGE AND ENDURANCE PERFORMANCE**		
	a. **Range and endurance**		
	• **Flying for range**	**X**	
	- Propeller propulsion	**X**	
	- Jet propulsion	**X**	

	- Helicopters		**X**
	• **Flying for endurance**		
	- Propeller propulsion	**X**	
	- Jet propulsion	**X**	
	- Helicopter		**X**
C.4.4	**AIRSPEED TERMINOLOGY AND SYMBOLS**		
	a. IAS, RAS / CAS), TAS, GS (groundspeed)	**X**	**X**
	b. VA, VNO, VNE, VX, VY	**X**	**X**
	c. VS, VS1, VSO, VFO, VFE, VLO, VLE, VMO, VS1g, VSR, VSR0, VSR1	**X**	
	d. VMCG, VMCA, VMC, V1, VR, V2, VREF, VLOF, VMBE	**X**	
C.4.5	**METEOROLOGICAL TERMINOLOGY**		
	a. International Standard Atmosphere (ISA)	**X**	**X**
	b. OAT, IOAT, TAT, SAT, RAT	**X**	**X**
	c. Temperature deviation from ISA	**X**	**X**
	d. Pressure altitude, Density altitude	**X**	**X**
	e. QNH, QFE, QNE	**X**	**X**
C.4.6	**FACTORS AFFECTING AIRCRAFT PERFORMANCE**		
	- Temperature	**X**	**X**
	- Air density	**X**	**X**
	- Aircraft mass	**X**	**X**
	- Aeroplane configuration	**X**	
	- Aeroplane antiskid system status	**X**	
	- Aircraft centre of gravity	**X**	**X**
	- Aerodrome runway surface	**X**	
	- Aerodrome runway slope	**X**	
	- The effect of flap settings	**X**	
	- The effects of different recommended power settings on range and endurance	**X**	**X**
	- The effect of wind and altitude on range and endurance	**X**	**X**
	- The effect of the wind component on take-off and landing performance	**X**	
	- The effect of mass, wind and speed on descent performance	**X**	
C.4.7	**AEROPLANE PERFORMANCE CLASSIFICATION**		
	South African Civil Aviation Regulations		
	a. Part 91.08 Performance Operating Limitations:		

	- Part 91.08.1 General provisions	**X**	
	- Part 91.08.4 Aeroplane performance classification	**X**	
	- Part 91.08.5 Performance limitations Class A and Class C aeroplanes	**X**	
	- SACATS 91.08.5 Performance limitations Class A and Class C aeroplanes	**X**	
C.4.8	**HELICOPTER PERFORMANCE CLASSIFICATION**		
	a. South African Civil Aviation Regulations		
	• **Part 1.01.1 Definitions**		
	- Operations in performance Class 1		**X**
	- Operations in performance Class 2		**X**
	- Operations in performance Class 3		**X**
	• **Part 91: General Aviation and Operating Flight Rules**		
	- Part 91.08.1 General provisions		**X**
	- Part 91.08.2 Helicopter operating limitations		**X**
	- Part 91.08.3 Helicopter performance classification		**X**
C.4.9	**STAGES OF FLIGHT**		
	- **Take-off**	**X**	**X**
	- **Climb**	**X**	**X**
	- **Level Flight**	**X**	**X**
	- **Descending**	**X**	**X**
	- **Approach and landing**	**X**	**X**
C.4.10	**CALCULATION OF PET and PNR**		
	- PET (point of equal time)	**X**	**X**
	- CP (critical point)	**X**	
	- PNR (point of no return)	**X**	**X**
	- PSR (point of safe return)	**X**	
C.4.11	**SPECIFIC PERFORMANCE**		
	a. Fuel weight and Performance	**X**	**X**
	- Specific fuel weight (AVGAS and Jet A-1)	**X**	**X**
	- Specific gravity	**X**	**X**
	b. Specific endurance	**X**	**X**
	- Explain specific endurance	**X**	**X**
	- Calculation of specific endurance	**X**	**X**
	c. Theory and calculation of specific range:		

	• **Explain specific range**	**X**	**X**
	• **Calculation of specific endurance**	**X**	**X**
	- ANM/fuel ratio	**X**	**X**
	- GNM/fuel ratio	**X**	**X**
	d. Specific fuel consumption (SFC):		
	• **Theory of SFC**	**X**	**X**
	• **Effect of the following on SFC**	**X**	**X**
	- Engine power / thrust	**X**	**X**
	- Altitude	**X**	**X**
	- Weight	**X**	**X**
	• **Calculation of SFC**	**X**	**X**
C.4.12	**FUEL PLANNING**		
	a. **Fuel requirements of South African legislation:**		
	- **CAR 91.07.12 Fuel supply**	**X**	**X**
	- **CATS 91.07.12 Fuel supply (**1. Planning criteria for aeroplanes)	**X**	
	- CATS 91.07.12 Fuel supply (2.. Fuel and oil supply for helicopters)		**X**
	b. In-flight fuel management and fuel state awareness	**X**	**X**
	- Importance of fuel state awareness and log-keeping	**X**	**X**
	- Unplanned events that could affect fuel state	**X**	**X**
C.4.13	**DOCUMENTATION AND SOURCES OF PREFLIGHT INFORMATION**		
	a. CAR 91.03.1 Documents to be carried on board	**X**	**X**
	• **Aircraft flight manual (AFM):**		
	- Layout of an AFM	**X**	**X**
	- CAR 91.03.2 Aircraft flight manual	**X**	**X**
	• **Checklists**		
	- CAR 91.03.3 Aircraft checklist	**X**	**X**
	• **ATS Flight plan**		
	- CAR 91.03.4 Air traffic service flight plan and associated procedures	**X**	**X**
	• **Flight folio**		
	-CAR 91.03.5 Flight folio	**X**	**X**
	b. Fuel record		
	- CAR 91.03.6 Fuel record	**X**	**X**
	c. **Certificate of release to service**		

	- CAR 91.03.7 Certificate of release to service	**X**	**X**
	d. Notice to airmen (NOTAM)		
	- Types	**X**	**X**
	- Classification	**X**	**X**
	e. Minimum equipment list (MEL)		
	- Definition	**X**	**X**
	- Master minimum equipment list (MMEL)	**X**	**X**
	- Operational use of MEL	**X**	**X**
	f. RSA AIP & AIP Supplements		
	- Purpose of AIP and supplements	**X**	**X**
	g. Aeronautical Information Circulars (AIC's)		
	- Purpose	**X**	**X**
C.4.14	**IFR ALTITUDES**		
	Explain the following altitudes / heights:		
	- MEA	**X**	**X**
	- RNAV MEA	**X**	**X**
	- MRA	**X**	**X**
	- MAA	**X**	**X**
	- MOCA	**X**	**X**
	- MORA	**X**	**X**
	- MTA	**X**	**X**
	- MCA	**X**	**X**
	- Reduced Vertical Separation Minima (RSVM)	**X**	**X**
	- Height above ground (QFE)	**X**	**X**
	- Barometric Pressure for Standard Altimeter Setting (QNE)	**X**	**X**
	- Barometric Pressure for Local Altimeter Setting (QNH)	**X**	**X**
C.4.15	**AERODROME TERMINOLOGY (AEROPLANE)**		
	- Runway length	**X**	
	- Take-off run available (TORA)	**X**	
	- Take-off run required (TORR)	**X**	
	- Take-off distance available (TODA)	**X**	
	- Take-off distance required (TODR)	**X**	
	- Landing distance available (LDA)	**X**	

	- Landing distance required (LDR)	**X**	
	- Accelerate-stop distance available (ASDA)	**X**	
	- Accelerate-go	**X**	
	- Clearway, stopway	**X**	**X**
	- Displaced thresholds (permanent / temporary)	**X**	**X**
	- Runway slope	**X**	**X**
	- Runway strength (ACN/PCN)	**X**	**X**
	- Balanced and Unbalanced Field Lengths	**X**	
	- WAT limits	**X**	**X**
	- Pre-flight altimeter check location	**X**	**X**
C.4.16	**AERODROME TERMINOLOGY (HELICOPTER)**		
	a. Declared distances — heliports		**X**
	- Take-off distance available (TODAH)		**X**
	- Rejected take-off distance available (RTODAH)		**X**
	- Landing distance available (LDAH)		**X**
C.4.17	**MASS AND BALANCE**		
	Mass limitations	**X**	**X**
	- The relationship between aircraft mass and structural stress	**X**	**X**
	- The relationship between aircraft mass and performance	**X**	**X**
	- Centre of gravity (CG) limitations	**X**	**X**
	- The relationship between CG position and stability / controllability of aircraft	**X**	**X**
	- The effects of a CG in front of the forward limit and a CG behind the aft limit	**X**	**X**
	- Describe the relationship between CG position and aircraft performance	**X**	**X**

CATS 61.11.3 Topic (v):
SPECIAL OPERATIONAL PROCEDURES AND HAZARDS

SYLLABUS ASPECT NUMBER	SYLLABUS ASPECT	AIRCRAFT CATEGORY APPLICABILITY	
		A	**H**
C.5.1	**GROUND DE-ICING**		
	a. icing conditions	**X**	**X**
	b. ground de-icing,	**X**	**X**
	c. de-icing and anti-icing fluids	**X**	**X**
	d. holdover times	**X**	**X**

C.5.2	**BIRD STRIKE RISK AND AVOIDANCE**	**X**	**X**
C.5.3	**FIRE AND SMOKE**		
	a. engine fire	**X**	**X**
	b. fire in the cabin, cockpit, freight compartment	**X**	**X**
	c. selection of appropriate fire extinguishing agents with respect to fire classification	**X**	**X**
	d. actions in case of over-heated brakes after aborted take-off and landing	**X**	**X**
	e. smoke in the cockpit and cabin (effects and actions taken	**X**	**X**
C.5.4	**WINDSHEAR, MICROBURST**		
	a. effects and recognition during approach/departure	**X**	**X**
	b. actions to avoid and actions taken during encounter	**X**	**X**
C.5.5	**WAKE TURBULENCE:**		
	a. cause	**X**	**X**
	b. influence of speed and mass, wind	**X**	**X**
	c. actions taken during approach, landing, take-off, crossing behind	**X**	**X**
C.5.6	**CONTAMINATED RUNWAYS:**		
	a. **SA CAR Part 1.01.1 Definitions:**	**X**	
	- damp runway	**X**	
	- dry runway	**X**	
	- wet runway	**X**	
	- contaminated runway	**X**	
	b. Types of contamination	**X**	
	c. Hydroplaning / Aquaplaning	**X**	
	- types	**X**	
	- critical speed formula	**X**	
	- reducing the effects of hydroplaning	**X**	
C.5.7	**CFIT**		
	a. Definition	**X**	**X**
	b. Avoidance	**X**	**X**
C.5.8	**STABILIZED APPROACH**		
	a. Requirements for a stabilized approach	**X**	**X**
	b. Advantages	**X**	**X**
CATS 61.11.3 Topic (vi): INSTRUMENTS			
SYLLABUS ASPECT	**SYLLABUS ASPECT**	**AIRCRAFT**	

NUMBER		CATEGORY APPLICABILITY	
		A	H
C.7.1	**AIR DATA INSTRUMENTS**		
	a. Pitot and static system	X	X
	- pitot tube, construction and principles of operation	X	X
	- static source	X	X
	- malfunction	X	X
	- heating	X	X
	- alternate static source	X	X
	b. Altimeter	X	X
	- construction and principles of operation	X	X
	- simple, sensitive and servo assisted altimeters	X	X
	- errors and tolerances	X	X
	- settings, QNH, QFE, QNE	X	X
	- pressure, true and absolute altitude	X	X
	- altitude alert	X	X
	c. Airspeed indicator (ASI)	X	X
	- construction and principles of operation	X	X
	- meaning of coloured sectors	X	X
	- maximum speed indicator	X	X
	- errors, blockages and leaks	X	X
	d. Vertical speed indicator (VSI)	X	X
	- construction and principles of operation	X	X
	- aneroid and instantaneous VSI (IVSI)	X	X
	- errors	X	X
C.7.2	**GYROSCOPIC INSTRUMENTS**		
	a. Gyroscopic fundamentals	X	X
	- theory of gyroscopic forces (stability, precession)	X	X
	- types, construction and principles of operation:	X	X
	- drive types: electrical, vacuum system	X	X
	b. Directional gyro (DG)	X	X
	- construction	X	X
	- principle of operation	X	X

	- limitations	X	X
	c. Remote indicating compass	X	X
	- construction and principle of operation	X	X
	- components	X	X
	- modes of operation	X	X
	- drive types: electrical, vacuum system	X	X
	- application, uses of output data	X	X
	d. Attitude Indicator / Artificial horizon (AI / AH)	X	X
	- construction and principle of operation	X	X
	- turn and acceleration errors	X	X
	- application, uses of output data	X	X
	e. Turn and slip indicator	X	X
	- construction and principle of operation	X	X
	- errors	X	X
	- turn co-ordinator	X	X
	- rate of turn and angle of bank	X	X
	f. Attitude and Heading Reference System (AHRS)	X	X
	- Micro-electro-mechanical sensors (MEMS) accelerometers	X	X
	- basic principle of operation	X	X
	- typical aircraft application	X	X
C.7.3	**HORIZONTAL SITUATION INDICATOR (HSI)**		
	- construction and principle of operation	X	X
	- information displayed	X	X
C.7.4	**ELECTRONIC FLIGHT INSTRUMENT SYSTEM (EFIS)**		
	- design and operation	X	X
	- Primary Flight Display (PFD) and information displayed	X	X
	- Navigation Display (ND) / Multi-function Display (MFD) and information displayed	X	X
	- typical aircraft installation	X	X
	- crew alerting display	X	X
C.7.5	**FLIGHT DIRECTOR SYSTEM (FD)**		
	- design and principle of operation	X	
	- FD displays and interpretation	X	
	- input sources	X	

	- integration with attitude director indicator (ADI)	**X**	
	- FD mode of operation	**X**	
	- autoflight guidance	**X**	
C.7.6	**AUTOPILOT**		
	- general principles of operation	**X**	**X**
	- types: single axis, two axis, three axis	**X**	**X**
	- lateral modes (pitch)	**X**	**X**
	- longitudinal modes (roll)	**X**	**X**
	- combined modes (roll and pitch)	**X**	**X**
C.7.7	**RADIO ALTIMETER**		
	- principles	**X**	**X**
	- frequency band	**X**	**X**
	- presentation and interpretation	**X**	**X**
	- errors and accuracy	**X**	**X**
C.7.8	**PROXIMITY AND WARNING SYSTEMS**		
	a. Ground proximity warning system (GPWS)	**X**	**X**
	- design and principle of operation	**X**	**X**
	- GPWS indications and warnings	**X**	**X**
	b. Terrain Avoidance Warning System (TAWS) or Enhanced GPWS	**X**	**X**
	- design and principle of operation	**X**	**X**
	c. Traffic Alert and Collision Avoidance System (TCAS / ACAS)	**X**	**X**
	- principles of operation	**X**	**X**
	- displays and traffic indications	**X**	**X**
	- Traffic advisory (TA)	**X**	**X**
	- Resolution Advisory (RA)	**X**	**X**
	- TCAS commands	**X**	**X**
	- responsibility of flight crew	**X**	**X**
	- Principle of reduced surveillance	**X**	**X**
	d. Altitude alert system	**X**	**X**
	- function	**X**	**X**
	- altitude approach alert	**X**	**X**
	- altitude deviation alert	**X**	**X**
C.7.9	**AIR TEMPERATURE INDICATORS**		

	- sensors	X	X
C.7.10	**MAGNETISM**		
	Magnetic compass	X	X
	- components and principle of operation	X	X
	- serviceability tests	X	X
	- turning and acceleration errors	X	X
C.7.11	**BASIC PRINCIPLES OF PRACTICAL INSTRUMENT FLYING**		
	a. Control instruments	X	X
	b. Performance instruments	X	X
	c. Relationship between power / thrust and attitude and resultant performance	X	X
	d. Instrument cross-check (scan) and scanning techniques:	X	X
	- Selected radial cross-check	X	X
	- Inverted-V cross-check	X	X
	- Rectangular cross-check	X	X
	- Common cross-check errors	X	X
	- Instrument Interpretation	X	X
	e. Implication of failure of instruments	X	X
C.7.12	**AEROPLANE INSTRUMENT FLYING USING ANALOG INSTRUMENTATION**		
	a. Full panel manoeuvres and common errors:	X	
	• **Straight and level flight**	X	
	• **Straight climbs and descents**	X	
	• **Turns**	X	
	- Standard rate turns	X	
	- Timed turns	X	
	- Turns to predetermined headings	X	
	- Compass turns	X	
	• **Steep turns**	X	
	• **Climbing and descending turns**	X	
	• **Change of airspeed during turns**	X	
	• **Unusual attitudes and recovery**	X	
	- Recognizing unusual attitudes	X	
	- Recovery from unusual attitudes - (nose-high and nose-low)	X	
	- Common errors in unusual attitudes	X	

	• **Instrument take-off**	**X**	
	b. Limited (partial) panel manoeuvres and common errors:	**X**	
	• **Straight and level flight**	**X**	
	• **Straight climbs and descents**	**X**	
	• **Turns**	**X**	
	- Standard rate turns	**X**	
	- Timed turns	**X**	
	- Compass turns	**X**	
	- Climbing and descending turns	**X**	
C.7.13	**AEROPLANE INSTRUMENT FLYING USING AN ELECTRONIC FLIGHT DISPLAY**		
	a. Scanning Techniques:	**X**	
	- Selected radial cross-check	**X**	
	- Common errors (fixation, omission, emphasis)	**X**	
	b. Basic manoeuvres and common errors:	**X**	
	- Straight and level flight	**X**	
	- Straight climbs and descents	**X**	
	- Standard rate turns	**X**	
	- Turns to predetermined headings	**X**	
	- Timed turns	**X**	
	- Compass turns	**X**	
	- Steep turns	**X**	
	- Instrument take-off	**X**	
C.7.14	**HELICOPTER FLIGHT MANOEUVRES:**		
	a. **Basic manoeuvres:**		**X**
	• **Straight and level flight**		**X**
	- Common errors during straight and level flight		**X**
	- Power control during straight and level flight		**X**
	- Common errors during airspeed changes		**X**
	• **Straight climbs (constant airspeed and constant rate)**		**X**
	- Entry		**X**
	• **Straight descents (constant airspeed and constant rate)**		**X**
	- Entry		**X**
	- Level off		**X**

	- Common errors during straight climbs and descents		**X**
	• **Turns**		**X**
	- Turn to a predetermined heading		**X**
	- Timed turns		**X**
	- Change of airspeed in turns		**X**
	- Compass turns		**X**
	- Climbing and descending turns		**X**
	- Common errors during turns		**X**
	b. Unusual attitudes		**X**
	- Common errors during unusual attitude recoveries		**X**
	c. Emergencies		**X**
	- Autorotations		**X**
	- Servo failure		**X**
	d. Instrument take-off		**X**
	- Common errors during instrument take-offs		**X**

CATS 61.11.3 Topic (vii): HUMAN PERFORMANCE AND LIMITATIONS			
SYLLABUS ASPECT NUMBER	**SYLLABUS ASPECT**	**AIRCRAFT CATEGORY APPLICABILITY**	
		A	**H**
C.7.1	**MAN AND THE ENVIRONMENT: THE SENSORY SYSTEM**		
	- The senses	**X**	**X**
C.7.2	**CENTRAL, PERIPHERAL AND AUTONOMIC NERVOUS SYSTEM**		
	a. Parts of the central nervous system	**X**	**X**
	b. Basic functions	**X**	**X**
	c. Transfer of information	**X**	**X**
	d. Division of the peripheral nerves into sensory and motor nerves	**X**	**X**
	e. Sensitivity	**X**	**X**
	f. Sensory adaptation	**X**	**X**
C.7.3	**VISION**		
	a. Functional anatomy	**X**	**X**
	b. Parts of the eye and the pathway to the visual cortex	**X**	**X**
	c. Functionality and components	**X**	**X**

	d. Accommodation	**X**	**X**
	e. Rod and cone cells	**X**	**X**
	f. Foveal and peripheral vision	**X**	**X**
	g. Visual acuity, visual field, central vision, peripheral vision, fovea and explain their function in the process of vision	**X**	**X**
	h. Factors degrading visual acuity	**X**	**X**
	i. Night vision limitations	**X**	**X**
	j. Adapting from day to night	**X**	**X**
	k. Adaptation time	**X**	**X**
	l. Colour blindness	**X**	**X**
	m. Binocular and monocular vision	**X**	**X**
	n. Depth perception and flight performance	**X**	**X**
	o. Monocular depth perception	**X**	**X**
C.7.4	**HEARING**		
	a. Components of the human ear	**X**	**X**
	b. Basic functions of the different parts of the auditory system	**X**	**X**
	c. Function of the cochlea	**X**	**X**
	d. Equilibrium	**X**	**X**
	e. Functional anatomy	**X**	**X**
	f. Functions of the vestibular apparatus on the ground and in flight	**X**	**X**
	g. Semi-circular canals	**X**	**X**
C.7.5	**INTEGRATION OF SENSORY INPUT**		
	a. Spatial orientation	**X**	**X**
	b. Illusion	**X**	**X**
	c. Approach and landing illusion	**X**	**X**
	d. Flicker vertigo	**X**	**X**
	e. Vestibular illusions	**X**	**X**
	f. Seat-off-the-pants senses	**X**	**X**
	g. Spatial disorientation	**X**	**X**
	h. Prevention	**X**	**X**
C.7.6	**HUMAN ERROR AND RELIABILITY**		
	a. Reliability of human behaviour	**X**	**X**
	b. Mental models and situational awareness	**X**	**X**
	c. The theory and models of human error	**X**	**X**

	d. Error generation	**X**	**X**
	e. Decision-making	**X**	**X**
	f. Decision-making concepts	**X**	**X**
C.7.7	**HUMAN BEHAVIOUR**		
	a. Personality, Attitude and behaviour	**X**	**X**
	b. Individual differences in personality and motivation	**X**	**X**
	c. Identification of hazardous attitudes (error proneness)	**X**	**X**
C.7.8	**HUMAN OVERLOAD AND UNDERLOAD**		
	a. Arousal	**X**	**X**
	b. Stress	**X**	**X**
	c. Fatigue and stress management	**X**	**X**