Flight Navigation Syllabus Matrix

-	-	Topic No.	PPL	CPL	IR	ATPL
-	-		6	18	54	38
Fundamentals of Air Navigation	Form of the Earth	2	ü	ü		ü
	Direction on the Earth	4	ü	ü		ü
	Distance on the Earth	6	ü	ü		ü
	Speed/Velocity	8	ü	ü		ü
	Position Referencing	10	ü	ü		ü
	Altimetry	12	ü	ü	ü	
	Principles and Terminology	14	ü			
	Time	16	ü	ü		ü
	Twilight	18	ü			
Aeronautical charts	Properties and Principles	22	ü	ü	ü	ü
	Scale	24				ü
	Chart Reading	26	ü	ü	ü	ü
Circular Slide Rule	Computations	28	ü	ü		ü
	Relative velocity	30				ü
	Wind Components	32	ü			
	Triangle of Velocities	34	ü	ü		
	1:60 Rule	36	ü	ü		
Deduced Reckoning	In Flight Revisions	38	ü			
Flight Planning	Route Selection	40	ü	ü	ü	
	Chart Preparation	42	ü	ü		
	Plan Preparation	44	ü	ü	ü	
	Fuel Planning	46	ü	ü	ü	
Navigation Procedures - VFR	VFR Flight Navigation	48	ü	ü		
	Special Procedures	50	ü	ü		
Navigation Procedures - IFR	Properties and Principles	52			ü	
	Chart Plotting	54			ü	ü
	Chart reading	56			ü	
	Enroute Diversion Calculation	58		ü	ü	ü
Flight Management	Flight Management	60	ü			
	Fuel Management	62	ü			
Radio Aids	ADF	64			ü	
	VOR	66			ü	
	DME	68			ü	
GNSS	Global Navigation Satellite System	70	ü	ü	ü	
Radar	Procedures	72	ü			

Subject No. 38 Flight Navigation General (Aeroplane & Helicopter)

NOTE: *This syllabus is primarily based on regional/oceanic/global IFR navigation as applicable to navigating a multi engine turbine air transport type aeroplane or IFR capable turbine Helicopter.*

Each subject has been given a subject number and each topic within that subject a topic number. These reference numbers will be used on knowledge deficiency reports and will provide valuable feedback to the examination candidate. These reference numbers are common across the subject levels and therefore may not be consecutive.

This syllabus presupposes a knowledge and understanding already attained at PPL/CPL/IR level.

Sub Topic	Syllabus Item
	Fundamentals of Air Navigation
38.2	**Form of the Earth**
38.2.2	Define: (a) great circles (b) small circles (c) rhumb lines (d) the equator (e) parallels of latitude (f) meridians of longitude (g) Greenwich (Prime) Meridian (h) the International Date Line.
38.4	**Direction on the Earth**
38.4.2	Define, with reference to navigation at higher latitudes and polar areas: (a) magnetic pole (b) true north (c) magnetic north (d) compass north.
38.4.4	When deriving track distances and bearings from a chart, with particular reference to navigation at higher latitudes and polar areas, explain: (a) processes (b) cautions (c) limitations
38.6	**Distance on the Earth**
38.6.2	Define units of distance used on aviation charts and the basis for these units.
38.6.4	Explain the distance calculation basis used by GNSS and FMC systems.
38.6.6	Determine distances (± 3nm) on an appropriate Oceanic FIR chart (ENRC).
38.8	**Speed and velocity**
38.8.2	State the frame of reference for speed measurement provided by a GNSS and inertial systems.
38.8.4	Calculate the groundspeed to make good a specified position at a specified time.

Sub Topic	Syllabus Item
38.10	**Position Referencing**
38.10.2	Describe the grid system position reference method.
38.10.4	Describe the reference system used by a GNSS navigation system.
38.10.6	Plot and reference a position (± 3nm) on appropriate Oceanic FIR chart (ENRC).
38.16	**Time**
38.16.8	Explain the relationship between time and longitude.
38.16.10	Convert between arc and time.
	Aeronautical Charts
38.22	**Properties and Principles**
38.22.2	Describe the construction, properties, uses and limitations of: (a) a Mercator projection (b) a Lambert's conformal projection (c) a Polar Stereographic projection
38.22.4	Describe orthomorphism.
38.22.6	State the properties that a chart must possess to be considered orthomorphic.
38.22.8	Explain earth and chart convergence.
38.22.10	Describe the relationship between a change in longitude and distance at a given latitude (departure).
38.22.12	Calculate the distance between two longitudes, at a given latitude.
38.22.14	Describe the position of a great circle track relative to the rhumb line track between two points.
38.24	**Scale**
38.24.2	Define chart scale.
38.24.4	Calculate earth distance, given scale and chart distance.
38.24.6	Calculate chart distance, given scale and earth distance.
38.24.8	Calculate chart scale, given earth distance and chart distance.
38.26	**Chart Reading**
38.26.2	Interpret the features and symbols of appropriate aeronautical charts.
38.26.4	Derive navigation information from appropriate aeronautical charts.
	Navigation Calculations
38.28	**Computations**
38.28.2	Derive TAS, given a Compressibility Correction Table, CAS, pressure altitude/flight level and air temperature in degrees Celsius.
38.28.4	Calculate the equivalent still air distance, given total distance, mean TAS and mean wind component.
38.30	**Relative Velocity**
38.30.2	Calculate the closing/opening speeds of two aircraft on the same track.
38.30.4	Calculate the distance between two aircraft when they are 10 minutes apart on the same track.
38.30.6	Calculate the time that two aircraft will be 10 minutes apart on the same track.

Sub Topic	Syllabus Item
38.30.8	Calculate the position of an aircraft along track when a following aircraft is 10 minutes behind it on the same track.
38.30.10	Calculate the time of passing of two aircraft on the same track, given relative positions and speeds.
38.30.12	Define a line of constant bearing.
38.30.14	Calculate the distance two aircraft on diverging/converging tracks are apart at a given time.
38.30.16	Calculate the true, magnetic or relative bearing between two aircraft on diverging/converging tracks at a given time.
38.30.18	Determine whether the relative bearing between two aircraft on diverging/converging tracks will remain constant.
	Navigation Procedures - IFR
38.54	**Plotting**
38.54.2	Plot and measure the initial great circle track between two points on an appropriate Oceanic FIR chart (ENRC), in: (a) true (b) magnetic
38.58	**Enroute Diversion Calculations**
38.58.2	Calculate, considering normal operations, depressurised and engine out scenarios: (a) time and distance to the PNR (b) time and distance to the ETP between two aerodromes on a track (c) time and distance to the ETP between two aerodromes, one or both of which are not on track (d) time and distance to the ETP between two aerodromes, given multiple legs with separate wind components.
38.58.4	State the flight profile (speed) required to achieve a PNR that is furthest from the departure aerodrome.
38.58.6	Describe the effect of headwind/tailwind on the position of the PNR from the departure aerodrome.
38.58.8	Describe the effect of headwind/tailwind on the position of the ETP between the departure and destination aerodrome.