

Human Performance & Limitations -
Module J — The Exam Arsenal

Numbers &
Mnemonics

Chapter 25 — Every exam-critical figure and memory aid from the whole book, collected into master quick-reference tables. Memorise these cold — the DGCA paper is built from them.

BOOK

Human Performance & Limitations

AUTHOR

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EXAM

DGCA CPL / ATPL — HPL

CHAPTER

25 of 26 · Module J

GHOST AVIATOR

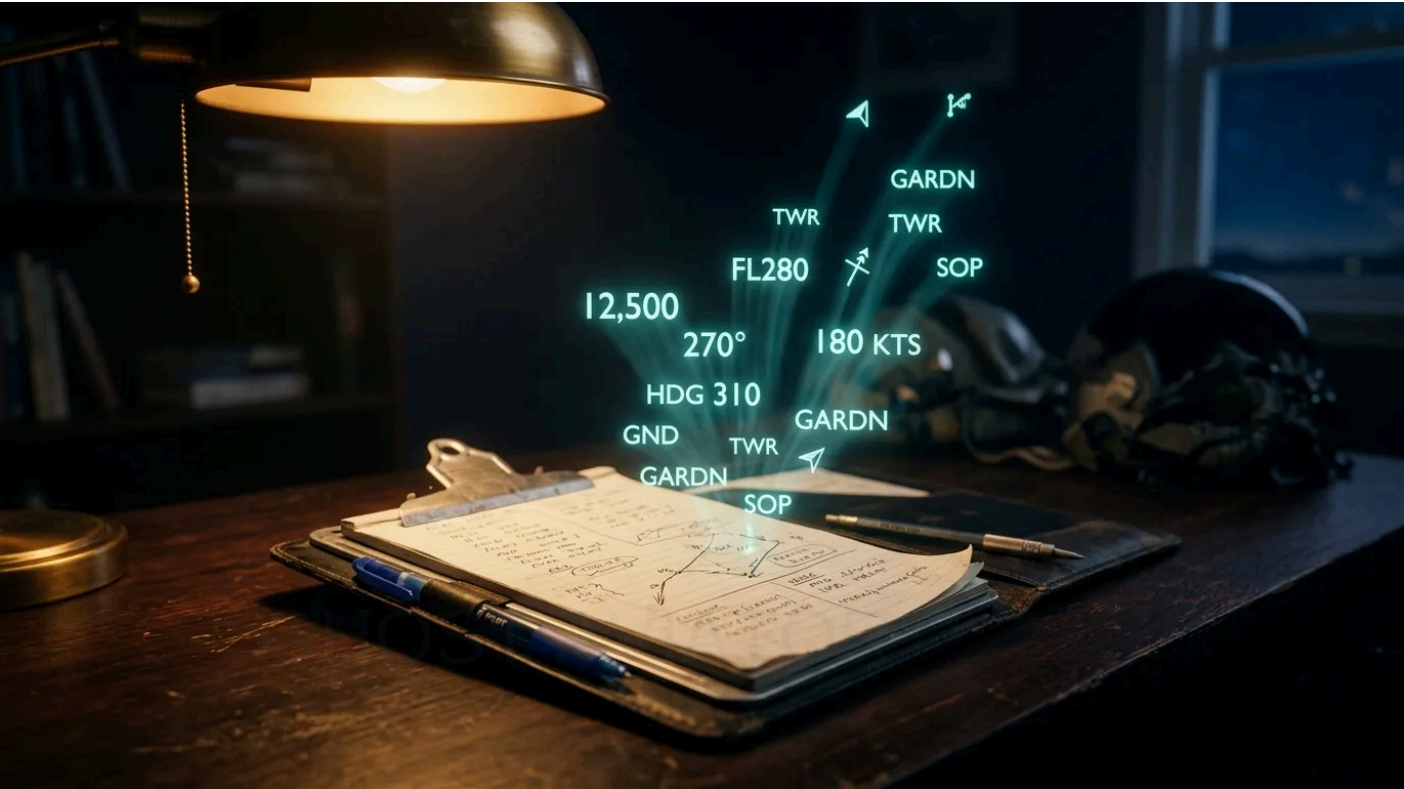


Plate 25.0 — The whole syllabus distilled to the numbers that win marks. If you know these, you know the paper.

HOW TO USE THIS CHAPTER

These figures are drawn from every chapter of this book. Cover the right-hand column, recall the value, then reveal. Any number in a **red pill** is a killer item the examiner returns to again and again.

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Module A — atmosphere, ISA & the physiological zones

Parameter	Value
Troposphere top (average)	13 km / 8.1 mi / 43,000 ft
Stratosphere reaches	over 100,000 ft
Troposphere holds	75% of atmospheric mass
Composition N ₂ / O ₂ / Ar	78.08% / 20.95% / 0.93%
Water vapour (variable)	1 - 4%
ISA sea-level pressure	1013.25 hPa = 760 mmHg = 29.92 inHg = 14.7 psi
ISA lapse rate	1.98 °C / 1000 ft
Tropopause altitude	36,090 ft
Isothermal temperature	-56.5 °C
Cabin altitude maintained	6,000 - 8,000 ft
O ₂ available: half / quarter of sea level	18,000 ft / 36,000 ft
Compensatory reactions begin	6,000 - 7,000 ft
Supplementary O ₂ from	10,000 ft
Physiological-Deficient Zone	12,000 - 50,000 ft
Critical threshold (no O ₂ , unpressurised)	~22,000 ft
Safe altitude on 100% O ₂	~38,000 ft
Armstrong's Line (body fluids boil)	63,000 ft
Partial Space-Equivalent Zone	50,000 ft - 120 nm

C The Thin Air — Hypoxia, TUC & Decompression

Module C — the killers and their numbers

Parameter	Value
Night vision impaired from	5,000 ft
Smoker at 7,000 ft equals a non-smoker at	10,000 ft
Marked day hypoxia symptoms / descend	10,000 ft
CO affinity for haemoglobin vs O ₂	> 200×
TUC — FL180 / FL250 / FL300	20–30 min / 3–5 min / 1–2 min
TUC — FL350 / FL400 / FL500	30–60 s / 15–20 s / 8–10 s
Rapid decompression effect on TUC	halves it
Donating blood before flying	48-hour rule
Flying after (compressed-air) diving	24-hour rule

D Poisons & The Cabin

Module D — smoking, alcohol & the cabin environment

Parameter	Value
Smoker's altitude penalty	3,000 ft (10,000 ft feels like 13,000 ft)
Smoking O ₂ -capacity loss (pack/day)	5 – 8%
Bottle-to-throttle	24 hours
Alcohol metabolised (BAC drop)	~0.015 per hour
BAC pilot-error spike threshold	40 mg / 100 ml
Alcohol at altitude	1 drink at 6,000 ft = 2 at sea level
Peak performance temperature	~20 °C
Vibration — breathing / vision resonance	1–4 Hz / 30–40 Hz

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E The Senses — Vision & Hearing

Module E — the eye and the ear

Parameter	Value
Dark adaptation — cones / rods (full)	~7 min / ~30 min
Off-centre night viewing	look 15 - 20° to the side
Fovea / periphery photoreceptors	cones (day, colour) / rods (night)
Human audible range	20 Hz - 20,000 Hz
Noise-induced hearing loss threshold	80 - 90 dB (prolonged)

F/G Forces & The Fit Aviator

Modules F–G — G-forces, fitness & health

Parameter	Value
Load factor at 45° / 60° bank (level turn)	1.41 G / 2.0 G
Positive-G cascade	grey-out → black-out → G-LOC
BMI formula	weight (kg) ÷ height ² (m ²)
Normal BMI — men / women	20 - 25 / 19 - 24
Fly after dental work	48 - 72 hours
Hypothermia — normal / mild / severe core	98.6 °F / <95 °F / ≤82 °F

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Modules H-I — cognition, sleep & rhythms

Parameter	Value
Information-processing chain	sensory → detection → perception → decision → response → feedback
Memory stores	sensory (<1 s) · short-term (~7 items) · long-term
Skill acquisition (Anderson)	cognitive → associative → autonomous
Sleep — NREM 2 share / REM onset	~50% of sleep / 70 - 90 min in
Window of circadian low	~03:00 - 05:00

The Mnemonics

GAS LAWS "Bad Hens Cluck, Geese Dance" → Boyle · Henry · Charles · Graham · Dalton.

O₂ HALVING "Half by Eighteen, Quarter by Thirty-Six" → half of sea-level O₂ at 18,000 ft, one-quarter at 36,000 ft.

PHYSIOLOGICAL ZONES P · PD · PS · TS → Physiological · Physiological-Deficient · Partial Space-equivalent · Total Space-equivalent.

SHELL MODEL Software · Hardware · Environment · Liveware · Liveware — the human L at the centre.

AIM OF HPL D · P · U · I → Describe · Predict · Understand · Influence.

FITNESS SELF-CHECK I · M · S · A · F · E → Illness · Medication · Stress · Alcohol · Fatigue · Eating/Emotion.

THE DIRTY DOZEN 12 preconditions for error — communication · complacency · knowledge · distraction · teamwork · fatigue · resources · pressure · assertiveness · stress · awareness · norms.

EDITOR'S NOTE — VERIFY AGAINST THE LIVE SYLLABUS

Every figure here is compiled from this book's chapters. Before an exam, cross-check any borderline value against the current DGCA CAR/AIC, as published figures are periodically revised.

◆ END OF CHAPTER 25 ◆

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