Possible Technical Interview Questions

PRINCIPLES OF FLIGHT

Wing Design

Describe a glider‟s wing (having done gliding before)
Very high aspect ratio = less drag/more efficient

What is the difference between angle of attack and angle of incidence?
AOA=chord line to airflow AOI=chord line to longitude datum

What is the critical AoA?
Maximum lift coefficient

How does an aerofoil work?
Bernoulli effect and pressure

How do high lift devices work?
Trailing (fowler)=lift at low deflection
Leading (Kruger)/slats=increase lift by increasing camber,chord,area
Slots=delay separation

Why do aircraft have leading edge devices?
Reduces stall speed (see slats above)

Why does a wing stall?
Airflow over the top surface breaks away when critical AOA exceeded

How does a wing stall?
(see above)

How does a stall strip work?
Ensures root stalls before tip. Causes turbulence at high AOA

C of P movement during/approaching stall?
Moves forward with increasing AOA then rapidly aft=pitch down

Can you stall a helicopter rotor blade?
Yes, retreating blade stall

What is so special about modern Jet Airliners?
Engines (high by-pass, more efficient, quieter), swept wings, materials

Why swept wings?
Increase Mcrit, faster

Is swept an effective wing?
No but advantages outweigh dis-advantages. (tip stall=pitch up, less Aerodynamically efficient=Cl lower, Clmax at higher AOA), requires requires lift devices for takeoff,) Dutch roll. Positive contribution to directional and lateral stability

What are the lift qualities of a swept wing?
Reduced, lower Cl for given AOA, Clmax at higher AOA

Where does a swept wing stall first?
Tip

On a tapered wing, where would the stall occur first?
Tip

Why do we have swept wings, and what are the advantages?
Higher Mcrit, faster

What are the disadvantages of a swept wing, and how is this compensated?
Pitch up=require stick pusher, super stall, less aerodynamically efficient, tip stall, dutch roll=require yaw damper, require lift devices for reasonable takeoff and landing, mach tuck

Why do some aircraft have swept back wings?

Higher Mcrit, faster

Tell us about wing tips?

Induced drag, vortices etc

What are wing tip vortices?

Spanwise flow, from bottom to top due to lower pressure above, induced drag, less efficient, wake turbulence, less stability (downwash over tailplane)

Why winglets?

Reduce induced drag, improve efficiency

List the advantages and disadvantage of winglets

Ad – reduced effects of vortices, more efficient wing/fuel

Dis – fitting/maintenance

If you can only use 1 word to answer, tell me why winglets are beneficial to Ryanair?

Efficiency

What is anhedral?

Downward inclination

What is dihedral?

Upward inclination

Why do we use dihedral?

Lateral stability

Why is anhedral used instead on some aircraft?

As some aircraft are too stable (high wing)

On a diagram of a fuselage, with wings angled upwards, what"s that feature on the 737 called?

Dihedral

On A high wing anhedral diagram, like a BAE146, and a high wing straight winged aircraft like a Fokker 50, why they don"t have Dihedral if it"s so good?

High wing aircraft are inherently more stable and do not require it

Why anhedral and dihedral wings re Cessna 152 vs Piper Warrior

Cessna high wing, warrior low wing

What is wing loading?

Weight divided by wing area

What do you prefer, a high or low wingload (He was trying to get to the approach where you need flaps and slats to increase S (lower wingload) in order to be able to fly a lower speed)

Lower=take of/land at lower speeds

Speed (IAS/TAS/Mach)

If you climb to FL300 at a constant IAS of 250kts, what would happen to the TAS?

Increase

Why do we measure speed as a Mach number? When does speed change from IAS to Mach?

Because at altitude Mach is more significant (Mmo) If climbing at constant IAS you could exceed Mmo

At high altitudes, what speed do aircraft climb on?

Mach no

Why do we bother with Mach Number?

At altitude it is more significant. If you were to climb at constant IAS you could exceed Mmo

Can you explain to me what mach tuck is?

Nose down pitch when passing Mcrit. CP moves rearwards behind CG due to shockwaves

At what speed does mach tuck occur?

Mcrit

What is mcrit?

Speed at which airflow over wing becomes sonic

How do you prevent an aircraft reaching mcrit?

Swept wings

What is a mach trimmer?

System corrects for mach tuck above Mcrit

How do you recover from Mach tuck? How do you avoid it?

Descend

What are the advantages of an all moving/variable incidence tailplane?

Larger CG range, large speed range, changes in config, reduce elevator trim drag

What increases Mach Crit?

Swept wing

Why does a swept wing increase Mach crit?

Effective chordwise velocity is reduced. Wing believes it is flying slower than it actually is

What do airlines have to guard against reaching Mach crit?

Swept wings

Speed and Altitude

Why do we fly high and fast?

More efficient, less power but less power is required, faster

Why do jet A/C fly as high as possible?

More efficient

What is the maximum operating ceiling of a typical jet?

35000-40000

Why will a jet not fly this altitude?

Coffin Corner

When will a jet be able to fly this altitude?

If warmer temperature

Explain what coffin corner is and what happens at it.

Absolute ceiling, mach buffet/stall buffet coincide, cant slow down as will stall, cant speed up as will exceed Mcrit

V Speeds

Starting with V1 tell me what V speeds we need to consider and where does VMCA fit in?

VMCG, VMBE, V1, VMCA, Vr, V2

Explain V1, V2, VR, Vmca, Vmcg and where do they stand to each other? Why are they important & when do you take these into account?

VMCG, V1, VMCA, Vr, V2

What are the Vspeeds during takeoff and where do Vmcg and Vmca fit in and why?

VMCG, V1, VMCA, Vr, V2

What effect does a wet runway have on V1 and V2?

Lower V1 (gives more stopping distance),

What is VMCG?

Min control speed on ground with loss of critical engine

Explain VMCG in layman"s terms

Min control with rudder with loss of offset engine

Do single engined planes have a VMCG?

No

Can Vmcg be lower than V1? Explain.

It is unless in wet conditions

Would you be happy if VMCG is higher than V1?

Only in wet conditions

What is V2? Why is it important?

Take off safety speed by screen height (35ft.) Maintains climb and directional control

Being an excellent pilot, if I can fly at VMCA, do I need a V2 speed?

Yes, VMCA is only directional, V2 is climb performance

If you take off on 2 engine and are below Vmca, will you have directional control?

Yes

How do you calculate VREF?

1.3 x Vs in landing config

What is VMBE?

Max speed on ground which brake capability can stop with

What is Vmu?

Min unstuck speed

What is VS?

Stall speed. Air over wings will stall at this speed. Varies with weight and config

Departure

What is a departure?

Take-off. Broken into 4 segments up to 1500ft

What is the screen height for a single engine?

50ft

If whilst taking off in a Seneca you lose the left engine what side do you want the crosswind to come from?

Left

Departure segments, what are they and why do we have them and for what circumstances

How many climb segments are there and what is their purpose?

Ref zero – up to screen height

1st – From screen height to landing gear retracted at V2

2nd – 400-1000ft AGL

3rd – Acceleration and flap retraction

4th – 1500ft and max continuous thrust

If going around what climb segments do you need to consider?

1,2,3,4

What does the third segment of a departure mean to you? Where does it end?

Level flight acceleration and flap retraction. Up to1000ft

When does the final take off segment end?

1500ft with flaps up and max cont thrust

If on a go-around, which take-off stages still apply?

1,2,3,4

What are TORA, TODA, ASDA clearways, stopways, and screen heights.

Take off run avail (runway), take off distance avail (TORA+clearways), accel stop dist avail (TORA+stopway), clearway (obst free area that can be used as part of climb to screen height), stopway (unprepared ground that can take aircraft weight), screen height (min height achieved over runway before end of clearway in case of engine failure)

What is TODA? How is it calculated?

Take off dist avail (TORA+clearways) (<1.5xTORA)

What is ACA? What ACA did you use? Why do we have an ACA?

Asymmetric Committal Altitude. Threshold + 200ft. Safety

Cruise

What setting would you set the trim to for long range cruise

Aft....less drag=more efficient

Do airlines have an optimum CofG and where is it?

It has to be kept within a certain range

Critical Engine

Explain the term "critical engine"

Engine which failure would result in the most adverse effects

Does a jet have a critical engine?

No...because they are symmetrical and have opposing revolutions

Drag

What is induced drag?

By-product of lift. High AOA=more induced drag. Wingtip vortices

What is adverse yaw?

Yaw opposite to turn (corrected by differential or frise ailerons)

Aircraft Design

Why was the PA34 Tomahawk designed with a T tail?

Tailplane out of the airflow from wings, larger moment=more effective, less prone to damage, (but prone to deep stall/spin)

What are yaw dampers?

Gyro system sensitive to changes in yaw. Counteracts Dutch roll and co-ordinates turns. Applies opposite rudder

If the yaw damper fails and the aircraft enters Dutch roll how can the pilot stabilize the aircraft?

Use the ailerons and avoid using the rudder

Propellers/Turboprops

What is the advantage of a variable pitched prop? Why not have a fixed prop?

Adjusts to optimum angle of attack to maintain efficiency. Fixed is only truly efficient at one RPM, altitude and speed

If turboprops are more efficient A/C why do they not climb that high?

AIRCRAFT SYSTEMS

Systems – Electrics

Explain electricity

Movement of electrons that produce a power

What is the difference between Volts and Amps?

Volt=electrical force/pressure (EMF/PD) Amps=number of electrons flowing when the pressure/force is applied

What is the difference between a Generator and Alternator?

Gen=armature spun in stationary magnetic field Alt=stationary armature in spinning field

How does an alternator work?

Stationary armature with rotating field. Converts to DC using rectifier

Why do you need a battery if you have two alternators? What does it power?

Back-up

How can you tell if the battery is charging?

Load showing on ammeters

How does the battery get recharged and how do you know it‟s recharging/ recharged?

Secondary cell converts electrical energy back to chemical energy

Systems - Structures

Some wings, flaps and rudders are indented, why?

What is an anti-servo tab?

Works opposite to servo tab and moves in the same direction as the control surface. Used as trimming device

What is tyre creep, is it important?

Tyre slowly rotates and can rip out the valve

What are Fusible plugs, where are they used, how do they work, why do we have them?

Fitted in tubeless hubs and let the air leak out if it becomes too hot

How does anti-skid work?

Senses wheel is not spinning and releases brake pressure

Systems - Jet Engines/Gas Turbine Engines

Explain to me how a jet engine works. How does a Gas Turbine engine work?

Turbine driven compressor. Pressure energy is increased by compressor, then combustion adds heat, then it is passed through the turbine and then exhausted to create thrust

Where is thrust produced in a gas turbine engine?

Exhaust

What are the benefits of a free turbine?

No need for complex transmissions or clutches

What is a turbo fan? What is a high bypass ratio engine?

Some air goes through the core and some is bypassed. Bypassed air produces thrust and lowers SFC. Ratio of air bypassing the core to that going through the core

What is high bypass?

Large amount of air bypassing the core. Gives lower SFC but is slower

What is N1, N2, EGT, EPR?

N1=low compressor RPM N2=inter comp RPM EGT=Engine gas temp EPR=Engine pressure ratio (pressure at exhaust to inlet)

How much thrust comes from the N1 fan?

75%

Explain how the N1 compressor produces thrust.

Acts like a shrouded prop, produces thrust in bypass air

Turbochargers/ Superchargers

How do turbochargers work?

Compressor powered by engines own exhaust gases. Increases air delivered to the cylinder. Also allows more fuel and therefore more power

If you had two A/C, one turbocharged and the other not, which one would reach 2000ft first and why?

Turbo as naturally aspirated has less power and loses power with alititude

What do you know about superchargers and turbochargers?

Turbo=internal super=external (driven mechanically)

What is the difference between a supercharger and a turbocharger?

See above

What's the benefit of turbocharged engines?

More volumetric efficiency, compensates for loss of atmospheric pressure with altitude, greater power

Carburettors/Fuel Injection

What do you know about carb icing? Would you experience it today?

Accel of air causes drop in temp (up to 35 degrees) and can cause ice in the venturi around the throttle valve

When would you use carb heat in a SEP?

icing and throttle butterfly icing in float- type carburettors can occur within the ambient air temperature range of –10°C to +35°C at relative humidities above 50%

How does a carb heat system work?

Takes heat from the engine compartment

While climbing with a SEP, temp range for carb icing.

–10°C to +35°C

Is it an electrical system?

No. Mechanical

Why don‟t you use Carb heat on the ground for long periods?

Fouling spark plugs

What are the advantages of fuel injection vs carb?

No ice, uniformed delivery, improved control of fuel-air ratio, few maintainence problems, instant response, increased efficiency

Why fuel injected engines & what would happen if your primer kept operating?

(See above) Mixture would become excessively rich

Piston Engines

Explain the Otto cycle.

Induction, compression, combustion, exhaust

How does a 2-stroke engine work?

Uses the beginning of the compression stroke and end of combustion stroke to perform the intake and exhaust simultaneously

What sort of things would they be used for?
Lawn mowers, chain saws etc
What is the difference between a 2 stroke and a 4 stroke engine?
(See above)

Fuel
What colour is avgas?
Green or blue
What contaminates fuel?
Water and dirt
How would you check for water contamination?
Take fuel tests
So is fuel heavier or lighter than water?
Lighter

QUESTIONS ABOUT THE PREVIOUS AIRCRAFT TYPE (SENECA/WARRIOR)

General Knowledge
What series Seneca did you fly?
Seneca II
Tell me about the last aircraft you flew in, Seneca

- Voltage? 12 volt battery
- Amperage? 2 65 amp alternators
- Landing gear? Hydraulic, fully retractable tricycle gear
- Controls? Dual control, actuated by cables, stabilator with anti-servo trim tab, frise ailerons
- Engine? Continental 6 cylinder, horiz opposed, air cooled, turbo, 200hp
- Fuel system? Fuel injection
- Heating system? Combustion heater
- Type of flaps? Why it's appropriate for that particular aircraft? Plain flap
- Safety Features of the plane? Gear up horn

Electrical Systems
Tell me about the Warrior PA28 and Seneca Electrical Systems
Is it AC or DC?
So tell us what systems were electricly driven? Nav, comms, window heat
How would you know that the battery is charging? No „ALT" light
How long would the battery last? 30 mins
You have lost both alternators, how long would the battery last and what would you do? 30 mins. Land as soon as poss
What uses the most battery power, transmit or receive? Transmit

Procedures and SOP's
How do you recover from a spin in a small aircraft? Throttles idle, rudder opposite to spin, release back pressure, ailerons neutral
Tell me about the recovery procedure for a spin in the Warrior? (See above)
If you have a fire from the engine in the Warrior, what do you do?
Talk me through an engine failure on a Seneca
What is the EFATO drill on the Seneca?

If you are flying your light twin would you ensure minimum obstacle clearance if your engine fails on take off? How would you do this, or, where can you find the relevant information? Pitch for Vyse, this speed can be found in the hand book

Anti-/De-Icing Procedures

How do the pneumatic boots on the Seneca work? Pressure pump on each engine, drop in gyro
What ice protection systems does the Seneca have? Boots, screen mat or spray, pitot, prop, alternate air, stall warner
How do the pneumatic de-icing devices on the Seneca work? (see above)

Hydraulic Systems/Landing Gear

Tell me about the landing gear system in the Seneca
Is the landing gear in the Seneca electrically or hydraulically operated? Gravity down, hyd up
Tell me about the hydraulic system on the Seneca; brakes and gear.
On a Seneca how does the landing gear system work and how can you tell if the hydraulic pressure is lost? No brake pressure, gear will not come up
How does the Seneca undercarriage work? Electric or Hydraulic? Hyd

Aircraft Speeds/Aerodynamics

Tell me about the V speeds in a Seneca. Vne-195 Vno-163Vfe-107 Vle/Vlo-129
What is the Vmca speed in the Seneca? And what is it. 66
Where does the wing first stall on a warrior? Root becuase of stall strip

Engines/Propellers

What engines on your last twin? Tell me about them. Power output? Ceiling altitude?
Continental, 6 cylinder, horiz opposed, turbo, fuel injected, 200hp, 25000ft
How is start generated in the Seneca?
Does the Seneca have a carb heat system? Doesn‟t need one
Do you get carb icing in the Seneca? No, fuel injection
What is alternate air? Oh so what does it do with the Filter? Unfiltered warm air
Is the Seneca turbocharged? Yes
Why is it turbocharged? Maintain power at altitude
If you slammed the throttles wide open after takeoff, what would happen?
Why is there an over boost on the PA34? Becuase max manifold pressure is 40 inches
What indications would you get inside the cockpit? Yellow light
What is the limiting rpm on a Seneca if you need to feather the prop? Above 800 rpm cos of feathering prop
You‟ve been flying the Seneca, that doesn‟t have a critical engine does it? No because it has counter-rotating props

Fuel

What colour of fuel is used in the Warrior? Blue
Endurance of a Seneca? 4 hours
Could a Seneca fly to the South of France without stopping for extra fuel? Yes
Give a calculation to work out how far a Seneca could fly with a certain amount of fuel.

Speeds/Aerodynamics

What Seneca did you fly? II

If you pitched up in the Seneca, what would happen to the blade angle?
What performance category was your last aircraft? How are they classified? A, by threshold speeds
What is the maximum crosswind limit on a Seneca? 17 kts

Aircraft Structure
What are the longitudinal ridges on the stabilator of the Seneca for?
What are the grooves in the flap of a Seneca?
What's the purpose of the mirror looking at the nose-wheel on a Seneca? To ensure that the gear is down

QUESTIONS ABOUT THE BOEING 737-800

Aircraft structure and general knowledge
What do you know about the 737 800 that Ryanair uses? 189 seats, mach 0.785, 26,000lbs thrust x 2, 430 aircraft* this is increasing daily - keep updated!
What wings do 737-800 use? Swept
Why are they effective wings? Increase mcrit, enable to fly higher and faster
Why does a 737 have swept wings? Yes
What angle of sweep do our aircraft have? Why not 27° instead? 25. 27 not as efficient, WHY?
Explain how the all moving stabilator works on the 737 compared to the Seneca? Seneca cables, 737 servos. 737 stabilator moves depending on trim, but also has elevator
The tail plane of a Seneca has an elevator and a trim tab, what about a 737?
Compare the tailplane with the stabilator of a Seneca
What is optimum ISA cruise altitude for 737? 36000ft
What is the pressurization of cabin in the cruise? 8000ft
What is the fuel capacity of the 737–800? 6875 USG
What are the G-limits of the Boeing 737-800? Flaps up=+2.5 to -1.0g Down=+2.0 to 0.0

Technical General Knowledge about Ryanair and the Boeing 737-800
How many aircraft do Ryanair have? 430 (as of March 2018)
How many seats do our Boeing 737 aircraft have? 189
What is the minimum number of Ryanair crew required to operate a flight. 2 pilots, 4 cabin
Our 189 seats, are they in an economy and first class arrangement? Economy
Why don‟t Ryanair use turbo props? Lower range, public perception, faster
What are the advantages of operating a one aircraft fleet, and why don‟t we use an A320 / B737 mixed fleet? Easier maintenance, cheaper, less training costs
Imagine us being in charge of making a decision of whether to increase the fleet with either A320, which Frank is in favour of or B737 (which Steve was in favour of). Sell the B737 to us. Cost....maintenance, training costs etc

Aircraft Avionics/Instrumentation
Tell me about the MCP and the FMA‟s. Mode control panel. Flight mode annuciators
Pointing at the FMA‟s, what are they and what are they used for? To let you know what mode the flight controls are in
Why not use the MCP instead? What the MCP says can‟t always be trusted
Explain the use of FMA's.
Why do you get the annunciation of the selected modes on both the PFD and on the FMA?
What is the reason for having the writing at the top of the PFD? FMA‟s
He also asked me to explain why we select VOR/LOC, for example, on the MCP but it's displayed on the FMAs (you need to describe Armed and Captured modes on the FMAs)

What navigational instruments does the 737-800 have? VOR, NDB, IRS,
Why the speed tape on the PFD reads 45kt when the aircraft is stationary?
Below 45kts the difference between total and static pressure is too small to be dependably resolved.

Powerplants

What engines do we use on our aircraft? CFM-56
Tell me about the CFM56-7b engines. 24200lbs each, high bypass turbo fan
What is special about this engine? More thrust, lower maintenance and more efficient than predecessors
Does the 737 have a critical engine? No
Why doesn‟t the 737-800 have a critical engine? They are have opposing revolution directions
Do both engines on the 737 turn the same way? No
What kind of engines has a 737 and which one is the critical one? CFM56, no critical engine

Aircraft Systems

How many hydraulic systems does the 737 have? 4 pump-2 elec, 2 eng. System A/B has one of each for redundancy
What are the hydraulic systems called?
What is the fuel consumption of the Boeing 737? 2500 kgs p/h
Describe the landing gear on the 737. Tricycle, dual wheels
What powers the Gear? What is the PSI of the system? Hydraulic. 3000psi
If the Engine driven pump failed how would the gear lower? There are pull handles behind the FO
Tell me about the Boeing 737-800 electrical system. 115V AC. Generator on each engine + APU generator

METEOROLOGY

Weather Documentation

He got out a weather chart and pointed at different lines and symbols which I had to tell him what they were. Below is what he pointed at:

- Jet stream
- The speed of the jet stream
- Warm front
- Occluded front
- Tropopause level
- Front direction and speed
- Cloud Type
- Turbulence
- Icing

Can you explain to me these symbols on an upper air chart? 260
Shown an upper level air chart and shown a route I was flying and asked what weather I would experience en route.
What is a METAR? Once an hour published observations
Can you tell me what this METAR means?
Decode this TAF and explain it to us as non aviators
Describe what's happening in the following METAR/TAF

The Atmosphere

What is density altitude? Altitude that the density would occur in standard atmosphere
What is pressure altitude? Altitude when set to 1013
What is an isobar? Line joining points of equal pressure
Tell me about adiabatic lapse rates. Decrease of temperature with height
Tell me about environmental lapse rates. Is actually how the temperature is changing with height
What's the temperature at FL150? -15
You are flying at FL350 and the temperature reads –30, is the aircraft at its optimum temperature? This is warmer than standard so aircraft may not be as efficient as it could be
What is the average temperature at 25,000ft? -35
What is the speed of sound? Colder=lower speed of sound
What is the height of the tropopause? 36,000ft
Is the tropopause uniform in height? So what height is it at the pole and the equator? No, it is lower at the poles (36000) than equator (60000)
How are contrails formed? Water vapour from engine condenses or pressure drop from wing tip vortices cause condensation
Tell me, I was looking out the window and I saw white stroke coming out of the engines at cruising level, but I didn't see it from an ac. taking off. Why is that and what is the difference? It happens at altitude because it is cooler

Weather Phenomena
What is a Jet Stream? Fast flowing narrow air currents near the tropopause. Caused by earths rotation and atmospheric heating
Are jet streams there all the year round? Yes (except some of the tropical ones)
Which way do jetstreams travel? West to East (except in tropics in summer)
On a flight from London to New York, New York to London, which will take the shortest time and why? New York London because of jet stream

What are the dangers of flying into thunderstorms? Turbulence, hail, wind shear, lightning
Why don't you want to fly into a thunderstorm? (see above)
What are the problems associated with icing? Drag, engine problems (carb)
Have you ever had icing before? Yes
What is windshear? Sudden change in wind speed/direction
What weather is associated with windshear? Thunderstorms, inversions, mountains, CAT
What causes windshear? How can you detect it? Look for thunderstorms, heavy rain, virga, terrain, fronts
Does windshear show on weather radar? Yes
Why are jets wary of windshear? Can cause sudden change in direction and performance
What would happen to an aircraft's performance if it passed through an inversion? Change in engine performance and flight path

Weather Patterns
What is advection fog? Warm air passes over a cool surface
What is radiation fog? Heat from earth cause condensation. Cloudless sky, moist air and light breeze. Valleys and low lying areas
Have you heard of a coastal breeze? Yes, wind flows from the sea inland during the day as the land is warmer than the sea and rises
Tell me about occluded fronts. Combination of a warm and cold front
What sort of weather would you find at an occluded front? Thunderstorms
What is orographic cloud? Cloud that is formed when an air mass is forced to rise over terrain

Explain the Fohn wind. Dry downward wind on the lee side of a mountain

AIRMANSHIP/ INFLIGHT PROCEDURES

SOP's

What are SOP"s? Standard Operating Procedures
Why do you think Ryanair or any other company have SOPs? Safety and continuity

Failures (Engine/Radios etc)

If you had an engine failure on takeoff what procedure would you follow? Treat it as a fire
What would you do in the event of an engine failure below V1? How? Stop the aircraft
How do you know if the hydraulics for the gear have failed during flight? Low pressure
What's the procedure? Refer to the QRH
Green landing gear lights are inop, how would you know that the gear is down? Pull the cords to make sure
You are on a flight from Stansted to Amsterdam and just after T/O you are at your cleared level of 2000ft when you have a complete radio failure. What are your actions? Fly for 7 mins on same heading, then return to flight plan
Tell me about the radio failure procedures on a SID. Check SID for procedures. If not, continue sid or fl for 7 mins etc

Normal Procedures

You are flying in a straight line on an airway when your company calls and requests you to return to base, how will you turn around? Liaise with ATC
If you had to approach the landing gear, where do you approach from? Front or back, not side
What do you need to descend from MDA on a non-precision approach? Visual
If you had to explain to your neighbour what is the difference between a precision and a non-precision approach. Precision=G/S + LOC. Non-prec=LOC
What is RVSM? Reduced Vertical Separation Minima...from 2000 to 1000 above FL290 to FL410

AIR LAW (Plates and Briefings)

Plates in general

What kind of plate is this?
Why do we use Jeppesen plates?
What did you use at Oxford? Both (Jepp-mcc Aerad-IR)
What do you prefer and why? Jepp better explained/laid out
Where do Jeppesen get the information from to make their plates?
Which plates did I prefer to use jeppy or aerad?
Tell us what you think is good and bad about the jeppy and aerads?

Decoding of Plates

What is MSA? Minimum safe altitude
What are the different MSA sector values & why are they relevant? Depends on which direction you are coming from
What clearance do MSA values give? 1000ft
What distance does the MSA cover? 25nm
What is the radius of the MSA circle? 25nm

Where does this radiate from? Navaid or Airfield reference point
What"s the reference point for these MSA figures?
What is the highest point on a particular Jeppesen chart? (he has the plate and wants you to identify it)
What is this (pointing at the Maltese Cross - FAF)? Final approach fix
What is this (pointing at the arrow above obstacle)?
What is this (pointing at the locator)? NDB
What is this heavy black arrow on the picture? (Highest point)
What is DA? Decision alt (precision approach)
What is MDA? Minimum decision alt (non-prec)
What"s the difference?
Can you go through DA or MDA? If you are visual
What are these (pointing to range altitude checks)? Height checks along approach
What is there relevance? Height you should be at at different distances
Quick reference missed approach diagram? (This is found near the bottom of the plate and normally is a line with a DME or an altitude)
What is this box containing an arrow and 2000ft (A. Initial part of the go-around. Climb straight ahead 2000 feet and then pick up the rest of the info at the top of the chart where it"s written out in full).

Approach Aids
What is PAPI? Precision approach path indicator

Briefings
Brief me this departure
What do OAA say about Briefings?

GENERAL NAVIGATION

What is convergency? Change in direction along east west tracks due to converging meridians
What is departure? East west distance along parallel line of lat
What is a Rhumb Line? Track with constant direction between 2 point
Why would someone fly a Rhumb Line track? Wouldn"t as they are longer than great circles
What is a Great Circle? Shortest distance between two points. Changes direction due to convergency
Why do we fly a great circle? Shortest distance
Great Circle – describe what the line looks like between two meridians
A drawing of the great circle route from London the New York; as with all great circle routes, was concave to the equator. Another drawing showed an arc convex to the equator. Why isn"t this the shortest route between the two points?
Why is a great circle the shortest distance between two points? Changes direction to account for convergency
If you only have a compass, which is easier to navigate along: a line of longitude or a line of latitude?
What is the formula for departure? Change of long (mins) x cos of lat

RADIO NAVIGATION

NDB

What is an NDB? Non-directional beacon
What frequency range and band is this in? 200-1750kHz medium and low range freq
What is the typical range? 15-25 miles
Why is an NDB powered so that it only has a range between 15-25 miles? So not to interfere with other NDB‟s
How reliable are they? Suffer from numerous errors
What errors does an NDB suffer from? Interference from other NDB‟s, static (storms), night effect, coastal, quadrantal

VOR
What is a VOR? What frequency range and band is this in? VHF omni-dir range. 108 to 118 mHz
What is the range of a VOR? Line of sight and power output
What is the range at 20,000ft/32000ft? 180, 220
VORs – realistic range (high alt VORs) I would provide both theoretical and actual
How would you navigate if all VOR's and NDB's en route fail? IRS

ILS
How does an ILS work? Precision approach system. 2 transmitters-LOC and GS
Tell us what ranges the glidescope and localiser beams are checked out to? LOC-10 degrees either side to 25nm and 35 degrees out to 17nm GS-8 degrees to 10nm
What frequency range it the ILS glide-scope / localiser? What distance is this out too? 108-112 (odds) LOC-25nm GS-10nm
What is the purpose of the locator? Check that you are in the right place at the correct alt
If you are at the locator, on glide-scope, on localiser, but your altimeter is reading 500ft high what could be the cause of this? Spurious lobe

INS/IRS/GPS
If you are outside the range of any VOR‟s/NDBs how does the aircraft know where it is? IRS
How does an IRS work? Measures inertia movement from an initial position (accelerometers)

AIRCRAFT PERFORMANCE

- What are the performance categories? A,B,C,D
- What are they in reference too? Threshold speed
- How are the performance categories classed? (Vref = 1.3x Vs)
- The categories of the aircraft A, B, C or D associated with the RVR‟s and DA or MDA‟s make reference to what? Threshold speed

Mass and Balance

- Why do we calculate Mass and Balance (structural, stability, and T/O and landing performance)?
- What is the relevance of the Mass and Balance document? To know aircraft is within all of its limits
- What is BEM (Basic Empty Mass)? Weight of empty aircraft with basic equip and un-usable fuel/oil
- What is OM (Operating Mass)? DOM+fuel
- What is DOM (Dry Operating Mass)? TOM-Payload
- What is a moment arm? Force x distance

- How would you load an aircraft for max range? With an aft CofG, lower drag/fuel consumption
- If you were responsible for loading and aircraft and wanted to achieve the most fuel efficient flight where would you choose to put the cargo and why? Aft CofG, less drag

INSTRUMENTS

- What is pitot pressure? Total pressure=static and dynamic
- How does an ASI work? Measures difference between the total pressure in capsule and static pressure in the case
- How does an altimeter work? Measures static pressure which decreases with altitude and expands capsule
- Explain how an altimeter / ASI works to me assuming I know nothing about aviation? (ass above)
- What would cause an altimeter to malfunction? Blocked static port
- You are at the end of the runway with the static ports blocked. What will be the reading on the altimeter after departure? It will stay at the same reading
- How does TCAS work? Interogates other aircrafts SSR to plot location and speed and provides warnings as necessary
- How does GPWS work? Receives data on config, alt/height, GS deviation and gives warnings
- What is EGPWS? Enhanced GPWS. New features like terrain mapping. Can warn of wind shear

FLIGHT PERFORMANCE AND PLANNING

Conversion calculations

- How do you convert litres to kg? Ltrs x specific g=kgs
- How do you convert between lbs and kg? Lbs/2.2
- You need to uplift four tonnes of fuel, how many litres would you ask for if the SG is 0.8? 5000

Fuel Uplift/Requirements

- Why do the fuel gauges read in kg, yet fuel is delivered it litres? Mass + balance
- If you where picking up 10,000 litres of fuel in Newfoundland (cold weather), and 10,000 litres of fuel in Lima, Peru (hot weather), where would you have picked up the most fuel?
- What are the components that make up a fuel plan for a minimum-fuel trip? Trip fuel, contingency, alternate, pilots discretion
- Explain how total fuel is calculated for a commercial flight in a piston single engined aircraft? Start, taxi, trip, contingency, alternate, final reserve, pilots discretionary
- Why do you need contingency fuel?
- Your Captain wants to go with less than the fuel required as there are no refuellers available for 12 hours and the weather is CAVOK. He waves you away and loads the passengers on the airplane…. If you were a manager of the company involved what would you do to them when you found out if two pilots had gone in that situation.
- You have planned for min fuel, you arrive at destination and your captain accepts a 20 min hold. What is your reaction?
- With 10 minutes to go to the destination, I"ve been advised by ATC that I will have to hold. What 3 things should I immediately consider? Fuel remaining, endurance

- What is the critical point? En-route point where the time to destination is the same as time to turn back
- What is Point of No Return (PNR)? Last point en-route that it is possible to return to departure airport with fuel reserves in tact
- Tell us about point of equal time and point of no return? Do you think Ryanair pilots should be concerned about these?

HUMAN PERFORMANCE AND LIMITATIONS

- What is CRM? Team work etc
- What is the role of Pilot Monitoring? Monitor, assist etc etc
- What are the effects are on the human body in case of depressurisation? Loss of consciousness etc
- He then handed me his pen and asked me what I‟d do to it to make it better. I had heard about this one before but I couldn‟t remember what it was that he was getting at. Then I remembered…. the point here is to say that it‟s possible the pen doesn‟t need changing as it may be perfectly fine the way it is. (If it ain‟t broke, don‟t try and fix it), was what Frank was getting at. He‟s trying to see if you can evaluate something by looking “outside” the box.