NYÍREGYHÁZI EGYETEM Műszaki és Agrártudományi Intézet Közlekedéstudományi és Infotechnológiai Tanszék	Tantárgy: **RM1304/RS1304/FRF1304** **Teljesítményszámítás** 2025/2026. tanév II. félév PG / FOSZK IV. évf.

FOGLALKOZÁSI TERV

Tanítási hetek száma: 14	A tantárgy kredit értéke: 2
Előadás: heti 1 óra, félévi: 14 óra	Gyakorlat: heti 1 óra, félévi: 14 óra
Előadó: Dr. Szilágyi Dénes egyetemi docens	Gyak. vez.: Dr. Szilágyi Dénes egyetemi docens

Számonkérés formája: gyakorlati jegy
Zárthelyi dolgozatok száma: 2 **megírásának időpontja:** 13. és 21. hét

Kötelező és ajánlott szakirodalmak:

- Performance BGS 2022
- Flight Performance and Planning 1 OXFORD Aviation Services 2020
- BCAA CAP 698
- Boeing Jet Transport Performance Methods 2009 (D6-1420)
- Airbus Getting to Grips with Aircraft Performance (2002)
- Nyomtatványok: teljesítmény diagrammok és táblázatok.

A szorgalmi időszak követelményei:
A hallgatók munkájának értékelése az alábbi pontrendszer alapján történik:
Foglalkozásokon a jelenlét, fegyelmezett viselkedés és aktív munkavégzés a Tanulmányi és Vizsgaszabályzat szerint.

Órai aktivitással szerezhető	10 p
Zárthelyi dolgozat 1. szerezhető	45 p
Zárthelyi dolgozat 2. szerezhető	45 p
A maximálisan elérhető pontszám	100 p

Részfeladatonként min 51 %-os teljesítmény elérése kötelező!

Nyíregyháza, 2026. 02.06.

Dr. Szilágyi Dénes Ph.D. tantárgyfelelős	Dr. Sikolya László C.Sc. tanszékvezető

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
7. A	Repülési teljesítmények alapfogalmai, tömeg és sebességkorlátozások. 032.01.01.01.01 Describe the application of certification specification (CSs) with regard to the different kinds of aeroplanes. 032.01.01.01.02 Describe the general differences between aeroplanes certified according to CS-23 and CS-25. 032.01.01.02.01 Describe the basic concept that the applicable operational requirements differ depending on aeroplane performance. 032.01.01.02.02 Describe the performance classes for commercial air transport according to the applicable operational requirements. 032.01.01.03.01 State that aeroplane performance required for commercial air transport may limit the weight of a dispatched aeroplane in order to achieve a sufficient level of safety. 032.01.01.03.02 Describe that the minimum level of safety required for commercial air transport is ensured through the combination of airworthiness requirements and operational limitations, i.e. the more stringent airworthiness requirements of CS-25 enable a wider range of operating conditions for these aeroplanes. 032.01.01.04.01 Describe measured performance and explain how it is determined. 032.01.01.04.02 Describe gross performance. 032.01.01.04.03 Describe net performance and safety factors. 032.01.01.04.04 Describe that the size of a safety factor depends on the likelihood of the event and the range of the measured performance data. 032.01.01.04.05 Describe the relationship between net and gross take-off and landing distances, and net and gross climb and descent gradients.	1	Alkalmazástechnikai feladatok kiadása. Alapfogalmak és definíciók tisztázása.	2
8. B	A teljesítményekkel kapcsolatos alapfogalmak, definíciók. 032.01.02.02.01 Define the terms ‘climb angle’ and ‘climb gradient’. 032.01.02.02.02 Define the terms ‘flight-path angle’ and ‘flight-path gradient’. 032.01.02.02.03 Define the terms ‘descent angle’ and ‘descent gradient’. 032.01.02.02.04 Explain the difference between climb/descent angle and flight-path angle. 032.01.02.02.05 Define ‘absolute ceiling’. 032.01.02.02.06 Describe ‘clearway’ and ‘stopway’ according to CS-Definitions. 032.01.02.02.07 Describe: take-off run available (TORA); take-off distance available (TODA); accelerate-stop distance available (ASDA); and determine each from given data or appropriate aerodrome charts. 032.01.02.02.08 Describe ‘screen height’ including its various values. 032.01.02.02.09 Define the terms ‘range’ and ‘endurance’. 032.01.02.02.10 Define an aeroplane’s ‘specific range’ (SR) in terms of nautical air miles (NAM) per unit of fuel, and ‘specific range over the ground’ (SRG) in terms of nautical ground miles (NGM) per unit of fuel. 032.01.02.02.11 Define the power available and power required.	3	Repülési teljesítményekkel kapcsolatos követelmények alapfogalmak, definíciók.	4
9. A	A felszállás jellemzői.	5		6

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
	032.02.01.01.04 Describe the European Union airworthiness requirements according to CS-23 relating to aeroplane performance (stall, take-off, climb, landing). 032.02.01.01.05 Define and identify the critical engine of a multi-engine propeller aeroplane. 032.02.01.01.06 Explain the effect of an engine failure on the power required, the total drag (thrust required) and climb performance of a multi-engine aeroplane. 032.02.01.01.07 Explain the effect of engine failure on the minimum control speed of a multi-engine aeroplane under given conditions (temperature and pressure altitude). 032.02.03.01.01 Define the following distances and masses: take-off distance; landing distance; ground-roll distance; maximum allowed take-off mass; maximum allowed landing mass. 032.02.03.01.02 Explain the effect of flap-setting on the take-off, landing and ground-roll distances. 032.02.03.01.03 Explain the effects of the following runway (RWY) variables on take-off distances: RWY slope; RWY surface conditions: dry, wet and contaminated; RWY elevation. 032.02.03.01.04 For both fixed-pitch and constant-speed propeller aeroplanes, explain the effect of airspeed on thrust during the take-off run. 032.02.03.01.05 Describe the effects of brake release before take-off power is set on the TOD and ASD. 032.02.03.01.06 Explain the effect of wind on take-off and landing distances, and determine the actual headwind/tailwind component given the runway direction, wind speed and direction, by use of wind component graphs, mathematical calculations, and rule of thumb. 032.02.03.01.07 Explain why an aeroplane has maximum crosswind limit(s) and determine the crosswind component given the runway direction, wind speed and direction, by use of wind component graphs, mathematical calculations, and rule of thumb. 032.02.03.01.08 Explain the percentage of accountability for headwind and tailwind components during take-off and landing calculations. 032.02.03.01.09 Explain the effect of runway conditions on the landing distance. 032.02.03.01.10 Explain the effects of pressure altitude and temperature on the take-off distance, take-off climb, landing distance and approach climb. 032.02.03.01.11 Describe the landing airborne distance and ground-roll distance and estimate the effect on the landing distance when the aeroplane is too fast or too high at the screen. 032.04.01.01.01 Explain the forces affecting the aeroplane during the take-off run. 032.04.01.01.02 State the effects of thrust-to-weight ratio and flap-setting on ground roll.		A felszálló teljesítményt befolyásoló tényezők	
10 B	Emelkedési és útvonal-jellemzők. 032.01.04.01.01 Resolve the forces during a steady climb. 032.01.04.01.02 Define and explain the following terms: critical engine; speed for best angle of climb (VX); speed for best rate of climb (VY). 032.01.04.01.03 Explain climb performance in relation to the thrust available and thrust required (angle of climb), and power available and power required (rate of climb). 032.01.04.01.04 Explain the meaning and effect of ‘excess thrust’ and ‘excess power’ in a steady climb. 032.01.04.01.05 Interpret the ‘thrust/power required’ and ‘thrust/power available’ curves in a steady climb. 032.01.04.01.06 State the difference between climb angle and gradient.	7		8

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
	032.01.04.01.07 Explain the effect of weight on the climb angle and rate of climb, and the speed for best angle and best rate of climb. 032.01.04.01.08 Explain the effects of pressure altitude and temperature, including an inversion on climb performance (angle and rate of climb). 032.01.04.01.09 Explain the effect of configuration on climb performance (angle and rate of climb, and VX and VY). 032.01.04.01.10 Describe the effect of engine failure on climb performance (angle and rate of climb, and VX and VY). 032.01.04.01.11 Calculate the all-engine and one-engine-out climb gradient from given values of engine thrust and aeroplane drag and weight. 032.01.02.03.01 Name the following factors that affect aeroplane performance: pressure altitude and temperature, wind, aeroplane weight, aeroplane configuration, aeroplane anti-skid status, aeroplane centre of gravity (CG), aerodrome runway surface, and aerodrome runway slope. 032.01.02.03.02 Describe how, for different density altitudes, the thrust and power available vary with speed for a propeller-driven aeroplane. 032.01.02.03.03 Describe how, for different density altitudes, the thrust and power available vary with speed for a turbojet aeroplane. 032.01.02.03.04 Describe how, for different density altitudes, the drag and power required vary with indicated airspeeds (IAS) and true airspeeds (TAS). 032.01.02.03.05 Describe how, for different aeroplane weights and configurations, the drag and power required vary with IAS and TAS. 032.01.03.01.01 Explain how drag (thrust) and power required vary with speed in straight and level flight. 032.01.03.01.02 Explain the effect of excess thrust and power on speed in level flight. 032.01.03.01.03 Interpret the ‘thrust/power required’ and ‘thrust/power available’ curves in straight and level flight. 032.01.03.01.04 Describe how the maximum achievable straight and level flight IAS and TAS vary with altitude. 032.01.03.01.05 Describe situations in which a pilot may elect to fly for ‘maximum endurance’ or ‘maximum range’. 032.01.03.02.01 Define a turbojet aeroplane’s specific fuel consumption (SFC) and describe how it affects fuel flow and specific range. 032.01.03.02.02 Define a propeller-driven aeroplane’s SFC and describe how it affects fuel flow and specific range. 032.01.03.02.03 Explain the optimum speed for maximum SR for a turbojet aeroplane in relation to the drag curve. 032.01.03.02.04 Explain the optimum speed to achieve maximum SR for a propeller-driven aeroplane in relation to the power required and drag graphs. 032.01.03.02.05 Explain the effect of aeroplane weight and CG position on fuel consumption, range and the optimum speed for maximum SR. 032.01.03.02.06 State how a turbojet engine’s SFC varies with temperature and thrust setting. 032.01.03.02.07 Explain how SR for a turbojet aeroplane varies with altitude and under different meteorological conditions. 032.01.03.02.08 Explain how SRG for a propeller-driven aeroplane varies with altitude and under different meteorological conditions. 032.01.03.02.09 Explain the effect of weight on the optimum altitude for maximum range.		Az emelkedő és utazó teljesítményt befolyásoló tényezők	

Nap- tári hét	Előadás tárgykör	Óra- szám	Gyakorlat tárgykör	Óra- szám
	032.01.03.02.10 Describe the effect of wind on SRG and the optimum speed for SRG , when compared to SR, and the optimum speed for SR. 032.01.03.03.01 Explain fuel flow in relation to TAS and thrust for a turbojet aeroplane. 032.01.03.03.02 State the speed for maximum endurance for a turbojet aeroplane. 032.01.03.03.03 Explain fuel flow in relation to TAS and thrust for a propeller-driven aeroplane. 032.01.03.03.04 State the speed for maximum endurance for a propeller-driven aeroplane and the disadvantages of holding at this speed (e.g. high angle of attack (AoA) and lack of speed stability). 032.01.03.03.05 Explain the effect of wind and altitude on endurance, and the maximum endurance speed for a turbojet aeroplane. 032.01.03.03.06 Explain the effect of wind and altitude on endurance, and the maximum endurance speed for a propeller-driven aeroplane. 032.01.03.03.07 Describe the benefits of managing your en-route airspeed to reduce or avoid holding time, and the operational situations when it could be used (commanded by the pilot or air traffic control (ATC), when delays at arrival airport occur).			
11 A	A repülőgép süllyedő mozgása. Süllyedési profilok. 032.01.05.01.01 Resolve the forces during steady descent and in the glide. 032.01.05.01.02 Explain descent performance in relation to thrust available and thrust required (drag), and power available and power required. 032.01.05.01.03 Explain the meaning of ‘excess thrust required’ (excess drag) and ‘excess power required’ in a steady descent. 032.01.05.01.04 Interpret the ‘thrust/power required’ and ‘thrust/power available’ curves in a steady descent. 032.01.05.01.05 Explain the effect of mass, altitude, wind, speed and configuration on the glide descent. 032.01.05.01.06 Explain the effect of mass, altitude, wind, speed and configuration on the powered descent.	9	A süllyedést / siklást befolyásoló tényezők. Teljesítményszámítás egyszerű (L; D; M) jellemzőkkel.	10
12 B	A leszállás jellemzői. 032.02.01.01.01 Define the following speeds: stall speeds VS, VS0 and VS1; rotation speed VR; speed at 50 ft above the take-off surface level; reference landing speed VREF. 032.02.01.01.02 Describe the limitations on VR, on the speed at 50 ft above the take-off surface and on VREF, and given the appropriate stall speed, estimate the values based on these limitations for a single-engine, class B aeroplane. 032.02.01.01.03 Describe the limitations on VR, on the speed at 50 ft above the take-off surface and on VREF, and given the appropriate stall speed, estimate the values based on these limitations for a multi-engine, class B aeroplane. 032.02.04.01.01 Describe the climb and en-route requirements according to the applicable operational requirements.	11	A leszálló teljesítményt befolyásoló tényezők	12
13 A	Classroom paper	13	Zárthelyi dolgozat.	14
14 B	SEP repülőgépek teljesítményszámítása, a felszállási, emelkedési, utazó, és leszálló teljesítményadatok használata.	15		16

Nap- tári hét	Előadás tárgykör	Óra- szám	Gyakorlat tárgykör	Óra- szám
	032.02.04.01.02 For a single-engine aeroplane, calculate the expected obstacle clearance (in visual meteorological conditions (VMC)) given gross climb performance, obstacle height and distance from reference zero. 032.02.04.01.03 For a single-engine aeroplane, calculate the net glide gradient and net glide distance, given aeroplane altitude, terrain elevation, gross gradient or lift/drag ratio (L/D ratio), and headwind or tailwind component. 032.03.03.01.01 Determine the field-length-limited take-off mass and take-off speeds given defactored distance, configuration, pressure altitude, temperature and headwind/tailwind component. 032.03.03.01.02 Determine the accelerate-go distance and accelerate-stop distance data. 032.03.03.01.03 Determine the ground-roll distance and take-off distance from graphs.		Teljesítményszámítások.	
15 A	Spring break		Tavaszi szünet	
16 B	MEP repülőgépek teljesítményszámítása, a felszállási, emelkedési, utazó, süllyedési és leszálló teljesítményadatok használata, hajtóműhibák hatása. 032.02.03.01.12 Describe the take-off flight path for a multi-engine, class B aeroplane. 032.02.03.01.13 Describe the dimensions of the take off flight path accountability area (domain). 032.03.03.01.04 Determine the all-engine-out and critical-engine-out take-off climb data. 032.03.03.01.05 Determine take off flight path for a MEP aeroplane of given mass and given airfield conditions, and calculate the obstacle clearance based on the take off flight path. 032.03.03.01.06 Determine the minimum headwind or maximum tailwind component required for take-off for a given mass and given airfield conditions. 032.03.03.01.07 Given take-off run available (TORA), TODA and ASDA, slope and surface conditions, calculate the defactored distance to be used for commercial air transport using the appropriate take-off graphs. 032.03.03.01.08 Calculate the minimum TORA or TODA for commercial air transport given the defactored take-off distance or run, runway surface and slope. 032.03.03.02.01 Determine rate of climb. 032.03.03.02.02 Calculate obstacle clearance climb data. 032.03.03.02.03 Determine the still-air and flight-path gradients for given IAS, altitude, temperature, aeroplane weight and, if relevant, wind component. 032.03.03.04.01 Determine the field-length-limited landing mass and landing speeds given defactored distance, configuration, pressure altitude, temperature and headwind or tailwind component. 032.03.03.04.02 Determine landing climb data in the event of balked landing. 032.03.03.04.03 Determine landing distance and ground-roll distance for given flap position, aeroplane weight and airfield data. 032.03.03.04.04 Calculate, given the landing distance available (LDA), slope and surface type and condition, the defactored distance to be used for commercial air transport using the appropriate landing graphs. 032.03.03.04.05 Calculate the minimum landing distance (LD) that must be available for commercial air transport given the defactored landing distance, runway surface and slope.	17	Teljesítményszámítások	18

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
17 A	MRJT repülőgépek teljesítményszámítása, a felszállási, emelkedési, utazó, süllyedési és leszálló teljesítményadatok használata. 032.04.01.01.03 Describe the European Union airworthiness requirements according to CS-25 relating to large aeroplane performance (General and Take-off). 032.04.01.01.04 Describe the terms ‘aircraft classification number’ (ACN) and ‘pavement classification number’ (PCN), and the requirements and hazards of operating on aerodrome surfaces with PCNs smaller than the ACNs. 032.04.01.01.05 Define and explain the following speeds in accordance with CS-25 or CS-Definitions: reference stall speed (VSR); reference stall speed in a specific configuration (VSR1); 1-g stall speed at which the aeroplane can develop a lift force (normal to the flight path) equal to its weight (VS1g); minimum control speed with critical engine inoperative (VMC); minimum control speed on or near the ground (VMCG); minimum control speed at take-off climb (VMCA); engine failure speed (VEF); take-off decision speed (V1); rotation speed (VR); take-off safety speed (V2); minimum take-off safety speed (V2MIN); minimum unstick speed (VMU); lift-off speed (VLOF); maximum brake energy speed (VMBE); maximum tyre speed (VMax Tyre). 032.04.01.01.06 Explain the interdependence between the above-mentioned speeds where relevant. 032.04.01.01.07 Define the following distances in accordance with CS-25: take-off run with all engines operating and one-engine- inoperative; take-off distance with all engines operating and one-engine-inoperative; accelerate-stop distance with all engines operating and one-engine-inoperative. 032.04.01.01.08 Explain how loss of TORA due to alignment is accounted for. 032.04.01.01.09 Explain the effect of the interdependency of relevant speeds in 032 04 01 01 (05) and the situations in which these interdependencies can cause speed and performance restrictions. 032.04.01.02.01 Explain the effects of the following runway (RWY) variables on take-off distances: RWY slope; RWY surface conditions: dry, wet and contaminated; RWY elevation. 032.04.01.02.02 Explain the effects of the following aeroplane variables on take-off distance: aeroplane mass; take-off configuration; bleed-air configurations. 032.04.01.02.03 Explain the effects of the following meteorological variables on take-off distances: wind; temperature; pressure altitude. 032.04.01.02.04 Explain the consequence of errors in rotation technique on take-off distance: early and late rotation; too high and too low rotation angle; too high and too low rotation rate. 032.04.01.02.05 Compare the take-off distance for specified conditions and configuration for all engines operating and one-engine-inoperative. 032.04.01.02.06 Explain the effect of using clearway on the field-length-limited take-off mass. 032.04.01.02.07 Explain the influence of aeroplane mass, air density and flap settings on V1, V2 and V2MIN and thereby on take-off distance. 032.04.01.02.08 Explain the effect of an error in V1 on the resulting one-engine-out take-off distance. 032.04.01.03.01 Explain how the accelerate-stop distance is affected by given conditions and configuration for all engines operating and one-engine-inoperative. 032.04.01.03.02 Explain the effect of using a stopway on the field-length-limited take-off mass. 032.04.01.03.03 Explain the effect of an error in V1 on the resulting accelerate-stop distance.	19	Teljesítményszámítások	20

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
	032.04.01.03.04 Explain the effect of runway slope or wind component on the accelerate-stop distance. 032.04.01.03.05 Explain how the accelerate-stop distance is determined and discuss the deceleration procedure. 032.04.01.03.06 Explain how the accelerate-stop distance is affected by the use of brakes, anti-skid, reverse thrust, ground spoilers (lift dumpers) and by brake energy absorption limits, delayed temperature rise and brake temperature indication. 032.04.01.03.07 Explain the hazards of rejecting a take-off from high ground speed or high take-off mass, and how to manage these hazards.			
18 B	MRJT repülőgépek teljesítményszámítása, a felszállási, emelkedési, utazó, süllyedési és leszálló teljesítményadatok használata. 032.04.01.04.01 Define the term ‘balanced field length’. 032.04.01.04.02 Describe the relationship between take-off distance and accelerate-stop distance, and identify on a diagram the balanced field length and balanced V1. 032.04.01.04.03 Describe the applicability of a balanced field length. 032.04.01.05.01 Describe the applicability of an unbalanced field length. 032.04.01.05.02 Explain the effect of additional stopway on the allowed take-off mass and appropriate V1 when using an unbalanced field. 032.04.01.05.03 Explain the effect of additional clearway on the allowed take-off mass and appropriate V1 when using an unbalanced field. 032.04.01.06.01 Explain the factors that affect the FLLTOM. 032.04.01.06.02 Explain the concept of a ‘range of V1’ and explain reasons for the placement of the designated V1 towards the faster or slower end of the range. 032.04.01.07.01 Define a ‘contaminated runway’, ‘wet runway’, and a ‘dry runway’. 032.04.01.07.02 Describe the different types of contamination: wet or water patches, frost-covered, dry snow, wet snow, slush, ice, compacted or rolled snow, frozen ruts or ridges. 032.04.01.07.05 Define the different types of hydroplaning. 032.04.01.07.06 Explain the difference between the two dynamic hydroplaning speeds and state which of them is the most limiting for an aircraft operating on a wet runway. 032.04.01.07.07 State that some wind limitations may apply in case of contaminated runways. Those limitations are to be found in Part B of the Operations Manual - Limitations. 032.04.01.07.08 State that the procedures associated with take-off and landing on contaminated runways are to be found in Part B of the Operations Manual - Normal procedures. 032.04.01.07.09 State that the performance associated with contaminated runways is to be found in Part B of the Operations Manual - Performance. 032.04.01.08.01 Explain the difference between the flat-rated and non-flat-rated part in performance charts. 032.04.01.08.02 State the differences in climb-gradient requirements for two-, three- and four-engined aeroplanes. 032.04.01.08.03 Explain the effects of aeroplane configuration and meteorological conditions on the take-off climb. 032.04.01.08.04 Determine the climb-limited take-off mass. 032.04.01.09.01 Describe the operational regulations for obstacle clearance in the net take-off flight path (NTOFP).	21		22

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
	032.04.01.09.02 Define the actual and NTOFP with one-engine-inoperative in accordance with CS-25. 032.04.01.09.03 Explain the effects of aeroplane configuration and meteorological conditions on the obstacle-limited take-off mass. 032.04.01.09.04 Describe the segments of the actual take-off flight path. 032.04.01.09.05 Describe the changes in the configuration, power, thrust and speed in the NTOFP climb segments. 032.04.01.09.06 State the standard maximum bank angle(s) in the first and second segment, and determine the effect on the stall speed and implication on V2. 032.04.01.09.07 Explain the influence of airspeed selection, acceleration and turns on the climb gradient. 032.04.01.09.08 Describe the European Union airworthiness requirements according to CS-25 relating to aeroplane performance take-off climb and flight path. 032.04.01.10.01 Define PLTOM and RTOM. MRJT repülőgépek teljesítményszámítása, a felszállási, emelkedési, utazó, süllyedési és leszálló Teljesítményszámítások teljesítményadatok használata. 032.04.01.10.02 Describe the use of RTOM tables or similar to find PLTOM and how this can also be done using an EFB. 032.04.01.10.03 Interpret what take-off limitation (field length, obstacle, climb, structural, etc.) is restricting a particular RTOM as it is presented in RTOM tables or similar. 032.04.01.10.04 Describe why data from an EFB can differ from data derived from RTOM tables or similar. 032.04.01.11.01 Explain the differences between the take-off performance determination on a wet or contaminated runway and on a dry runway. 032.04.01.11.02 Describe a wet V1 and explain the consequences of using a wet V1. 032.04.01.11.03 Describe the hazards, effects and management of operating from a contaminated runway. 032.04.01.11.04 Describe displacement drag, impingement drag, and the methods to monitor acceleration. 032.04.01.11.05 Explain the benefits and implications of using a derated take-off on a contaminated runway. 032.04.01.12.01 Explain the advantages and disadvantages of using reduced (flex) and derated thrust. 032.04.01.12.02 Explain the difference between and principles behind reduced (flex) and derated thrust. 032.04.01.12.03 Explain when reduced (flex) and derated thrust may and may not be used. 032.04.01.12.04 Explain the effect of using reduced (flex) and derated thrust on take-off performance including take-off speeds, take-off distance, climb performance and obstacle clearance. 032.04.01.12.05 Explain the assumed temperature method for determining reduced (flex) thrust performance. 032.04.01.13.01 Explain the advantages and disadvantages of using different take-off flap settings to optimise the performance-limited take-off mass (PLTOM). 032.04.01.13.02 Determine the optimum flap position and PLTOM from given figures. 032.04.01.14.01 Explain the advantages and disadvantages of the increased V2 procedure. 032.04.01.14.02 Explain under what circumstances this procedure can be used. 032.04.01.14.03 Explain the hazards of the fast V1 and VLOF speeds associated with the increased V2 procedure and how they can be managed. 032.04.01.15.01 Explain the effects on take-off performance of brake-energy and tyre-speed limits. 032.04.01.15.02 Explain under what conditions they are more likely to become limiting.		Teljesítményszámítások	

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
19 A	MRJT repülőgépek teljesítményszámítása, különböző meghibásodások hatásai. 032.04.02.01.01 Explain the effect of climbing at constant IAS on: TAS; Mach number; climb gradient; rate of climb. 032.04.02.01.02 Explain the effect of climbing at constant Mach number on: TAS; IAS; climb gradient; rate of climb. 032.04.02.01.03 Explain the correct sequence of climb speeds for turbojet transport aeroplanes. 032.04.02.01.04 Determine the effect on TAS when climbing in and above the troposphere at constant Mach number. 032.04.02.02.01 Explain the effect on the operational speed limit when climbing at constant IAS and at constant Mach number. 032.04.02.02.02 Explain the term ‘crossover altitude’ which occurs during the climb speed schedule (IAS–Mach number). 032.04.03.04.01 Define the term ‘long-range cruise’. 032.04.03.04.02 Explain the differences between flying at long-range speed and maximum-range speed with regard to fuel-flow and speed stability. 032.04.03.06.01 Define the term ‘optimum cruise altitude’. 032.04.03.06.02 Explain the factors that affect optimum cruise altitude. 032.04.03.06.03 Explain the factors that can affect or limit the maximum operating cruise altitude. 032.04.03.06.04 Explain the purpose of, and operational reasons for, a step climb and when such a climb would be initiated for optimum range. 032.04.03.06.05 Describe the buffet onset boundary (BOB) and determine the high- and low-speed buffet (speed/Mach number only). 032.04.03.06.06 Analyse the influence of bank angle, mass and the 1.3g buffet margin on a step climb. 032.04.03.06.07 Describe that the high-speed buffet can occur at speeds slower or faster than MMO. 032.04.03.06.08 Explain the reasons why a step climb may not be used (e.g. for short sectors, advantageous winds, avoiding turbulence, and due to air traffic restrictions). 032.04.03.07.01 Describe ‘cost index’. 032.04.03.07.02 Describe the reason for economical cruise speed. 032.04.03.07.03 Describe the effect of cost index on climb, cruise and descent speeds. 032.04.04.01.01 Describe the determination of en-route flight-path data with one-engine-inoperative in accordance with the CS-25 provision on en-route flight paths. 032.04.04.01.02 Describe the minimum obstacle-clearance height prescribed in the applicable operational requirements. 032.04.04.01.03 Describe the optimum speed that the pilot should select during drift-down. 032.04.04.01.04 Explain the influence of deceleration on the drift-down profiles. 032.04.04.02.01 Describe and explain the factors which affect the en-route net drift-down flight path. 032.04.05.01.01 Explain the effect of descending at constant Mach number. 032.04.05.01.02 Explain the effect of descending at constant IAS. 032.04.05.01.03 Explain the correct sequence of descent speeds for turbojet transport aeroplanes. 032.04.05.01.04 Determine the effect on TAS when descending in and above the troposphere at constant Mach number. 032.04.05.01.05 Describe the following limiting speeds for descent: maximum operating speed (VMO); maximum Mach number (MMO). 032.04.05.01.06 Explain the effect of a descent at constant Mach number on the margin to low- and high-speed buffet.	23	Teljesítményszámítások	24

Nap- tári hét	Előadás tárgykör	Óra- szám	Gyakorlat tárgykör	Óra- szám
	032.04.05.02.01 Explain the advantages and principle of a continuous descent. 032.04.05.02.02 Describe energy management in terms of chemical, potential and kinetic energy. 032.04.05.02.03 Describe the effect of increasing/decreasing headwind and tailwind on profile management. 032.04.05.02.04 Describe the effect of the Mach number to IAS transition (speed conversion) on profile management. 032.04.05.02.05 Describe situations during the descent and approach in which a pilot could find that an aeroplane flies high or fast, and explain how the pilot can manage descent angle/excess energy.			
20 B	MRJT repülőgépek teljesítményszámítása, különböző meghibásodások hatásai. 032.04.06.01.01 Describe the CS-25 requirements for the approach climb (one-engine-inoprative). 032.04.06.01.02 Describe the CS-25 requirements for the landing climb. 032.04.06.01.03 Explain the effect of temperature and pressure altitude on approach and landing-climb performance. 032.04.06.02.01 Describe the landing distance determined according to CS 25 ('demonstrated' landing distance). 032.04.06.02.02 Describe the landing-field-length requirements for dry, wet and contaminated runways and the applicable operational requirements. 032.04.06.02.03 Define the 'landing distance available' (LDA). 032.04.06.02.04 Define and explain the following speeds in accordance with CS-25 or CS-Definitions: reference stall speed in the landing configuration (VSR0); reference landing speed (VREF); minimum control speed, approach and landing (VMCL). 032.04.06.03.01 Explain the effect of runway slope, surface conditions and wind on the maximum landing mass for a given landing distance available in accordance with the applicable operational requirements. 032.04.06.03.02 Explain the effect on landing distance and maximum allowable landing mass of the following devices affecting deceleration: reverse; anti-skid; ground spoilers or lift dumpers; autobrakes. 032.04.06.03.03 Explain the effect of temperature and pressure altitude on the maximum landing mass for a given landing distance available. 032.04.06.03.04 Explain the effect of hydroplaning on landing distance required and methods of managing landing on contaminated or wet runways. 032.04.06.04.01 Describe how brake temperature limits the turnaround times. 032.05.00.00 CS-25/APPLICABLE OPERATIONAL REQUIREMENTS PERFORMANCE CLASS A - USE OF AEROPLANE PERFORMANCE DATA 032.05.01.01.01 Determine from given graphs the field-lenght-limited take-off mass (FLLTOM) and describe situations in which this limitation could be most restrictive for take-off. 032.05.01.01.02 Determine from given graphs the climb-limited take-off mass and describe situations in which this limitation could be most restrictive for take-off. 032.05.01.01.03 Determine from given graphs the obstacle-limited mass and describe situations in which this limitation could be most restrictive for take-off. 032.05.01.01.04 Determine from given graphs the tyre-speed-limited take-off mass. 032.05.01.01.05 Determine from given graphs the maximum brake-energy-limited take-off mass. 032.05.01.01.06 Determine the take-off V speeds for the actual take-off mass. 032.05.01.01.07 Determine the maximum take-off mass using given RTOM tables.	25	Teljesítményszámítások	26

Nap-tári hét	Előadás tárgykör	Óra-szám	Gyakorlat tárgykör	Óra-szám
	032.05.01.01.08 Using RTOM tables, determine the take-off V speeds for the actual take-off weight using appropriate corrections. 032.05.01.01.09 Determine the assumed/flex temperature and take-off V speeds using the RTOM tables. 032.05.01.01.10 Calculate the break cooling time following a rejected take-off given appropriate data. 032.05.02.01.01 Determine the one-engine-out net stabilising altitude (level-off altitude) from given graphs/tables. 032.05.02.01.02 Determine the maximum mass at which the net stabilising altitude with one-engine-out clears the highest relevant obstacle by the required clearance margin. 032.05.02.01.03 Determine, using drift-down graphs, fuel used, time and distance travelled in a descent from a cruise flight level to a given altitude. 032.05.03.01.01 Determine the field length required for landing with a given landing mass from the aeroplane performance data sheets. 032.05.03.01.02 Determine the landing and approach climb-limited landing mass from the aeroplane performance data sheets. 032.05.03.01.03 Calculate the maximum allowable landing mass as the lowest of: approach-climb- and landing-climb-limited landing mass; landing-field-length-limited landing mass; structural-limited landing mass. 032.05.03.01.04 Determine the brake cooling time for different landing masses using the aeroplane performance data sheets.			
21 A	Classroom paper	27	Zárthelyi dolgozat.	28