Tárgytematika / Course Description

Machine Elements

GKNB_MGTA010

Tárgyfelelős neve / Teacher's name: dr. Lelkes Márk

Félév / Semester: 2019/20/2

Beszámolási forma / Assesment: Vizsga

Tárgy heti óraszáma / Teaching hours(week): 2/3/0

Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

Provide overview on machine element and introduction of those on function, definition of design, assembly etc. In order to Improve and get familiar with machine elements construction competence for industrial task.

TANTÁRGY TARTALMA / DESCRIPTION

Calendar week	Date	Semester week	Name	Lecture	Practical class	Mid-term test
week 07	13.02. 2020	week 01	Construction of mechanical components	Present requirement structure, requirement management RQM V model, how the user/client/customer requirement is translated to technical parameters Design stages, key factors, hierarchy, sensitivity eg bearing vs seal gears for lube	Repetition: technical drawing of machine elements Distribution of Homework 1	
week 08	20.02. 2020	week 02	Fatigue of mechanical structure	Design to fatigue Mathematic basics, spread, Woehler curve, Gauss, 6 sigma, occurrence eg pulling force, (vehicle speed distribution, pulling force distribution at given speed) Real load to test conversion modes, damage factors, weighting Example tractor pulling force, engine curves correlation, effect on parts eg wheel hub bearing Smith/Whoehler diagram practical approach, why is created	Drawing and design of assemblies, tolerance calculation Material selection	

week 09	27.02. 2020	week 03	Industrial joints	Joint types and tightening methods *Bolted joints* - Opening and tightening torque - Self closing - Friction effect - Mechanical models, forces, balances - Stresses in bolts *Binding connections* - Welding, soldering - Different modes - Sizing	Smith/Whoehler diagram	
week 10	05.03. 2020	week 04	Definition of loads	Present different load occurrence (tension, compression, sheer, torsion, contact stress) in typical mechanical components Guideline for calculation	Bolted connection sizing	
week 11	12.03. 2020	week 05	Lubrication	Basic tribology Lubricant types Different applications Definition of lubrication	Practical work for Homework 01 Sizing of pins, keys, etc.	
week 12	19.03. 2020	week 06	Bearing	Bearing types, roller/sliding Definition of loads Selection process, calculation Typical failures Roller bearing types: ball, needle roller, cylindrical, taper roller Production process	Sizing of permanent Attachments	
week 13	26.03. 2020	week 07	Seals	Seal definition, static, dynamic Design parameters, bore/shaft/lubricant Seal types	Submission of Homework 01 Distribution of homework 2 Sizing of bearings	Mid-term test 01
week 14	02.04. 2020	week 08	Shaft	Shaft design Basic rules Materials Load cases, max tensile, composite tensile, rpm, vibration	Small test 01: bearing sizing Selecting seals	
week 15	09.04. 2020	week 09	Friction components	Use of friction component, brakes, locks Calculation methods Materials Environment types dry/wet	Sizing of shafts	
week 16	16.04. 2020	week 10	Shaft connection	Definition of different shaft connection. Fixed, non-fixed. Co axial, non-coaxial Spline design Belt, cardan shaft etc drives	Design of clutches and brakes	
week 17	23.04. 2020	week 11	Housing design and springs	*Housings* Definition of different housing designs Housing materials Production processes, casting, welding Machining *Springs* Definition of springs, mathematic models Characteristics of spring Different types	Practical work for Homework 02 Small test 02: Sizing of a shaft, fatigue calculation	Mid-term test 02

week 18	30.04. 2020	week 12	Toothed gears	Evolute maths Tooth flank generation methods Basic and modified gear tooth surfaces Gear contact characteristics, as contact pattern, kinematics, transmission errors Structural design of gears Different gear types, spur, helical, internal, spiral bevel etc	Submission of homework 2 Design of housings Sizing of springs	
week 19	07.05 2020	week 13		Exam	Sizing of gears	Repeated test

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

	Max points	Min points to pass	Remark
Homework 01	10	3	If submission delayed -20% from 10, max points 8
Homework 02	10	3	If submission delayed -20% from 10, max points 8
Midterm test 01	15	4	
Midterm test 02	15	4	
Small test 01	5		Only 5 or 0 can be distributed
Small test 02	5		Only 5 or 0 can be distributed
Total	60		
Repeated test	30		Transferred points max 15. If 25 points reached, transferred points 10 (25-15.)
Exam total	50		
Eligible for exam	If from each homework and midterm test 25% reach, and totality of two homework and midterm test min 50%. From each homework min 3-3 points, from the two home works 10 points in total. From each midterm test min 4-4 points, from the two midterm test 15 points in total. Otherwise repeated test to complete.		
Exemption from exam	If min 65% of each homework and midterm test reach and total points is 45 or more 4 (45-52), 5 (53-60)		

Half points not distributed

Grade

0-49 marks	inadequate	1
50-64 marks	adequate	2
65-74 marks	average	3
75-84 marks	good	4
85-100 marks	excellent	5

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Obligatory

Shigley’s Mechanical engineering design

Recommended, Hungarian language

Kovács Gáborné Mezei Gizella- Rácz Péter- Szalai Péter- Törőcsik Dávid: Gépelemek 2013. Műszaki és természettudományos alapismeretek tananyagainak fejlesztése a mérnökképzésben.

Bider Zs.- Lászlóné P. A.-Tóth J.: Gépszerkezettan II, HEFOP

Balogh T.- Bukoveczky Gy.- Lászlóné P. A.-Vereš M.: Gépszerkezettan III, HEFOP

Bider Zs.- Lászlóné P. A.-Tóth J.: Gépszerkezettan II, Universitas-Győr Nonprofit Kft. 2008.

Balogh T.- Bukoveczky Gy.- Lászlóné P. A.-Vereš M.: Gépszerkezettan III. Universitas-Győr Kht. 2007.

Balogh T.- Bider Zs.-Háromi F.- Lászlóné P. A.-Szalai P.: Gépszerkezettan II- III segédlet. Universitas-Győr Kht. 2007.

Szendrő Péter szerkesztette: Gépelemek. Mezőgazda kiadó 2007.

Ajánlott aktuális MSZ ISO szabványok.