

Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Technology Institute in Erbil	
Department	Renewable Energy Technology	
Module Name	Design of Machine Parts	
Module Code	DMP301	
Degree	Technical Diploma <input checked="" type="checkbox"/> Bachelor <input type="checkbox"/> High Diploma <input type="checkbox"/> Master <input type="checkbox"/> PhD <input type="checkbox"/>	
Semester	3 rd Semester, 2 nd year.	
Qualification	Ph.D.	
Scientific Title	Lecturer	
ECTS (Credits)	4	
Module type	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weekly hours		
Weekly hours (Theory)	(2)hr Class	(105)Total hrs Workload
Weekly hours (Practical)	(0)hr Class	()Total hrs Workload
Number of Weeks	12	
Lecturer (Theory)	Dr. Dler Abdullah Ahmed	
E-Mail & Mobile NO.	Dler.ahmad@epu.edu.iq	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	This course is prepared to provide a comprehensive understanding of the main principles of machine parts engineering in such a way that the tutees will gain theoretical and tutorial experience for fundamentals, processes, types of stress analyses, machine parts design, shaft design, gear design, clutch design, system design-related issues in a real-world application.				
Course objectives	The lectures are divided into four weekly hours. Mainly, the first two hours will be dedicated to the topic backgrounds and the main principles. Notes and hand-outs are given to the students containing the detail of the topics. This will be assisted by presentations using word and/or PowerPoint slides during the lecture time. Discussion time is provided for the students for questions. The second part of the week is tutorial time in which solved problems and exercises are done.				
Student's obligation	Missed classes will not be compensated including the quizzes and the scheduled assignments. The students will lose marks on unattended classes with quizzes unless a legal document or authorized leave is presented which should explain the excuse for the absence. However, the absent student should take the responsibility for making up the missed lecture.				
Required Learning Materials					
Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	
		Paper Review			
	Assign	Homework	14		
		Class Activity	2		
Report		12			

	Seminar	12		
	Essay			
	Project			
	Quiz	4		
	Lab.			
	Midterm Exam	16		
	Final Exam	40		
	Total			
Specific learning outcome:	<p>1- Apply principles of mathematics, science, and engineering.</p> <p>2- Design experiments and /or conduct standard tests and evaluate their results.</p> <p>3- Design and/or implement engineering systems, components, and processes to introduce solutions that meet specified needs.</p> <p>4- Take into account the sustainability concept and principles and identify the ethical, safety, and political constraints in engineering operations.</p> <p>5- Identify, formulate, and solve real-life engineering issues.</p> <p>6- Think critically in dealing with engineering issues.</p>			
Course References:	<ol style="list-style-type: none"> 1. Engineering mechanics and strength of materials, D.N.Ghosh – 1981 2. Machine elements in mechanical design fourth edition, Robert l .mott 3. A textbook of machine design, 2005, R.S .khurmi, J.K . Gupta 4. Mechanical Engineering Design, Shigley,9th edition 			

Course topics (Theory)	Week	Learning Outcome
Review of the strength of materials, stress in machine members, stress-strain curve, the factor of safety (F.S)	1	1
Screwed joints, forms of screw threads, common type screw fastening, and stresses in screwed fastening due to static loading.	2	2, 3, 4, 5
Shafts, the material used for shafts, type of shafts, and designing.	3	2, 3, 4, 5
Keys, types, and design of key	4	2, 3, 4, 5
Riveted joints, function of rivets, methods of riveting, types of riveted joints, failures of the riveted joint, efficiency of riveted joint.	5	2, 3, 4, 5
Welded joints, function of welded joints, classification of welded joints, design of welded joints for static loads.	6	2, 3, 4, 5, 6
Springs, the function of spring, application of springs, type of spring, design of cylindrical spring, and axial loading.	7	2, 3, 4, 5
Belts, Function of belts, Type of belts, Belt joints, Flat belt drive formulas.	8	3, 4, 5, 6
Clutches, Function of clutches, Type of clutches, Design procedure.	9	3, 4, 5, 6
Gear trains, Gear-Train mechanisms.	10	2, 3, 4, 5, 6
Gearbox, the component of gear-box, Selection of maximum and minimum speeds.	11	3, 4, 5, 6
Power screw, type of screw threads used for power screws, Turning moment and axial load, Efficiency of a screw mechanism, Stresses in the thread.	12	3, 4, 5, 6
Practical Topics	Week	Learning Outcome

Questions Example Design

Q1) Design a rectangular key for a shaft whose diameter (50mm) and the maximum stresses are:

$$\tau = 42 \frac{N}{mm^2} , \sigma_{cr} = 70 N/mm^2$$

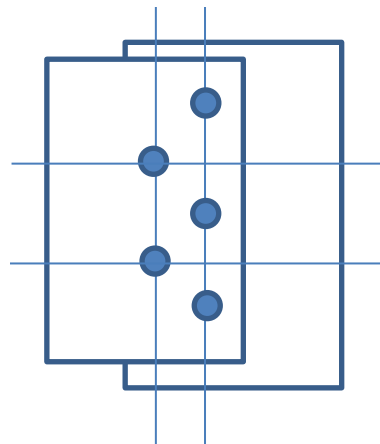
Q2) two plates (7mm) thick, are to be joined using triple riveted zig-zag lap joint.

Assume: $\sigma_t = 80MPa$, $\tau = 60MPa$, $\sigma_{cr} = 120MPa$

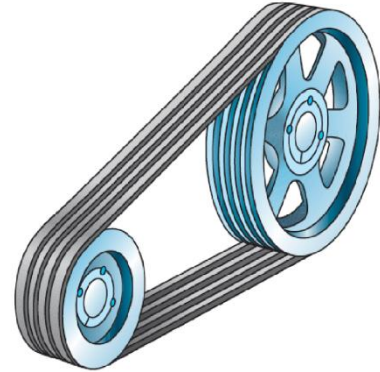
Calculate; a) rivet hole diameter,

b) Rivet pitch

c) Efficiency of the joint

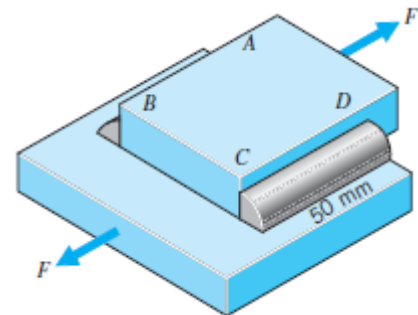


Q3) A flat plate is to be transmitted (20hp) from a motor with (1150r.p.m) speed, to a compressor with (400r.p.m) speed. Determine the size and number of belts, if the cross section of the belt is (2.3cm^2), belt speed (20m/s), coefficient of friction (0.4), contact angle (156°), allowable stress (147N/cm^2):



Q4) determine the diameter of a solid shaft used to transmit (25KW) with (200r.p.m). if the ultimate shear stress is (360N/mm^2) and factor of safety is (8):

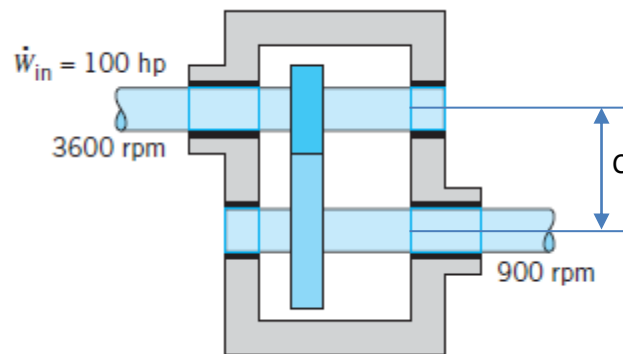
Q5) The plates in Figure are 12 mm thick and made of steel having ($S_\sigma = 350\text{ MPa}$, $S_\tau = 203\text{MPa}$). They are welded together by convex fillet welds along sides AB and CD, each of which is 50 mm long. With a safety factor of (3), what static load F can be carried?



Q6) a plate clutch has an external and internal radius (140mm, 120mm) respectively. If the external pressure (0.16N/cm²) and coefficient of friction are (0.25), calculate the axial load and number of clutch plates required to transmit (2000W) at (100r.p.m):

Q7) Find the stress is produced, diameters, and distance between centers of the pinion gear as shown in the figure, its module is (4.5mm), tooth width (45mm), and the number of teeth (25).

(if $Y = 0.34$).



Extra notes:

External Evaluator

Assist. Prof. Dr. Muhammedtahir Malapoor

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