

BMEE404L	Design of Transmission Systems	L	T	P	C
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Pre-requisite	BMEE301L	Syllabus version			
		1.0			
Course Objectives					
<p>1. To provide the knowledge on materials selection and mechanical properties from manufacturer's catalogue.</p> <p>2. To impart knowledge on design procedure of flexible and rigid mechanical transmission drives.</p> <p>3. To analyze various components of forces acting on the power transmission elements and evaluate load carrying capacity.</p>					
Course Outcomes					
<p>At the end of the course, the student will be able to</p> <p>1. Design flexible power transmission systems such as belt drives, chain drives and wire ropes.</p> <p>2. Examine the selection of rolling and sliding contact bearings in power transmission systems.</p> <p>3. Recommend suitable materials and design gears using manufacturer's catalogue.</p> <p>4. Analyze forces acting on the gear tooth and design based on strength and wear considerations</p> <p>5. Construct the layout of multispeed gearbox used in machine tools.</p> <p>6. Design different types of clutches and brakes used in the mechanical drives.</p>					
Module:1	Design of Flexible Mechanical Drives	7 hours			
Introduction to flexible drives – Design of flat belt drive and pulley – Design of V-belt drive and pulley – Ratio of Tensions – Belt materials – Design procedure using manufacturer's catalogue – Design of chain drives and sprockets – Load carrying capacity – Design of wire ropes – construction and designation – Selection procedure.					
Module:2	Design of Bearings	6 hours			
Rolling contact bearings – Types – Designation – Design procedure – Selection of rolling contact bearings – Design of sliding contact bearings – Types – Basic concepts of hydrodynamic lubrication – Bearing characteristics number – Design parameters for journal bearing – Bearing life – Heat generation and heat dissipation.					
Module:3	Parallel Axes Gear Drives	7 hours			
Gear Nomenclature – Stresses on gear tooth – Gear Materials – Design of spur gear pair – Design of helical gear pair – Surface compressive stress and bending stress calculation – Force analysis of parallel axes gear drives – Design based on beam strength and wear considerations – Gear tooth failures.					
Module:4	Design of Bevel Gears	5 hours			
Introduction to bevel gear drive – Types – Terminology of bevel gears – Stresses on bevel gear tooth – Design of bevel gear drive using manufacturer's catalogue – Equivalent number of teeth – Force analysis on bevel gear – Design based on beam strength and wear considerations					
Module:5	Design of Worm and Worm Wheel	6 hours			
Friction in worm gear pair – Design procedure for worm and worm wheel – Selection of materials – Efficiency of worm gear drive – Modes of failure – Thermal considerations – Analysis of forces – Design based on beam strength and wear considerations.					
Module:6	Design of Multispeed Gearbox	5 hours			
Introduction to multispeed gearbox – Components of speed reduction unit – Principles for optimum gearbox design – Progression ratio – Construction of kinematic layout and speed diagram – Centre distance calculation – Selection of number of teeth.					
Module:7	Design of Clutches and Brakes	7 hours			
Friction materials – Types of clutches – Uniform pressure and uniform wear theories –					

Design of disc or plate clutches – Cone clutch – Centrifugal clutch – Types of mechanical brakes – Design procedure – Block brakes with short and long shoe – Internal expanding shoe brakes – Band brakes – Disc brakes – Thermal considerations.			
Module:8	Contemporary Topics		2 hours
	Total Lecture hours:		45 hours
Text Book			
1.	Bhandari V.B, Design of Machine Elements, 2020, 5th edition, Tata Mc Graw Hill.		
Reference Books			
1.	Richard G. Budynas, Keith Nisbett J, Shigley's Mechanical Engineering Design, 2020, 11 th edition (in SI Units), McGraw Hill.		
2.	Robert L. Norton, Machine Design, 2018, 5th edition, Pearson.		
3.	Juvinal R.C, Kurt M. Marshek, 2016, Machine Component Design, Wiley.		
4.	Robert L Mott, Machine Elements in Mechanical Design, 2020, Pearson Education.		
5.	PSG Design Data: Data Book of Engineers, Kalaikathir Achchagam, 2020.		
Mode of Evaluation: CAT, Written assignment, Quiz, FAT.			
Recommended by Board of Studies		09-03-2022	
Approved by Academic Council		No. 65	Date 17-03-2022