

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN			
Course Title	MACHINE DESIGN		
Course Code	MEMI14	No. of Credits	03
Department	MECH	Faculty	N. PRAVIN KUMAR
Pre-requisites Course Code	None		
Course Coordinator(s) (if, applicable)	None		
Other Course Teacher(s)/Tutor(s) E-mail	pravin@nitt.edu	Telephone No.	9488515181
Course Type	MINOR ELECTIVE		
COURSE OVERVIEW			
<p>Students get exposure to Design of transmission elements to transmit power from driver to driven end. Students will study the design of Belt drives, Chain drives, Gear drives, Gear box, Cam and Friction elements used in machine.</p>			
COURSE OBJECTIVES			
<ol style="list-style-type: none"> <li>1. To gain knowledge on the principles and procedure for the design of power Transmission components.</li> <li>2. To understand the standard procedure available for Design of Transmission sip terms.</li> <li>3. To learn to use standard data and catalogues.</li> </ol>			

COURSE OUTCOMES (CO)	
Course Outcomes	Aligned Programme Outcomes (PO)
1. Be able to analyze the stress and strain on mechanical components; and understand,	1, 2, 3, 5, 8, 10, 11, 12.
2. Demonstrate knowledge on basic machine elements used in machine design; design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.	1, 2, 3, 5, 8, 10, 11, 12.

3. Be able to approach a design problem successfully, taking decisions when there is not a unique answer	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12.		
4. Be proficient in the use of software for analysis and design	1, 2, 3, 5, 7, 8, 9, 10, 11, 12.		
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
S.No.	Week	Topic	Mode of delivery
1.	1-2	Selection of V belts and pulleys – selection of Flat belts and pulleys - Wire ropes and pulleys – Selection of Transmission chains and Sprockets. Design of pulleys and sprockets.	Lecture C&T/ PPT or any suitable mode
2.	3-6	Gear Terminology-Speed ratios and number of teeth-Force analysis -Tooth stresses – Dynamic effects - Fatigue strength - Factor of safety - Gear materials – Module and Face width-power rating calculations based on strength and wear considerations - Parallel axis Helical Gears – Pressure angle in the normal and transverse planeEquivalent number of teeth-forces and stresses. Estimating the size of the helical gears.	
3.	7-10	Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of pair of straight bevel gears. Worm Gear: Merits and demerits terminology. Thermal capacity, materials-forces and stresses, efficiency, estimating the size of the worm gear pair. Cross helical: Terminology-helix angles-Estimating the size of the pair of cross helical gears.	
4.	11-14	Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box -Constant mesh gear box. – Design of multi speed gear box.	
5.	15-16	Cam Design: Types-pressure angle and under cutting base circle determination-forces and surface stresses. Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutche sinternal and external shoe brakes.	

COURSE ASSESSMENT METHODS				
S.no	Mode of Assessment	Week/ Date	Duration	% Weightage
1.	Assessment – 1 (Descriptive Type)	6 <sup>th</sup> Week	60 Minutes	20%
2.	Assessment – 2 (Conceptual and Logical Test)	11 <sup>th</sup> Week	60 Minutes	20%
3.	Assessment – 3 (Group Task) Assignment	13 <sup>th</sup> Week	-----	25%
4.	Compensation Assessment (CPA )	Before End Semester	60 Minutes	Corresponding Weightage
5.	Assessment – 4 (Descriptive)	End Semester	90 Minutes	35%
ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc				
Text Books:				
Reference Books:				
<ol style="list-style-type: none"> <li>1. Shigley J.E and Mischke C. R., “Mechanical Engineering Design”, Sixth Edition, Tata McGraw-Hill , 2003.</li> <li>2. Sundararamoorthy T. V, Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.</li> <li>3. Maitra G.M., Prasad L.V., “Hand book of Mechanical Design”, II Edition, Tata McGraw-Hill, 1985.</li> <li>4. Bhandari, V.B., “Design of Machine Elements”, Tata McGraw-Hill Publishing Company Ltd., 1994. 59</li> <li>5. Prabhu. T.J., “Design of Transmission Elements”, Mani Offset, Chennai, 2000,</li> <li>6. Hamrock B.J., Jacobson B., Schmid S.R., “Fundamentals of Machine Elements”, McGraw- Hill Book Co., 1999.</li> <li>7. Ugural A,C, "Mechanical Design, An Integrated Approach", McGraw-Hill , 2003.</li> </ol>				

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
<ul style="list-style-type: none"> <li>• Feedback from the students during class committee meetings.</li> <li>• Anonymous feedback through questionnaire and unknown formats.</li> </ul>
COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
CORRESPONDENCE
All the students are advised to come to the class regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be intimated in the Class only.

#### ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum of 75 % physical attendance in these contact hours along with assessment criteria to attend the end semester examination.
2. Any student, who fails to maintain 75% attendance need to appear for the compensation assessment (CPA). Student who scores more than 60 % marks in the CPA along with assessment criteria will be eligible for attending the end semester examination.
3. Those students who have attendance lag and also missed any of the continuous assessments (CAs) can appear for CPA to get eligibility for writing the end semester examination as quoted in Pt. 2. Their scores in the CPA WILL NOT be taken into account for computing marks for CA.
4. Students not having 75% minimum attendance at the end of the semester and also fail in CPA (scoring less than 60%) will have to RE DO the course.

#### ASSESSMENT

5. Attending all the assessments are MANDATORY for every student.
6. If any student is not able to attend any of the Assessments due to genuine reason, student is permitted to attend the Repeat assessment (RA) with Corresponding weightage.
7. Student who fails to score 60% in RA will take up additional assignments to get eligibility for writing End Semester examination.

Finally, every student is expected to score minimum 1/3rd of the top rank holder of the class (Including all the assessments) to pass the course. Otherwise the student would be declared fail and 'F' grade will be awarded. Further he can take up only FORMATIVE ASSESSMENT.

8. Please refer B.Tech Regulations 2015(B.12.1) for the letter grades and the corresponding grades

#### ACADEMIC HONESTY & PLAGIARISM

1. All the students are expected to be genuine during the course work. Taking of information by means of copying simulations, assignments, looking or attempting to look at another student's paper or bringing and using study material in any form for copying during any assessments is considered as dishonest.
2. Tendering of information such as giving one's program, assignments to another student to use or copy is also considered as dishonest.
3. Preventing or hampering other students from pursuing their academic activities is also considered as academic dishonesty.
4. Any evidence of such academic dishonesty will result in the loss of marks on that assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and HoD of the concerned department.
5. Students who honestly producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

#### ADDITIONAL COURSE INFORMATION

1. The faculty is available for consultation at times as per the intimation given by the faculty.
2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher ([pravin@nitt.edu](mailto:pravin@nitt.edu))

FOR SENATE'S CONSIDERATION

Course Faculty *Arumichay* CC-Chairperson *Rama* HOD *Shankar*

Course Co-ordinator \_\_\_\_\_