

**DEPARTMENT OF PRODUCTION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-620015.**

COURSE OUTLINE			
Course Title	DESIGN OF MACHINE ELEMENTS		
Course Code	PRPC20	No. of Credits	04
Department	Production Engineering	Faculty	B . Thiyagarajan
Pre-requisites Course Code	PRPC14 and PRPC10		
E-mail	bthiyagarajan@nitt.edu	Contact No.	9095997284
Course Type	Core course	<input checked="" type="checkbox"/>	Elective course
Course overview			
<ul style="list-style-type: none"> ➤ To study about the basic design concepts and procedures while designing any parts ➤ Brief into and detailed study about stresses developed on the machine elements and theories of failure. ➤ To study about design of shafts based on different loading conditions and design of springs. ➤ To study about the design of belt drive, chain drive, coupling, keys and bearings ➤ To study about welded and riveted joints based on their design considerations and failure theories. ➤ To study about design of spur and helical gears based on layout diagram, speed diagram, fixing number of teeth and module of gears. 			

Course objectives	
<ul style="list-style-type: none"> ➤ To understand material properties, design process and various theories for failure ➤ To design various basic machine components ➤ To design new components based on design principles. 	
Course Outcomes	Aligned Programme Outcomes
<ul style="list-style-type: none"> ➤ Understand the various theories of failures ➤ Design various machine components ➤ Design new components based on the design principles 	P01, P02, P03, P06

S. No	Week	Topic	Mode of Delivery
1.	1 st Week	Introduction to the design process	Lecture C&T/ PPT Video
		Factor influencing machine design,	
		Factor influencing machine design,	
		Mechanical properties of materials	
2.	2 nd Week	Direct stress, bending stress, torsional stress	
		Variable stress in machine parts	
		Theories of Failure	
		Theories of Failure	
3.	3 rd Week	Problems of Theories of Failure	
		Problems of Theories of Failure	
		Stress concentration factor, factor of safety	
		Stress concentration factor, factor of safety	
4.	4 th Week	Design of shafts based on bending moment	
		Design of shafts based on twisting moment	
		Design of Shafts based on bending and twisting	
		Design of Shafts based on bending and twisting	

5	5 th Week	Basics of Rigidity and stiffness	Lecture
		Introduction to Springs	C&T/ PPT
		Design of Springs	Video
		Design of Springs	
Cycle Test-1			
6	6 th Week	Introduction to belt and chain drives	Lecture
		Selection and Design of Flat belt drives	C&T/ PPT
		Selection and Design of V belt drives	
		Selection and Design of Chain drives	Video
7	7 th Week	Introduction to Couplings, bearing and Springs	
		Design of Springs	
		Design of Couplings	
		Design of Bearings	
ASSIGNMENT			
8	8 th Week	Introduction to welding	Lecture
		Types of Welding joints	C&T/ PPT
		Welding symbol representation	
		Welding symbol representation	Video
9	9 th Week	Strength of Welding joints subjected to various types of load.	
		Introduction to riveted joints	
		Design of riveted joints for structure	
		Design of riveted joints for structure.	
Cycle Test-II			
10	10 th Week	Design of spur gears. Design of gear box: layout diagram, speed diagram, fixing number of teeth and module of gears	Lecture
		Design of spur gears. Design of gear box: layout diagram, speed diagram, fixing number of teeth and module of gears	C&T/ PPT
		Design of helical gears. Design of gear box: layout diagram, speed diagram, fixing number of teeth and module of gears.	Video
		Design of helical gears. Design of gear box: layout diagram, speed diagram, fixing number of teeth and module of gears	

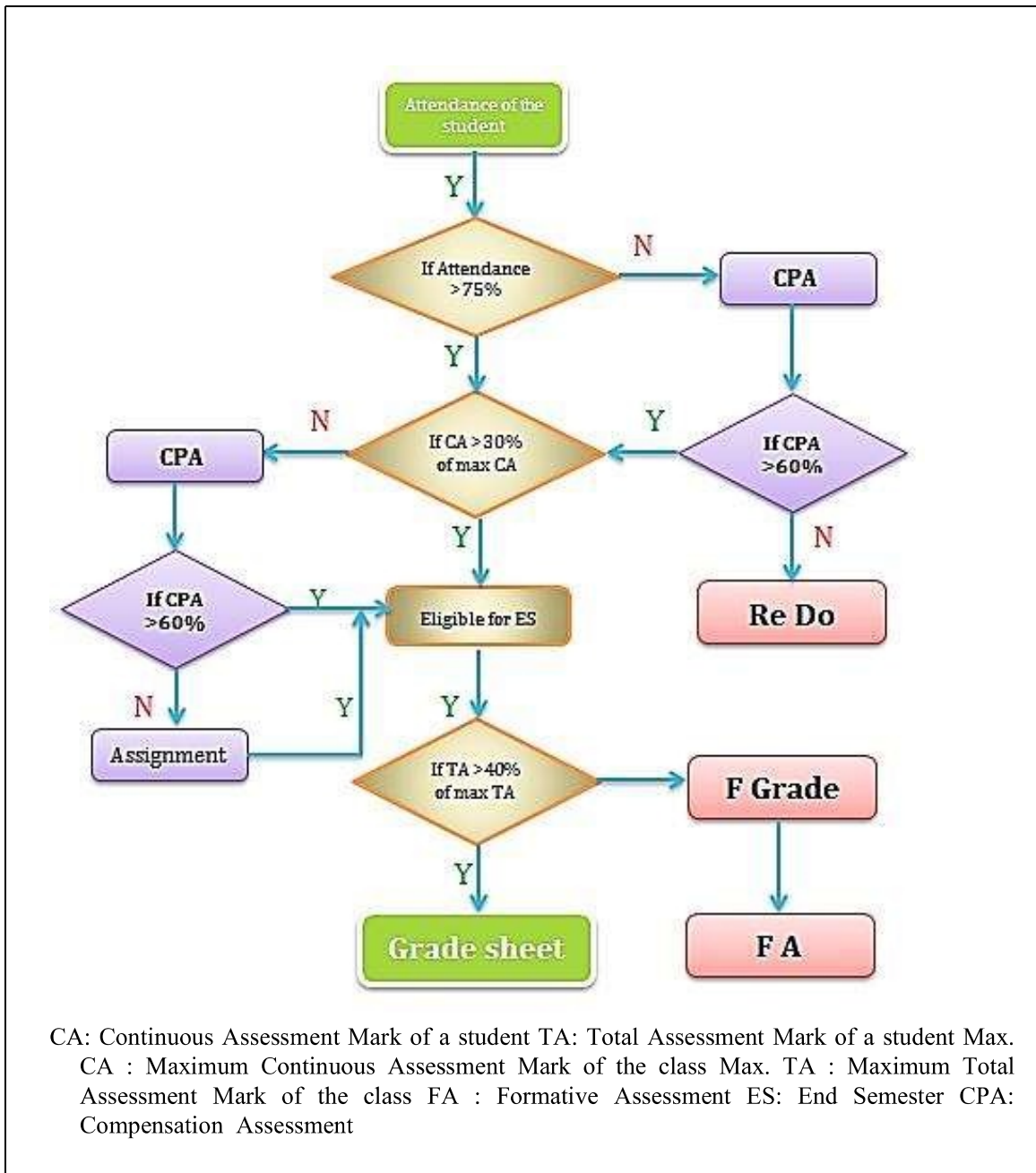
COURSE ASSESSMENT METHODS

S.No	Mode of Assessment	Week	Duration	% Weightage
1	Cycle test-1	4 th week	60 Minutes	20
2	Cycle Test 2	8 th week	60 Minutes	20
3	Assignment-I	7 th week		10
4	Descriptive Type Examination	10 th week	180 Minutes	50

ASSESSMENT

1. Attending all the assessments is MANDATORY for every student.
2. If any student is not able to attend any of the continuous assessments (CAs: Cycle test, Assignment) due to genuine reason, student is permitted to attend the compensation assessment (CPA) with 20 % weightage. If any student missed one cycle test of 10 % weightage then CPA will be considered for 10 % weightage. (This is not valid for students who have attendance lag also. Refer Pt. 3 under Attendance)
3. At any case, CPA will not be considered as an improvement test.
4. Students are expected to score minimum 30% of the maximum mark of the class in the CAs to attend the end semester examination in addition to the attendance requirement. Otherwise the student is permitted to attend CPA and is expected to score more than 60% marks to get eligibility to appear for end semester examination. However, the score in CPA WILL NOT be considered for computing marks for CA. Student who fails to score 60% in CPA will take up additional assignments to get eligibility for writing End Semester examination.
5. Finally, every student is expected to score minimum 40% of the maximum mark of the class in the total assessment (1, 2, 3, 4 and 5) 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.

Refer the following flow chart for more clarity:



ESSENTIAL READINGS: Textbooks, Reference Books Website addresses, journals, etc.

Text Books

1. Bhandari, V.B., "Design of Machine Elements", Tata McGraw-Hill, 2007.
2. Prabhu, T.J. "Design of Transmission Elements", Mani Offset, Chennai, 2005

Reference Books

1. Shigley, J.E. and Mischke, C.R. "Mechanical Engineering Design" Tata McGraw Hill, 2006.

2. Sharma, C.S. and Purohit, K. "Design of Machine Elements", Eurasia Publishing House(P)Ltd, New Delhi, 2005.

COURSE EXIT SURVEY

1. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the concept.
2. Feedback form issued to students to express their comments during mid of the semester and after completing the syllabus. Students are requested to give genuine feedback about the course.
3. Student knowledge about the topic covered in this course will be judged based on marks obtained in the written examinations and during surprise test.

Course Policy (including plagiarism, academic honesty, attendance, etc.)

Examination:

- Students must attend all the examinations (cycle tests, surprise test and end semester examination). If a student fails to attend any of the cycle test due to genuine reason he/she will be permitted to write re-test and the portion will be the combined portion of cycle test 1 and 2.
- Students should submit assignments as per the instructions given in the class. Late submission is not permitted.

Attendance:

- The minimum attendance for appearing for the semester examination is 75%.
- Those students, whose attendance falls below 75% but above 50% in the course, shall attend mandatory classes before the semester examinations to qualify to write semester exam.
- The students who are having attendance less than 50% has to redo the course in the next semester or academic year (at the time of offering the course).
- The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. The assessment of the course will be done on the basis of marks.


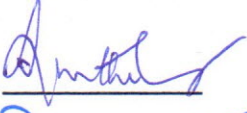

Correspondence

- All the correspondence (schedule of classes/schedule of assessment course material/ any other information regarding this course) will be done through their class representative.

ADDITIONAL COURSE INFORMATION

Students can reach course coordinator by fixing appointment through E-mail bthiyagarajan@nitt.edu or phone 9095997284

FOR APPROVAL

Course Faculty  CC-Chairperson 
HOD  3/7/17