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

COURSE OUTLINE			
Course Title	PRPC10 ENGINEERING MECHANICS		
Course Code	PRPC10	No. of Credits	04
Department	Production Engineering	Faculty	Dr.V.Senthilkumar
Pre-requisites Course Code			
Course Coordinator(s) (if, applicable)	Dr.V.Senthilkumar		
Email Id	vskumar@nitt.edu	Contact No.	9486001113
Course Type	Core course	✓ Elective course	

Course overview

Force and moment vectors, resultants. Principles of statics and free-body diagrams. Properties of areas, second moments. Internal forces in beams. Laws of friction, Bearings.

Principles of particle dynamics. Mechanical systems and rigid-body dynamics. Kinematics and dynamics of plane systems. Energy and momentum of 2-D bodies and systems.

Course objectives

➢ To provide a practice in the application of knowledge in science, mathematics and engineering so that students can expand this knowledge in the area of rigid body mechanics.

➢ To enable students to solve open ended problem in the design of complex system.

➢ To prepare students for higher level courses such as mechanics of materials, theory of machines, design of machine elements and numerical analysis.

Course Outcomes
➢ Students will be able to define the problems and apply analytical techniques to solve the problems regarding System of Forces, Friction, Work, Energy and Motion of Particle and Rigid Bodies.
➢ Students will be able to apply the knowledge gained, to solve Production Engineering Problems in various environment and global contexts.
➢ Students will be able to apply knowledge gained in mathematics, science, engineering and humanities to Production engineering Problems.

S. No	Week	Topic	Mode of Delivery
1.	1st Week	Introduction to Statics	Lecture C&T/ PPT Video
2.		System of Forces	
3.		Equilibrium system of forces	
4.		Free Body Diagram	
5.	2nd Week	Moment, Couple system	
6.		Support and Reactions	
7.		System of Parallel Forces	
8.		TUTORIAL 1	
1.	3rd Week	Dry Friction, Wedge Friction	Lecture C&T/ PPT Video
2.		Disk Friction, Thrust Bearing	
3.		Belt Friction, Square of threaded screw	
4.		Journal Bearings, Axle Friction	
5.	4th Week	Wheel Friction, Rolling Resistance	
6.		TUTORIAL 2	
A.		CYCLE TEST 1	
7.	5th Week	Centroid, Centre of Gravity	Lecture C&T/ PPT Video
8.		Moment of Inertia.	
9.		TUTORIAL 3	
B.		QUIZ 1	

1.		Moving Particle in Cartesian coordinates	
2.	6th Week	Moving Particle in Cylindrical coordinates	Lecture
3.		Path Co-ordinate systems	
4.		TUTORIAL 5	C&T/ PPT
5.		Translation of Rigid Bodies	Video
6.	7th Week	Rotation of Rigid Bodies	
7.		Motion of Particle Relative to rotating frame	
8.		TUTORIAL 6	
1.		Newton's Laws of motion	
2.	8th Week	Linear Momentum	
3.		Angular Momentum	Lecture
4.		TUTORIAL 7	
5.		Central force motion	C&T/ PPT
6.		Work Energy Principle	Video
7.	9th Week	Impulse momentum principles	
8.		TUTORIAL 8	
C.		**CYCLE TEST 2**	
1.		Plane motion of a rigid body	
2.	10th Week	Work, Energy and Impulse	
3.		Momentum principle for rigid bodies	Lecture
4.		TUTORIAL 9	
5.		Applications method of Virtual work	C&T/ PPT
6.	11th Week	Potential Energy and Equilibrium	Video
7.		Introduction to free and forced Vibration	
8.	12th Week	TUTORIAL 10	
D.		**QUIZ 2**	

COURSE ASSESSMENT METHODS					
S.No.	Mode of Assessment	Syllabus	Week	Duration	% Weightage
1	Cycle Test 1	Statics and Friction	4th week	60 Minutes	20
2	Quiz 1	Centroid, CG &Moment of Inertia	5th week	30 Minutes	10
3	Cycle Test 2	Rectilinear, Curvilinear Motion & Laws of Motion	9th week	60 Minutes	20
4	Quiz 2	Work, Energy and Vibration	12th week	30 Minutes	10
CPA	Compensation Assessment (Written Test)	–		60 Minutes	Refer course policy
5	Descriptive Type Examination (End Semester)	–		120 Minutes	40
Total Assessment				6 Hrs	100

ESSENTIAL READINGS: Textbooks, Reference Books Website addresses, journals, etc.
Text Books
Reference Books
1. *Vector Mechanics for Engineers: Statics and Dynamics (in SI Units) by Beer, Johnston, Mazurek, Cornwell and Sanghi: McGraw Hill Education, 10th edition, 2013.* 2. *Engineering Mechanics - Statics and Dynamics (Fourth Edition), by Irving H. Shames, Prentice Hall of India Pvt. Ltd. Eastern Economy Edition, 2001.* 3. *J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 5th Ed, John Wiley, 2002.* 4. *R. C. Hibbler, Engineering Mechanics, Vol I and II, Pearson Press, 2002.*

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
• Feedback from the students during class committee meetings • Anonymous feedback through questionnaire

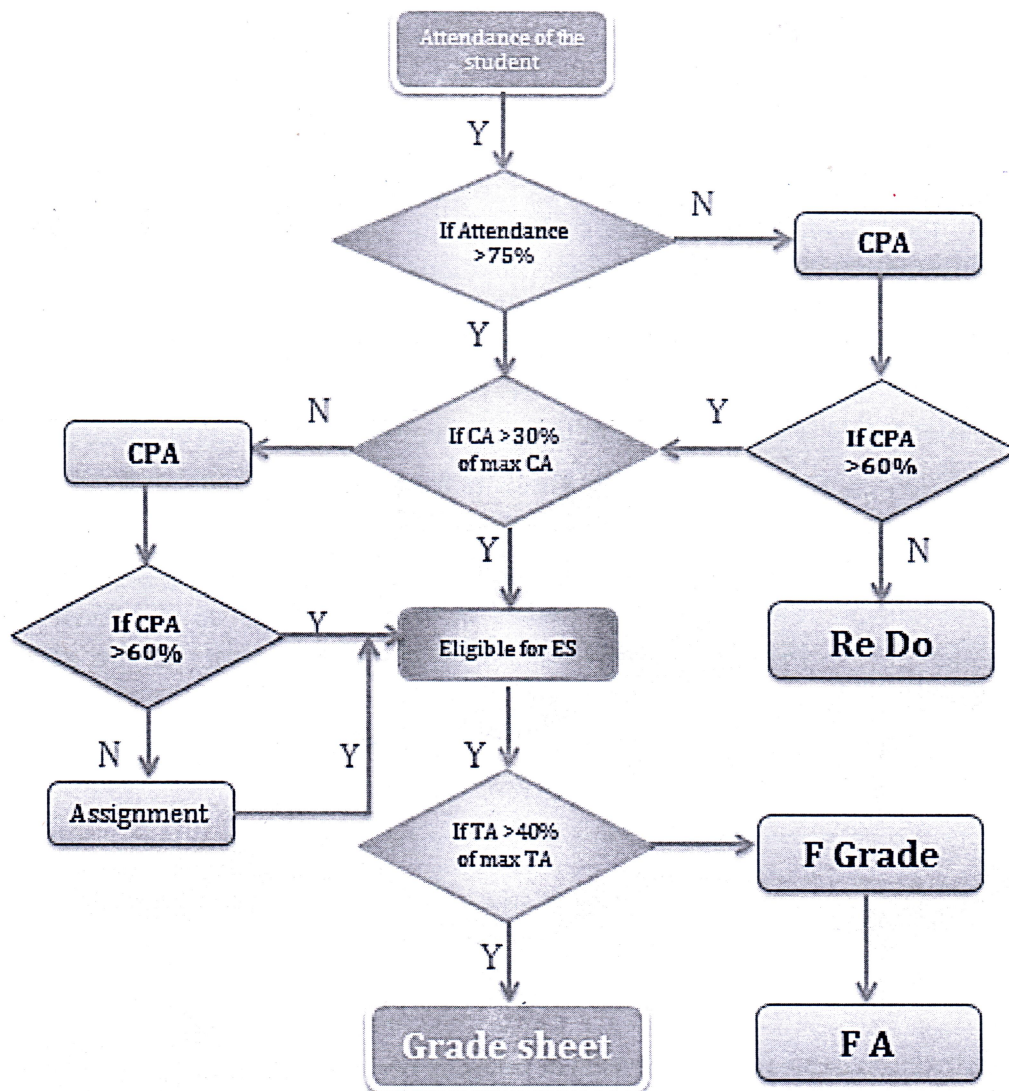| **COURSE POLICY** (including plagiarism, academic honesty, attendance, etc.) |
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| <u>CORRESPONDENCE</u>

1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail only.

2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher. |

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum 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

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, Quizzes) due to genuine reason, student is permitted to attend the compensation assessment (CPA) with 20 % weightage. If any student missed one quiz 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:

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                    ┌─────────────────┐
                    │ Attendance of the│
                    │     student      │
                    └─────────────────┘
                            │ Y
                            ▼
                      ◇ If Attendance ◇ ──N──► ┌─────┐
                      ◇    >75%       ◇         │ CPA │
                            │ Y                 └─────┘
                            ▼                      │
          N           ◇ If CA >30%  ◇    Y    ◇ If CPA ◇
    ┌─────┐ ◄──────── ◇ of max CA   ◇ ◄────── ◇  >60%  ◇
    │ CPA │                │ Y                    │ N
    └─────┘                ▼                      ▼
       │            ┌─────────────┐         ┌─────────┐
       ▼            │ Eligible for ES│       │  Re Do  │
  ◇ If CPA ◇   Y                     │       └─────────┘
  ◇  >60%  ◇ ──────┐        │ Y
       │ N         │        ▼
       ▼           │  ◇ If TA >40% ◇ ──────► ┌─────────┐
  ┌──────────┐  Y  │  ◇ of max TA  ◇         │ F Grade │
  │Assignment│─────┘        │ Y              └─────────┘
  └──────────┘              ▼                     │
                      ┌─────────────┐             ▼
                      │ Grade sheet │        ┌─────────┐
                      └─────────────┘        │   F A   │
                                             └─────────┘
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CA: Continuous Assessment Mark of a studentTA: Total Assessment Mark of a student
Max.CA : Maximum Continuous Assessment Mark of the class Max.TA : Maximum Total
Assessment Mark of the classFA : Formative Assessment
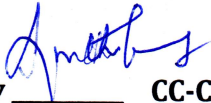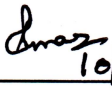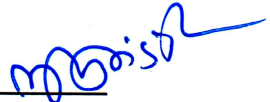ES: End Semester CPA:Compensation Assessment

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 dishonest.

2. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered 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

The faculty is available for consultation at times as per the intimation given by the faculty.

FOR APPROVAL

Course Faculty _____ CC-Chairperson _____ 10/1/97 HOD _____

Dean (Academic)   Director