NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF PRODUCTION ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech.- PRODUCTION ENGINEERING**		
Course Title	**KINEMATICS AND DYNAMICS OF MACHINES**		
Course Code	**PRPC15**	**No. of Credits**	**04**
Course Code of Pre-requisite subject(s)	**APPLIED MECHANICS (PRPC10)**		
Session	**January 2024**	**Section (if, applicable)**	**B**
Name of Faculty	**Dr. Matruprasad Rout**	**Department**	**Production Engg.**
Official Email	**matruprasad@nitt.edu**	**Telephone No.**	
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		**Telephone No.**	
Course Type (please tick appropriately)	✓ **Core course** ☐ **Elective course**		

Syllabus (approved in BoS)

- Kinematic pairs, diagram and inversion - Displacement, velocity and acceleration analysis of planar linkages– static and dynamic analysis of simple mechanisms
- Cam profile synthesis - Gears dynamic force analysis
- Flywheel – fluctuation of energy and speed, Governors
- Inertia forces and their balancing for rotating and reciprocating machines.
- Hydrodynamic and boundary lubrication in journal and thrust bearings.
- Vibration types - one degree – Two degrees of freedom systems – modal analysis

COURSE OBJECTIVES

- Understand the basic concepts of machines and machinery.
- Analyze different types of gear trains
- Construct cam profiles for a given motion.
- Design and evaluate various mechanisms of machines.
- Determine the vibration of systems with one and two degrees of freedom.

MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** (Enter Numbers only)
1. Understand the basic concepts of machines and machinery.	**1, 2, 4, and 6**
2. Understand law of gearing.	**1, 2, 4, 6 and 11**

3. Understand all mechanisms of machines.	**1, 2, 6, and 7**
4. Design various mechanisms of machines.	**1 and 6**
5. Evaluate various mechanisms of machines.	**1, 3, 4, 6, 9 and 12**

COURSE PLAN – PART II

COURSE OVERVIEW

- Basics of kinematics of mechanisms and their inversions
- Understaning the velocity and accelaration analysis of planar mechanisms
- Understaning the can profile and gear force analysis
- Study of inertia forces and their balancing for rotatting and reciprocating machines
- Study the different types of lubrications in journal and thrust bearings
- Study of vibration of systems with one and two degrees of freedom

COURSE TEACHING AND LEARNING ACTIVITIES **(** Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Introduction to kinematics and dynamics of machines- Kinematic pairs, chain	Chalk & Talk, PPT & Video
2	Week 2	Simple Mechanism and their Inversions	Chalk & Talk, PPT & Video
3	Week 3	Displacement, velocity analysis of planar linkages	Chalk & Talk, PPT & Video
4	Week 4	Acceleration analysis of planar linkages	Chalk & Talk, PPT & Video
5	Week 5	Static and dynamic analysis of simple mechanisms	Chalk & Talk, PPT & Video
6	Week 6	Gears dynamic force analysis	Chalk & Talk, PPT & Video
7	Week 7	Cam profile synthesis	Chalk & Talk, PPT & Video
8	Week 8	Flywheel – fluctuation of energy and speed	Chalk & Talk, PPT & Video
Mid-Semester			

9	Week 9	Governors	Chalk & Talk, PPT & Video
10	Week 10	Inertia forces and their balancing reciprocating machines	Chalk & Talk, PPT & Video
11	Week 11	Inertia forces and their balancing for rotating machines	Chalk & Talk, PPT & Video
12	Week 12	Hydrodynamic and boundary lubrication in journal and thrust bearings	Chalk & Talk, PPT & Video
13	Week 13	Vibrations-one degree of freedom systems and two degree of freedom systems	Chalk & Talk, PPT & Video
14	Week 14	Vibrations- Modal analysis	Chalk & Talk, PPT & Video

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quiz test	----	20 Minutes	10
2	Mid-Semester	March 2nd / 3rd Week	90 Minutes	30
3	Assignment	-----	---------	20
CPA	Compensation Assessment*	April 4th Week/ May 1st Week	90 Minutes	30
4	Final Assessment *	May 2nd/3rd Week	180 Minutes	40

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feedback from the students during class committee meeting
2. End semester feedback on course outcomes

COURSE POLICY (including compensation assessment to be specified**)**

<u>COMPENSATION ASSESMENT POLICY</u>

- Compensation is allowed for the Mid-Semester examination only for genuine cases. In such case student must inform the faculty prior to the Mid-Semester examination
- Student has to produce the proof (OD/Medical) for not attending the Mid-Semester

examination

- 90 minutes examination including all syllabus

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty _____ **CC- Chairperson** _____ **HOD** _____