DEPARTMENT OF MECHANICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech – Mechanical Engineering**		
Course Title	**Dynamics of Machinery**		
Course Code	**MEPE21**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)			
Session	**Jan 2022**	**Section (if, applicable)**	
Name of Faculty	**Dr. R. Prakash**	**Department**	**Mechanical Engg.**
Email	**rprakash@nitt.edu**	**Telephone No.**	**9444810545**
Name of Course Coordinator(s) (if, applicable)			
E-mail		**Telephone No.**	
Course Type	☐ **Core course**	✓ **Elective course**	

Syllabus (approved in BoS)

Fundamentals: Types of vibrations, spring and damping elements, Single degree of freedom systems – free undammed: translations, torsional vibrations, Rayleigh's Energy method. Free damped vibrations: viscous damping-coulomb damping.

Forced vibration: harmonic force, rotating unbalance / base excitation, concept of frequency response function (FRF), damping-coulomb and hysteresis, transfer functions. General periodic force, Laplace transform.

Two degree of freedom systems – free-undamped, forced, coupling, introduction to multi-DOF systems.

Vibration of continuous systems: transverse vibration, longitudinal vibration. Vibration control: critical speed of shaft, vibration isolation.

Vibration of plates and membranes, modal analysis, Wave and Euler equations, numerical methods.

COURSE OBJECTIVES

1. To understand the force-motion relationship of components subjected to external forces
2. To analyze the force-motion characteristics of standard machine elements
3. To study the undesirable effects of unbalances resulting from prescribed motions in mechanism.
4. To understand the importance of damping
5. To reduce the physical vibratory system into spring, mass and damping elements

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
At the end of the course student will be able to	
1. State the single degree of freedom systems.	**1-3,5,7,10,12**
2. Sketch the impulse response for a periodic excitation.	**1-3,5,7,10,12**
3. Examine the concept of forced vibration.	**1-3,5,7,10,12**
4. Extend the concept to two degree of freedom systems	**1-3,5,7,10,12**
5. Manipulate the vibration of continuous systems	**1-3,5,7,10,12**

COURSE PLAN – PART II			

COURSE OVERVIEW

This course provides overall concepts pertinent to dynamic of machineries which can be applied in real time systems.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week/Contact Hours	Topic	Mode of Delivery
1	1st Week	Fundamentals: Types of vibrations, spring and damping elements, Single degree of freedom systems – free undamped	Online mode - PPT & by writing pad
2	2nd Week	Translations, torsional vibrations, Rayleigh's Energy method	Online mode - PPT & by writing pad
3	3rd Week	Free damped vibrations: viscous damping-coulomb damping.	Online mode - PPT & by writing pad
4	4th Week	Forced vibration: harmonic force, rotating unbalance / base excitation	Online mode - PPT & by writing pad
5	5th Week	Concept of frequency response function (FRF), damping-coulomb and hysteresis, transfer functions	Online mode - PPT & by writing pad
6	6th Week	General periodic force, Laplace transform.	Online mode - PPT & by writing pad
7	7th Week	Two degree of freedom systems – free-undamped, forced, coupling	Online mode - PPT & by writing pad
8.	8th Week	Introduction to multi-DOF systems	Online mode - PPT & by writing pad
9.	9th Week	Vibration of continuous systems: transverse vibration, longitudinal vibration	Online mode - PPT & by writing pad
10.	10th Week	Vibration control: critical speed of shaft, vibration isolation.	Online mode - PPT & by writing pad
11.	11th Week	Vibration of plates and membranes	Online mode - PPT & by writing pad
12.	12th Week	Modal analysis	Online mode - PPT & by writing pad
13.	13th Week	Wave and Euler equations, numerical methods	Online mode - PPT & by writing pad

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	As decided by CC	1 hr 30 min	25
2	Cycle Test 2	As decided by CC	1 hr 30 min	25
3	Quizzes/ Assignments	Through Semester	Varying	20
CPA	Compensation Assessment*	As decided by CC	1 hr 30 min (syllabus – upto last week class teaching)	25
4	Final Assessment *	As per the academic calendar	2 hrs	30

*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. At the end of every cycle test, feedback will be obtained for the lecture improvement
3. End semester feedback on Course Outcomes.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

1. Per Email (rprakash@nitt.edu) only, NO MOBILE PHONE communications.
2. Student meeting hours: Monday to Thursday 16:00 – 19:00
   (during this time period, students can come and discuss their doubts, projects, and assignment works)
3. Strictly not by phone after the working hours (09:00 – 19:00)

COMPENSATION ASSESSMENT POLICY

Whomever missed the cycle test 1 or 2, can compensate with extra exam. Syllabus for the test should be the topics covered up to last week before the test.

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

Course materials can be obtained from MS Teams/MEPE21 Dynamics of Machinery

FOR APPROVAL

Course Faculty _24/01/2022_   CC-Chairperson _24-01-2022_   HOD _12/01/2022_

Guidelines:

a) The number of assessments for a course shall range from 4 to 5.

b) **Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**

c) **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.**

d) **The passing minimum shall be as per the regulations.**

B.Tech. Admitted in				P.G
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

a) **Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**

b) **Absolute grading policy shall be incorporated if the number of students per course is less than 10.**

c) **Necessary care shall be taken to ensure that the course plan is reasonable and is objective.**