

# **Ramgarhia Polytechnic College, Phagwara**



## **Mechanical Engineering Department**

Head of Department:	Er. Gaurav Kumar
Name of the Faculty:	Er. Gaurav Kumar
Discipline:	Mechanical Engineering Department
Semester:	5 <sup>th</sup>
Subject:	Theory of Machines
Lesson Plan Duration:	16 Weeks

### **RATIONALE**

A diploma holder in this course is required to assist in the design and development of prototype and other components. For this, it is essential that he is made conversant with the principles related to design of components and machine and application of these principles for designing. The aim of the subject is to develop knowledge and skills about various aspects related to design of machine components.

## Course Outcomes

After undergoing this course, the students will be able to:

- CO1. Explain working of different types of mechanisms and draw their inversion.
- CO2. Determine the horizontal force required to move a body on an inclined plane and calculate the efficiency of screw jack.
- CO3. Solve problems on power transmission.
- CO4. Determine ratio of driving tension for flat and V-belt drive.
- CO5. Identify various types of gears and their applications.
- CO6. Construct turning moment diagram of flywheel for different types of engine.
- CO7. Explain working of different types of governors.
- CO8. Calculate balancing of rotating mass and its position.
- CO9. Identify different type of vibrations, their causes, harmful effect and remedies.

PO $\Rightarrow$	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO $\Downarrow$							
CO1							
CO2							
CO3							
CO4							
CO5							
CO6							
CO7							
CO8							
CO9							

## Syllabus

Units	Details	Hours
1.	<p>Simple Mechanisms Introduction to link, kinematic pair, lower and higher pair, Kinematic chain, mechanism, Inversions. Different types of mechanisms ( with examples )</p>	(06 hrs)
2.	<p>. Friction Definition and its necessity Horizontal force required to move a body on an inclined plane both upward and downward Frictional torque in screws , both for square and V threads Screw jack ( Derivation and Numericals) Different types of bearings and their application</p>	(10 hrs)
3.	<p>. Power Transmission Introduction to Belt and Rope drives Types of belt drives and types of pulleys Concept of velocity ratio, slip and creep; crowning of pulleys (simple numericals) Flat and V belt drive: Ratio of driving tensions, power transmitted, centrifugal tension, and condition for maximum horse power (simple numericals) Different types of chains and their terminology Gear terminology, types of gears and their applications; simple and compound gear trains; power transmitted by simple spur gear</p>	(14 hrs)
4.	<p>Flywheel Principle and applications of flywheel Turning - moment diagram of flywheel for different engines Fluctuation of speed and fluctuation of energy - Concept only Coefficient of fluctuation of speed and coefficient of fluctuation of energy</p>	(08 hrs)
5.	<p>Governor 5.1 Principle of governor</p>	(10 hrs)

	Simple description and working of Watt, Porter and Hartnel governor (simple numerical based on watt and porter governor) Hunting, isochronisms, stability, sensitiveness of a governor	
6.	Balancing 6.1 Concept of balancing 6.2 Introduction to balancing of rotating masses (simple numericals)	(06 hrs)
7.	Vibrations Types-longitudinal, transverse and torsional vibrations (simple numericals) Dampening of vibrations Causes of vibrations in machines, their harmful effects and remedies	(10 hrs)

### Reference Books:

1. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
2. Theory of Machines by V.P Singh; Dhanpat Rai and sons, New Delhi.
3. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.
4. Theory of Machine by B.S Ubhi; S.K. Kataria and Sons, New Delhi.

### Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	PowerPoint Presentation

### Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Test	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

### Gaps in the syllabus - to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
	N/A	N/A	N/A

### Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

### Web Source References

Sr. No.	URL
1.	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>

## Lesson Plan

Week	Theory		Practical	
	Lecture Day		Practical Day	
1 <sup>st</sup>	1 <sup>st</sup>	Introduction to link,	1.	N/A
	2 <sup>nd</sup>	kinematic pair, lower and higher pair		
	3 <sup>rd</sup>	Kinematic chain,		
	4 <sup>th</sup>	Mechanism, Inversions.		
2 <sup>nd</sup>	5 <sup>th</sup>	Different types of mechanisms ( with examples )	2.	N/A
	6 <sup>th</sup>			
	7 <sup>th</sup>	Definition and its necessity		
	8 <sup>th</sup>	Horizontal force required to move a body on an inclined plane both upward and downward		
9 <sup>th</sup>				
3 <sup>rd</sup>	10 <sup>th</sup>	Frictional torque in screws , both for square and V threads	3.	N/A
	11 <sup>th</sup>			
	12 <sup>th</sup>	Screw jack ( Derivation and Numerical)		
	13 <sup>th</sup>			
4 <sup>th</sup>	14 <sup>th</sup>	Different types of	4.	N/A
	15 <sup>th</sup>			
	16 <sup>th</sup>			

		bearings and their application		
5 <sup>th</sup>	17 <sup>th</sup>	Introduction to Belt and Rope drives	5.	N/A
	18 <sup>th</sup>	Types of belt drives and types of pulleys		
	19 <sup>th</sup>	Concept of velocity ratio, slip and creep; crowning of pulleys (simple numericals)		
	20 <sup>th</sup>			
6 <sup>th</sup>	21 <sup>st</sup>	Flat and V belt drive: Ratio of driving tensions, power transmitted, centrifugal tension, and condition for maximum horse power (simple numericals)	6.	N/A
	22 <sup>nd</sup>			
	23 <sup>rd</sup>	<b>REVISION</b>		
	24 <sup>th</sup>	<b>1<sup>st</sup> Sessional Test (Tentative)</b>		
7 <sup>th</sup>	25 <sup>th</sup>	Different types of chains and their terminology	7.	N/A
	26 <sup>th</sup>	Gear terminology, types of gears and their applications		
	27 <sup>th</sup>			
	28 <sup>th</sup>	simple and compound gear trains		
8 <sup>th</sup>	29 <sup>th</sup>	power transmitted by simple spur gear	8.	N/A
	30 <sup>th</sup>			
	31 <sup>st</sup>			

	32 <sup>nd</sup>	Principle and applications of flywheel		
9 <sup>th</sup>	33 <sup>rd</sup>	Turning - moment diagram of flywheel for different engines	9.	N/A
	34 <sup>th</sup>			
	35 <sup>th</sup>	Coefficient of fluctuation of speed and coefficient of fluctuation of energy		
	36 <sup>th</sup>			
10 <sup>th</sup>	37 <sup>th</sup>	Principle of governor	10.	N/A
	38 <sup>th</sup>	Simple description and working of Watt, Porter and Hartnel governor (simple numerical based on watt and porter governor)		
	39 <sup>th</sup>			
	40 <sup>th</sup>			
11 <sup>th</sup>	41 <sup>st</sup>		11.	N/A
	42 <sup>nd</sup>	Hunting, isochronisms, stability, sensitiveness of a governor		
	43 <sup>rd</sup>			
	44 <sup>th</sup>	<b>REVISION</b>		
12 <sup>th</sup>	45 <sup>th</sup>	<b>PTM</b>	12.	N/A
	46 <sup>th</sup>	<b>2<sup>nd</sup> Sessional Test (Tentative)</b>		
	47 <sup>th</sup>	Concept of balancing		
	48 <sup>th</sup>			
	49 <sup>th</sup>			



13 <sup>th</sup>	50 <sup>th</sup>	Introduction to balancing of rotating masses  (simple numerical)	13.	N/A
	51 <sup>st</sup>			
	52 <sup>nd</sup>			
14 <sup>th</sup>	53 <sup>rd</sup>	Types-longitudinal, transverse and torsional vibrations  (simple numerical)	14	N/A
	54 <sup>th</sup>			
	55 <sup>th</sup>			
	56 <sup>th</sup>			
15 <sup>th</sup>	57 <sup>th</sup>	Dampening of vibrations	15.	N/A
	58 <sup>th</sup>	Causes of vibrations in machines, their harmful effects		
	59 <sup>th</sup>			
	60 <sup>th</sup>	Vibrations in machines, their harmful effects and remedies		
16 <sup>th</sup>	61 <sup>st</sup>		16.	N/A
	62 <sup>nd</sup>	<b>PTM</b>		
	63 <sup>rd</sup>	<b>REVISION</b>		
	64 <sup>th</sup>	<b>3<sup>rd</sup> Sessional Test (Tentative)</b>		