



**SARVAJANIK UNIVERSITY**  
Sarvajani College of Engineering and Technology  
Bachelor of Technology



**Mechanical Engineering Department**  
**B. Tech. Semester V**

**Course Name** : Theory of Machines and Machine Design      **Course Code:** BTME15606  
**Type of course** : Open Elective Course  
**Prerequisite** : None  
**Rationale of course** : The course aims to impart the basic skills, technical information, and innovative ideas for designing machine components and to study relative motion between them.

**Teaching and Examination Scheme:**

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	00	00	

**CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course.

**Contents:**

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	<b>Introduction to Theory of Machines and Machine Design:</b>  Theory of machines: kinetics & kinematics of motion, machine and mechanism, vibration. Machine design: design process of machine elements, design considerations, properties of materials, standards and codes, use of preferred series, factor of safety, service factor, limit, fit and tolerance.	06	15%
2	<b>Machines and Mechanisms:</b>  Kinematic link, machine and structure, kinematic pair, constrained motion, kinematic chain, joints in chain, mechanism, degree of freedom, mobility and range of movement-kutzbach and grubler’s criterion, grashof’s criterion, inversion of mechanism, contemporary mechanism.	09	20%



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<b>3</b>	<b>Transmission Elements:</b> Friction devices, clutches, brakes and dynamometers, types of bearings, gyroscope, belt-rope and chain drive, gear & gear trains, cam.	<b>10</b>	<b>25%</b>
<b>4</b>	<b>Design against Static Load:</b> Types of stress and strain, combinations of axial, shear, torsional and bending loads, theories of failures, design welded joint, riveted joint and threaded joint.	<b>10</b>	<b>20%</b>
<b>5</b>	<b>Design of Shaft, Key and Coupling:</b> Transmission shafts, hollow shaft, shaft design on strength, torsional basis, types of keys, design of square and flat keys, types of couplings, design of rigid and flexible coupling.	<b>10</b>	<b>20%</b>

**Percentage Distribution of Marks as per Revised Bloom’s Taxonomy (Theory/Practical):**

Percentage Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	25	25	10	20	5

**Legends:** **R:** Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference/Text Books:**

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Theory of machines	S.S. Ratan	Tata McGraw Hill Education	2014	5 <sup>th</sup>
2	Mechanism and Machine Theory	J.S., Rao and R.V. Dukupati	New edge international publishers	2007	2nd
3	Theory of mechanisms and machines	A. Ghosh, and A.K. Mallik	Affiliated East-West Press Private Limited	2008	3rd
4	Design of Machine Elements	V B Bhandari	McGraw Hill	2017	4 <sup>th</sup>



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5	Shigley's Mechanical Engineering Design	R G Budnyas, J K Nisbett	McGraw Hill	2015	7th
6	Machine Design: An Integrated Approach	R L Norton	Pearson	2013	4 <sup>th</sup>

**Course Outcomes (CO's):**

CO No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Recognizing the basic concepts of theory of machine and machine design.	15
CO-2	Analyze various types of mechanisms and their inversions.	25
CO-3	Understanding various power transmission elements.	20
CO-4	Examine the design against failure when mechanical components are subjected to static loading.	20
CO-5	Interpret and analysis of shaft, key and coupling.	20

**Mapping of CO's with Program Outcomes (PO's):**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO-1	1	2	2	1	0	0	0	0	0	0	1	1
CO-2	3	2	3	3	3	0	0	0	0	0	2	2
CO-3	3	3	3	3	3	1	2	1	0	1	2	2
CO-4	1	3	2	1	2	1	2	1	0	1	2	2
CO-5	0	2	3	1	1	1	1	1	0	1	2	1
<b>Rationale</b> *	8	12	13	9	9	3	5	3	0	3	9	8

**Mapping of CO's with Program Outcomes (PO's):**

This course will give basic understanding of machine design and theory of machine so that students can correlate this knowledge with real life problems.

This course highly maps with Program outcomes 1, 2, 3, 4, 5, 11, and 12. it states that the course will develop Engineering knowledge, Problem analysis, Design / development of solutions, Conduct investigations of complex problems, Modern tool usage, Project management and finance, Life-long learning.



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**Assignments to be given as per the requirement of the course.**

**List of Open Source/learning website:**

- 1) <https://nptel.ac.in/courses/112106137>
- 2) <https://nptel.ac.in/courses/112105268>