SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Bachelor of Technology

Mechanical Engineering Department
B. Tech. Semester V

Course Name : **Industrial Drafting and Fundamentals of Machine design** **Course Code:BTME13505**

Type of course : **Professional Core Course**

Prerequisite : Strength of Materials

Rationale of course : This subject is useful to provide basic skill for analysis of mechanical component and also communicate assembly and production drawings for the components designed.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

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	**Industrial Drafting:** Representation of straightness, flatness, circularity, cylindricity, parallelism, perpendicularity, angularity, concentricity and coaxiality, symmetry, radial run out and axial run out. representation of dimensional tolerance of hole, shaft and fits, unilateral, bilateral tolerance, deviation representation of surface roughness and direction of lay of machining, review of sheet preparation, parts list, numbering of components and associated detail drawing, bill of materials, machine drawing, detail drawing: assembly drawing, design drawing and production drawing, assembly drawings of various machine subassemblies and assemblies from detail drawings.	**10**	**25%**
2	**Introduction to Machine Design:** Design definitions, objective of design, design process, role of designer in designing various machine components, aesthetic and ergonomic considerations in design, selection of preferred sizes and manufacturing considerations in design, section modulus of	**09**	**20%**

	rectangular & circular (solid & hollow), I, T, Angle, channel sections, mechanical properties of materials, effect of alloying elements and heat treatment on properties of steels, materials selection in machine design, theories of failures, factor of safety.		
3	**Design for Fluctuating Load**: Stress concentration, endurance limit and fatigue failure, factors affecting endurance limit, notch sensitivity S-N diagram, fluctuating stresses: Soderberg, Gerber, Goodman and modified Goodman criteria, combined stresses.	**05**	**10%**
4	**Design of Machine Joints and Levers:** Design of simple cotter joint, design of knuckle joint, design of welded, riveted and bolted joint, design of levers: cranked, bell crank, foot, rocker arm.	**14**	**30%**
5	**Design of pressure vessels:** Types and applications of pressure vessels, design of thin and thick cylindrical and spherical shells, compounding of cylinders, design of interference joints – press / shrink fitted assemblies, design of cylinder covers, cover plates, pipes and pipe flanges for pipe joints	**7**	**15 %**

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**
10	**25**	**30**	**25**	**05**	**05**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyse, **E:** Evaluate, **C:** Create
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	Publication year	Publication Edition
1.	Design of Machine Elements	V B Bhandari	McGraw-Hill India	2020	5th
2.	Machine Design: An Integrated Approach	R L Norton	Pearson	2018	5th
3.	Mechanical Engineering Design	Shigley, J.E., and Mischke, C.R	McGraw-Hill India	2020	11th
4.	A Textbook of Machine Design	R.S. Khurmi, and J. K. Gupta	S Chand	2020	25th
5.	Machine Drawing	N. Sidheshwar, and P. Kannaiah	McGraw-Hill India	2017	5th

Course Outcomes (CO's):

CO No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Prepare the industrial drawing with its different specification.	25
CO-2	Explain the basic design procedure of mechanical components.	15
CO-3	Estimate the mechanical component design against the failure when components are subjected to fluctuating loading.	15
CO-4	Compute the design of various joints used in mechanical component and lever.	30
CO-5	Design and analyze dimensions of pressure vessel	15

Mapping of (CO's) with Program Outcomes (PO's) and Program Specific Outcomes (PSO's):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO-1	2	2	2	1	1	0	1	0	1	2	2	2	1	2	0
CO-2	3	2	2	1	1	0	0	0	0	0	1	1	1	2	0
CO-3	3	2	3	1	2	0	0	0	0	0	1	2	1	2	0
CO-4	3	3	3	2	3	1	1	1	0	1	2	2	2	3	1
CO-5	3	3	2	2	2	1	1	1	0	1	2	2	2	3	1
Rationale*	14	12	12	7	9	2	3	2	1	4	8	9	7	12	2

Rationale - Mapping of CO's with PO's and CO's with PSO's:
It will help to give basic understanding of various stresses and strains generated in mechanical components, develop the problem analysis skill in students as they are able to correlate with real life problems also students will able to design and analyze mechanical systems using modern computing and analysis software.

This course highly maps with Program outcomes 1, 2, 3,4,5,11,12 and Program Specific Outcomes 1 and 2. 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 and finally it will lead to, convert conceptual knowledge of mechanical engineering to real life application and with the use of modern computing tools.

List of Practical:

1) Prepare a drawing sheet of different joint Symbols.
2) Preparation of cotter and knuckle joint assembly drawing using CAD software.
3) Preparation of lever drawing using CAD software.
4) Design and drawing of cotter joint.
5) Design and drawing of knuckle joint.
6) Design and drawing of levers.
7) Design and prepare detail assembly drawing sheet of screw jack.
8) Prepare production drawing sheet of mechanical component.

Major Equipment:
1) Computational facility

List of Open Source/learning website:
1) https://nptel.ac.in/courses/112105125

List of Open Source Software:
1) Free CAD