Name of Institute: **ITE, Indus University**

Name of Faculty: **Parita Sheth**

Course code: ME0515

Course name: DOME

Pr-requisites: Engineering Mechanics, Strength of Material,

Credit points: 4

Offered Semester: 5th

Course Coordinator:**(16 weeks July to Dec 2022)**

Full Name: Parita Sheth

Department with sitting location: SOM Lab,First floor, Mechanical Engineering Dept., Bhanwar Building Telephone: 9925846097

Email: paritasheth.me@indusuni.ac.in

Consultation times: 4:00 p.m. to 5:00p.m.

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1.. To develop an ability to design a mechanical component subjected to fluctuating loads.
2. To develop an ability to design mechanical springs, clutch, brakes and pressure vessels.
3. To develop an ability to design coil springs (compression, tension and torsion) under various loading conditions.

Course Outcomes (CO)

On the completion of this course, students will be able to...

1. Estimate the fatigue strength and fluctuating loads that will cause failure in real parts using the Soderberg and Goodman techniques. Determine
2. suitable material and size for structural components in machines,
3. including effects of fatigue and stress concentration. Analyze and design components with non-uniform cross sections.

4. Analyze the stress and strain in material handling equipment.

Course Outline

Unit 1 – Design against Fatigue loading, Different design criteria for fatigue loading

Unit 2 - Theories of failure

Unit 3 - Design of key, coupling and shaft.

Unit 4 – Design of lever, material handling equipment.

Method of delivery

For this subject face to face lectures are conducted with ppt and conventional method.

Study time

1) Three lectures in a week.
2) Two hour Practical (once in a week)

CO-PO Mapping (PO: Program Outcomes)

PO**1** Engineering knowledge**:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO**2** Problem analysis**:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO**3** Design/development of solutions**:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO**4** Conduct investigations of complex problems**:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO**5** Modern tool usage**:** Create, select, and apply appropriate techniques, resources,and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO**6** The engineer and society**:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and

cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO**7** Environment and sustainability**:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO**8** Ethics**:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO**9** Individual and team work**:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO**10** Communication**:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO**11** Project management and finance**:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO**12** Life**-**long learning**:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	PO **1**	PO **2**	PO **3**	PO **4**	PO **5**	PO **6**	PO **7**	PO **8**	PO **9**	PO **10**	PO **11**	PO **12**
CO**1**	3	3	2	3	-	-	-	-	-	1	-	2
CO**2**	3	2	2	2	-	-	-	-	-	1	-	2
CO**3**	3	2	1	1	-	-	-	-	-	2	-	1
CO**4**	3	3	2	1	-	-	-	-	-	2	-	1

1-Lightly Mapped 2- Moderately Mapped 3- Highly Mapped

Blooms Ta**x**onomy and **K**nowledge retention **(**For reference**)**

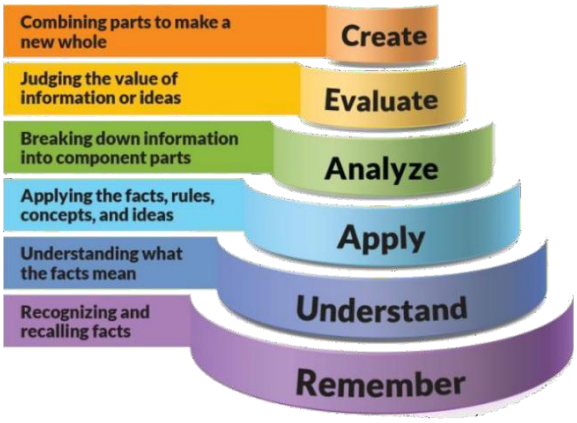

Figure **1:** Blooms Ta**x**onomy

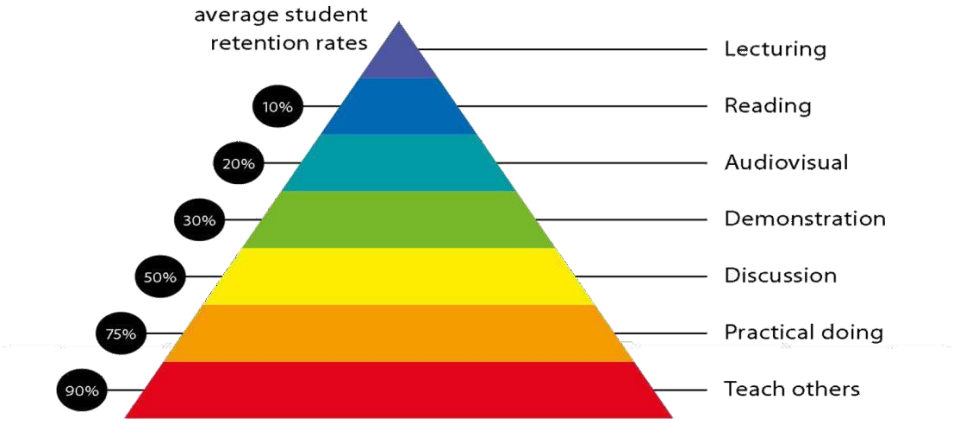

Figure**2:K**nowledge retention

Graduate **Q**ualities and Capabilities covered

General **G**raduate **Q**ualities	Specific Department of Mechanical **G**raduate Capabilities
Informed Have a sound knowledge of an area of study orprofession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area ofstudy has developed and how it relates to other areas.	**1** Professional knowledge**,** grounding & awareness

Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideasof others.	**2** Information literacy**,** gathering & processing
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4** Problem solving skills
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 W**ritten communication **6** Oral communication **7** Teamwork
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10** Sustainability**,** societal & environmental impact

Practical work:

NA

Lecture/tutorial times

Lecture:

1) Three lectures in a week.

Tutorial:

1) Two hours practical for each sub group (once in a week).

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be

used in written work Text books

1 V.B. Bhandari, Design of Machine Elements, Tata McGraw Hill Publishing Co Design

2 of Machine Elements, M.F.Spotts, T.E.Shoup, L.E.Hornberger, S.R.Jayaram and C.V. Venkatesh, Pearson Education.

3) Josheph Shighly, Mechanical Engineering Design, Tata McGraw Hill Book Co.

4) Farazdak Haideri, Machine Design - Volume 1, 2, Nirali Prakashan.

5) Dr. S.S. Wadhwa, Machine Design, Dhanpat rai & Co.

6) P.C.Sharma & Aggarwal, Machine Design, Katariya& Sons.

Reference Books

1 Joseph Shigley, Charles Mischke, Thomas Brown, Standard Handbook of Machine Design, McGraw-Hill Publishing Co .

2 Norton and Norton, Machine Design: An Integrated Approach, Pearson Publication.

1) Theory Assessment:

a) CIE theory will contains **60** marks and the distribution of marks will be as follows:

Distribution	Marks	Remarks
Active participation during lecture and tutorial	**10**	Based on active participation marks will be allotted
Assignment / Tutorial	**10**	Tutorial will be shared with the students.
MSE	**40**	–
Total marks	**60**	

b) ESE theory will contain **40** marks.

C) CIE practical contains 60 marks and distribution is as follows:

Distribution	Marks	Remarks
10 marks for each practical	**10*10= 100**	100 marks will be converted in to 60 marks for CIE
Total marks	**60**	

D) ESE practical will contain 40 marks.

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e. mid semester or end semester) of semester concerned. Students have to remain present during the supplementary examination period to take up the respective components
(mid semester or end semester) and need to obtain the required minimum 40% marks
to clear the concerned components.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of marks based on number of days after due date.

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Course schedule

	Weeks 1	Stress Concentration, Stress Concentration Factors, Reduction of Stress Concentration, Fluctuating Stresses, Fatigue Failure, Endurance Limit ,	1,2,3	Chalk and talk
	Weeks 2	Stress Concentration, Stress Concentration Factors, Reduction of Stress Concentration, Fluctuating Stresses, Fatigue Failure, Endurance Limit ,	1,2, 3	Chalk and talk
	Week 3	Theories of Failure Maximum Principal Stress theory, maximum Shear Stress theory, strain energy theory, shear strain energy, Maximum Principal strain energy.	1,2	Chalk and talk
	Week 4	Design of Keys and Couplings Design and drawing of different types of keys & Couplings, Rigid coupling, Flange Coupling, Flexible coupling- Oldham, Universal coupling	3,4	Chalk and talk
	Week 5	Design of Keys and Couplings Design and drawing of different types of keys & Couplings, Rigid coupling, Flange Coupling, Flexible coupling- Oldham, Universal coupling	3,4	Chalk and talk
	Week 6	Design of Shafts Design of solid and hollow shaft for transmission of torque, bending moment and axial forces, Design of shaft for critical speed, design of shaft for rigidity and stiffness.	2,3, 4	Chalk and talk
	Week 7	Design of Shafts Design of solid and hollow shaft for transmission of torque, bending moment and axial forces, Design of shaft for critical speed, design of shaft for rigidity and stiffness.	3,4	Chalk and talk
	Week 8	Design of Shafts Design of solid and hollow shaft for transmission of torque, bending moment and axial forces, Design of shaft for critical speed, design of	3,4	Chalk and talk

		shaft for rigidity and stiffness.		
	Week 9	Levers General Procedure for design of levers, design of lever for safety valve, design of bell crank lever, design of rocker arm for exhaust valves	2,3 , 4	Chalk and talk
	Week 10	Levers General Procedure for design of levers, design of lever for safety valve, design of bell crank lever, design of rocker arm for exhaust valve	3,4	Chalk and talk
	Week 11	Design of Material Handling System Introduction, M.H. system design principles, factors for selection of M.H. equipment, Design of belt, rope and chains, Pulley Design, Hook design, pulley system design, Design procedure of Sheaves and Drums	2,4	Chalk and talk
	Week 12	Design of Material Handling System Introduction, M.H. system design principles, factors for selection of M.H. equipment, Design of belt, rope and chains, Pulley Design, Hook design, pulley system design, Design procedure of Sheaves and Drums	2,3 , 4	Chalk and talk
	Week 13	Design of Material Handling System Introduction, M.H. system design principles, factors for selection of M.H. equipment, Design of belt, rope and chains, Pulley Design, Hook design, pulley system design, Design procedure of Sheaves and Drums	3,4	Chalk and talk