

FACULTY OF TECHNOLOGY & ENGINEERING
CHAMOS MATRUSANSTHA DEPARTMENT OF MECHANICAL
ENGINEERING

MEI44: ELEMENTS OF ENGINEERING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	1	7	5
Marks	100	50	0	150	

A. Objective of the Course:

This course covers the basics of mechanical and civil engineering. The principles and application of the two core branches of engineering is covered along with the fundamentals of engineering drawing. The objectives of the course are to:

1. Introduce the universal language and tool of communication for engineers and understand the concepts, elements & grammar of engineering drawing.
2. Introduce the important aspects and applications of mechanical engineering and explain the working of different mechanical systems.
3. Understand the scope and basic elements of civil engineering.

B. Outline of the course:

Sr. No.	Title of the Unit	Minimum number of hours
<u>Part: A</u>		
1.	Fundamentals of Engineering Graphics	08
2.	Projections & Section of Solid	06
3.	Orthographic Projection	06
4.	Isometric Projections	06
5.	Computer Aided Drafting & Modeling	04
<u>Part: B</u>		
6.	Introduction of Mechanical Engineering	05

7.	Steam and Steam Generator	04
8.	Internal Combustion Engines	03
9.	Refrigeration and Air Conditioning Systems	03
<u>Part: C</u>		
10.	Scope of Civil Engineering	02
11.	Introduction to Surveying	06
12.	Elements of building Construction	07

Total hours (Theory): 60

Total hours (Lab): 30

Total hours (Tutorial): 15

Total hours: 105

C. Detailed Syllabus:

Part: A

1	Fundamentals of Engineering Drawing	08 Hours	12%
1.1	Importance of engineering drawing, drawing instruments and materials, BIS and ISO		
1.2	Different types of lines used in engineering practice, methods of projections as per SP 46-1988.		
1.3	Engineering Scale.		
1.4	Engineering Curve.		
2	Projections & Section of Solid	06 Hours	10%
2.1	Projection of solids		
2.2	Sectional view		
2.3	True shape of Sections		
2.4	Auxiliary Inclined Plane (AIP), Auxiliary Vertical Plane (AVP)		
3	Orthographic Projection	06 Hours	10%
3.1	Principle projection		
3.2	Methods of first and third angle projection with examples / problems		
4	Isometric Projections	06 Hours	10%

- 4.1 Terminology, Isometric scale
- 4.2 Isometric view and Isometric projection with examples / problems
- 5 Computer Aided Drafting & Modeling 04 Hours 08%**
- 5.1 Introduction to 2D drafting facilities in CAD software

Part: B

- 6 Introduction of Mechanical Engineering 05 Hours 08%**
- 6.1 Prime movers and its types, Sources of energy
- 6.2 Basic terminology: Force and mass, Pressure, Work, Power, Energy, Heat, Temperature, Units of heat, Specific heat capacity, Interchange of heat, Change of state, Internal energy, Enthalpy, Entropy, Efficiency
- 6.3 Zeroth Law and First Law of Thermodynamic, Boyle's law, Charle's law and Combined gas law, Relation between Cp and Cv
- 7 Steam and Steam Generator 04 Hours 07%**
- 7.1 Introduction to steam formation and its types
- 7.2 Introduction to steam table
- 7.3 Boiler definition and its classification
- 7.4 Cochran boiler.
- 8 Internal Combustion Engines 03 Hours 05%**
- 8.1 Introduction
- 8.2 Basic terminology of I.C. engine
- 8.3 Types of I. C. Engines
- 9. Refrigeration and Air Conditioning Systems 03 Hours 05%**
- 9.1 Introduction to refrigeration and air conditioning
- 9.2 Basic terminology, Principal and application of refrigeration
- 9.3 Vapour compression refrigeration system,
- 9.4 Window and split air conditioning systems

Part: C

- 10. Scope of Civil Engineering 02 Hours 04%**
- 10.1 Scope of Civil Engineering,
- 10.2 Branches of civil engineering,

10.3	Role of civil engineer		
11.	Introduction to Surveying	06 Hours	10%
11.1	Definition of surveying,		
11.2	Objects of surveying, Uses of surveying,		
11.3	Primary divisions of surveying, Principles of surveying,		
11.4	List of classification of surveying, Definition: Plan and Map, Scales : Plain scale and Diagonal scale, Conventional Symbols		
11.5	Introduction to linear and angular measurements, Concepts of land profiling		
12.	Elements of building Construction	07 Hours	11%
12.1	Types of building, Design loads,		
12.2	Building components (super structure and substructure),		
12.3	Principles of Planning,		
12.4	Basics Requirements of a building Planning,		
12.5	Types of Residential Building,		

D. Instructional Method and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of Multi-Media projector, Black Board, OHP etc.
- Attendance is compulsory in lectures and laboratory.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- The course includes a laboratory, where students will get opportunities to build appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.
- In the lectures and laboratory discipline and behavior will be observed strictly.

E. Student Learning Outcomes:

On the completion of the course one should be able to:

1. Understand and interpret various engineering drawing.
2. Learn the concepts and be able to draw engineering scale, engineering curve, projection

& section of solid, orthographic and isometric drawing.

3. Understand the overview of computer aided drafting.
4. Understand fundamental principles, theory and applications of mechanical engineering which plays an important role in industries.
5. Learn the formation of different types of steam and utilize it for the boiler.
6. Understand the basics of internal combustion engine, refrigeration and air conditioning system.
7. Understand importance and application of civil engineering.
8. Understand the fundamentals of surveying and be able to carry out simple survey exercise.
9. Learn about different building components, building planning and design of residential building.

F. Recommended Study Material:

❖ Text Books:

1. N. D. Bhatt & V. M. Panchal, "Engineering Drawing", Charotar Publishing House Pvt. Ltd.
2. P. J. Shah, "Engineering Graphics", S. Chand Publishing & Co.
3. P.S.Desai, S.B.Soni, "Elements of Mechanical Engineering", Atul Prakashan, Ahmedabad
4. S.M.Bhatt, H.G.Katariya, J.P.Hadiya, "Elements of Mechanical Engineering", Books India Publication, Ahmedabad.
5. Khasia R.B. and Shukla R.N., "Elements of Civil Engineering", Mahajan Publication.
6. Punamia B.C., "Surveying", Vol. I & II.

❖ Reference Books:

1. P.B. Patel & P.D. Patel, "Engineering Graphics", Mahajan Publishing House.
2. Arunoday Kumar, "Engineering Graphics", Tech-Max Publication.
3. M.L. Agrawal & R.K. Garg, "Engineering Drawing", Vol. I, Dhanpatrai & Co.
4. Dr. Sadhu Singh, "Elements of Mechanical Engineering", S.CHAND Publication, New Delhi
5. V.K.Manglik, "Elements of Mechanical Engineering", PHI Learning, Delhi.

6. Kandya Anurag, "Elements of Civil Engineering", Charotar Publishing House Pvt. Ltd.
7. Kanetkar T.P. & Kulkarni S.V., "Surveying and Levelling", Vol. I & II.

❖ **Web Materials:**

1. <http://nptel.ac.in/courses/112103019/>
2. <http://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing>
3. http://www.engineering108.com/pages/Engineering_graphics/Engineering_graphics_tutorials_free_download.html
4. <https://law.resource.org/pub/in/bis/S01/is.sp.46.2003.pdf>
5. <http://nptel.ac.in/downloads/112105125/>
6. http://www.slideshare.net/allsaintsscience/7th-grade-ch-2-sec-3-behavior-of-gases?qid=75b08741-fb53-4413-b434-5982afe602bf&v=&b=&from_search=12
7. http://www.slideshare.net/Arjun_Dedaniya/properties-of-steam-62226458?qid=fa8777fd-b543-4128-813c-cf3af3b86579&v=&b=&from_search=2
8. http://www.slideshare.net/shanus1/i-c-engines-a-study?qid=69826356-b9ed-4618-9c77-b2d5a3eac2e3&v=&b=&from_search=8
9. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104101>
10. <http://nptel.ac.in/courses/105107122/>