VPKBIET

Vidya Pratishthan's Kamalnayan Bajaj Institute of Institute of Engineering and Technology, Baramati

Board of Studies Mechanical Engineering Department

(Course-2025)

First Year Bachelor of Technology

(w. e. f. Academic Year 2025-26)

Syllabus: First Year (FY B. Tech.) Mechanical Engineering

(Pattern 2025) w.e.f. AY:2025-2026, SEMESTER-I

Course Type	Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	CAA	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BSC	BS25101 TH	Engineering Mathematics – I	3	-	-	10	30	60	-	-	-	100	3	-	-	3
BSC	BS25101 TUT	Engineering Mathematics – I	-	-	1	-	-	-	30	-	-	30	-	-	1	1
BSC	BS25103 TH	Engineering Physics	2		-	10	-	60	-	-	-	70	2	-	-	2
BSC	BS25103 PR	Engineering Physics	-	2	-	-	-	-	30	-	-	30	-	1	-	1
ESC	EL25101 TH	Basic Electrical Engineering	2		-	10	-	60	-	-	-	70	2	-	-	2
ESC	EL25101 PR	Basic Electrical Engineering	-	2	-	-	-	-	30	-	-	30	-	1	-	1
ESC	CE25101 TH	Applied Mechanics	2	-	-	10	-	60	-	-	-	70	2	-	-	2
ESC	CE25101 PR	Applied Mechanics	-	2	-	-	-	-	30	-	-	30	-	1	-	1
ESC	CO25101 TH	Fundamentals of Programming Languages	2	-	-	10	-	60	-	-	-	70	2	-	-	2
ESC	CO25101 PR	Fundamentals of Programming Languages	-	2	-	-	-	-	30	-	-	30	-	1	-	1
VSEC	CO25102 TH	Software lab	1	-	-	30	-	-	-	-	-	30	1	-	-	1
VSEC	CO25102 PR	Software lab	-	2	-	-	-	-	30	-	-	30	-	1	-	1
AEC	HS25101 TH	Communication and Professional Skills	2	-	-	-	-	-	30	-	30	60	2	-	-	2
CC	HS25103 PR	Art and Culture	-	4	-	-	-	-	50	-	-	50	-	2	-	2
Total			**14**	**14**	**1**	**80**	**30**	**300**	**260**	**-**	**30**	**700**	**14**	**7**	**1**	**22**

Head
First Year
VPKBIET Baramati-413133

BOS F.Y. B. Tech

BOS HSSH

BOS Mechanical

Dean Academic

Principal

Principal
Vidya Pratishthan's
Kamalnayan Bajaj Institute of
Engineering & Technology, Baramati
Vidyanagari, Baramati-413133

Syllabus: First Year (FY B. Tech.) Mechanical Engineering

(Pattern 2025) w.e.f. AY:2025-2026, SEMESTER-II

Course Type	Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	CAA	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
BSC	BS25102 TH	Engineering Mathematics - II	3	-	-	10	30	60	-	-	-	100	3	-	-	3
BSC	BS25102 TUT	Engineering Mathematics - II	-	-	1	-	-	-	30	-	-	30	-	-	1	1
BSC	BS25104 TH	Engineering Chemistry	2		-	10	-	60	-	-	-	70	2	-	-	2
BSC	BS25104 PR	Engineering Chemistry	-	2	-	-	-	-	30	-	-	30	-	1	-	1
ESC	ET25101 TH	Basic Electronics Engineering	2		-	10	-	60	-	-	-	70	2	-	-	2
ESC	ET25101 PR	Basic Electronics Engineering	-	2	-	-	-	-	30	-	-	30	-	1	-	1
ESC	ME25101 TH	Engineering Graphics	2	-	-	10	-	60	-	-	-	70	2	-	-	2
ESC	ME25101 PR	Engineering Graphics	-	2	-	-	-	-	30	-	-	30	-	1	-	1
PCC	ME25102 TH	Basic Thermodynamics	3	-	-	10	30	60	-	-	-	100	3	-	-	3
VSEC	ME25103 TH	Mechanical Workshop	1	-	-	30	-	-	-	-	-	30	1	-	-	1
VSEC	ME25103 PR	Mechanical Workshop	-	2	-	-	-	-	30	-	-	30	-	1	-	1
AEC	HS25102 TH	Indian Knowledge System	2	-	-	-	-	-	30	-	30	60	2	-	-	2
CC	HS25104 PR	Physical Education - Exercise and Field Activities	-	4	-	-	-	-	50	-	-	50	-	2	-	2
Total			**15**	**12**	**1**	**80**	**60**	**300**	**230**	-	**30**	**700**	**15**	**6**	**1**	**22**

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ME25101- Engineering Graphics FYB. Tech (Sem-I and Sem-II)		
Teaching Scheme: **TH : 02 Hr/Week** **PR : 02 Hr/Week**	**Credit** **03 (TH: 02, PR:01)**	**Examination Scheme:** **CAA: 10 Marks** **End Sem: 60 Marks** **TW: 30 Marks**

Engineering Graphics is a fundamental subject in engineering that involves creating and interpreting graphical representations of objects, designs, and systems. It serves as a communication tool among engineers, designers, and other stakeholders in the engineering field. It is considered as a language of an engineer.

Prerequisite: Basic trigonometry and knowledge of basic drawing instruments

Course Objectives:

1. To communicate design concepts effectively through graphical representation.
2. To Gain knowledge of conic sections, their significance in engineering applications, and methods of constructing conic shapes.
3. To acquire knowledge of development of lateral surfaces for optimizing material usage.
4. To develop visualization skills through orthographic and isometric projections.
5. To make use of Computer Aided Design (CAD) software for developing technical drawings.

Course Outcomes:

On completion of the course, learner will be able to:

CO1: **Understand** the need for engineering drawing and design, applying sheet layout, line types, dimensioning, and projections of points and lines in first and third quadrants.

CO2: **Construct** engineering curves such as ellipses, parabolas, hyperbolas, helixes, and cycloids using appropriate methods.

CO3: **Develop** lateral surfaces for solids like cones, pyramids, prisms, and cylinders, applying industrial applications of these concepts.

CO4: **Apply** orthographic projection principles, creating accurate views from pictorial representations using first and third angle projection methods.

CO5: **Create** isometric projections of simple and compound solids using isometric scales and converting given orthographic views into isometric views.

Unit-1: Fundamentals of Engineering Graphics	**[6 Hrs.]**
Need of Engineering Drawing and design, Sheet layout, Line types and simple geometrical constructions, Dimensioning- Methods of Dimensioning. **Projections of points:** Theory of projections (reference plane and auxiliary planes, first and third angle method of projections), Projections of point only on first and third quadrant with all possible positions. **Projections of Line:** Projections of line [by first angle method of projection only] inclined to horizontal plane, frontal plane and both i.e oblique lines, on reference and auxiliary plane, true length of a line by rotation of a view and rotation of plane method, traces of lines *[Note: no application oriented questions]*	
Unit 2 – Engineering Curves and Development of Lateral Surfaces	**[8 Hrs.]**
Engineering Curves: Conic Section- Ellipse, Parabola and hyperbola by focus directrix and rectangle method, Helix for cylinder, involute of a circle, cycloid, and Archimedean spiral. *[Note: construction of tangent and normal is not expected in examinations]* Introduction to development of lateral surfaces and its industrial applications. Draw the development of lateral surfaces for cut sections of cone, pyramid, prism, Cylinder etc.	
Unit-4: Orthographic Projection	**[6 Hrs.]**
Principles of Orthographic Projections, types of orthographic projections–First angle and third angle projections, obtaining orthographic projections of given pictorial views by using first angle projection method along with sectional views. *[Note: only full sectional orthographic view to be asked for examination]*	
Unit-5: Isometric Projection	**[6 Hrs.]**
Principles of Isometric projection – Isometric and natural Scale, Isometric views of simple and compound solids, drawing isometric views from given orthographic views.	
Text Books:	

1) Bhatt N.D and Panchal V.M, Elementary Engineering Drawing, (Plane and Solid Geometry), Charotar Publishing House, 53rd Edition.
2) Jolhe Dhananjay, Engineering Drawing with An Introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited,5th Edition 2017.
3) K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi
4) Dhawan, R. K., (2000), "A Textbook Of Engineering Drawing", S. Chand, New Delhi

Reference Books:

1) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2) Madsen, D. P. and Madsen, D. A., (2016), "Engineering Drawing and design", Delmar Publishers Inc., USA
3) Rathnam, K., (2018), " A First Course in Engineering Drawing", Springer Nature Singapore Pte. Ltd., Singapore.
4) NPTEL Course on Engineering Graphics and Design, IIT Delhi by Prof. Naresh Varma Datla and Prof. S.R Kale

Practical Session (Term work assessment guidelines):

Draw minimum two problems on each assignment on the A3 size drawing sheet.

Suggested List of Laboratory Experiments/Assignments:

Assignment 1: Draw projection of a line and find inclinations

Assignment 2: Construct any Engineering Curve

Assignment 3: Draw the development of lateral surface of a solid/ truncated solid

Assignment 4: Orthographic view of any machine element along with sectional view.

Assignment 5: Draw Isometric view for given orthographic views.

Assignment 6: Construct all above assignments using CAD software.(Print on A4 size sheets)

List of Activities: (10 Mark Each)

1. **Engineering Drawing Interpretation and Problem-Solving:**
   Activity: Provide students with a complex orthographic drawing and ask them to analyze and interpret the missing views.
2. **Investigation-Based Orthographic to Isometric Conversion:**
   Activity: Give students real-life industrial components (e.g., a mechanical bracket, pipe joint, or valve body). They must create both orthographic and isometric drawings of the object.
3. **Safety Symbol Representation in Engineering Graphics:**
   Activity: Students must research and sketch engineering safety signs & symbols used in industries (e.g., hazard signs, chemical safety symbols).
4. **Case Study on Environmental Impact of Engineering Design:**
   Activity: Students analyze an engineering drawing of an industrial layout (e.g., a factory, chemical plant) and identify possible environmental & safety concerns. They must propose modifications for sustainability.
5. **Team-Based CAD Modeling and Design Challenge:**
   Activity: In teams, students design and model a simple mechanical/chemical equipment (e.g., a mixing tank, pump casing) using CAD software.

Course Coordinator | Dept. Autonomy Coordinator | Dept. Academic Coordinator | BOS Chairman

First Year B. Tech. (2025 Course)		
ME25102: Basic Thermodynamics		
Teaching Scheme: **TH : 03 Hrs./week**	**Credits: 03** **(Theory: 03)**	**Examination Scheme:** **CAA : 10 Marks** **In Semester : 30 Marks** **End Semester : 60 Marks**

Prerequisites:

Higher Secondary Science courses: Fundamental concepts of Mathematics (e.g. derivative, integration, nature of curves, slope of curve), Physics (e.g. Volume, Pressure, Velocity, Work, Energy).

Course objectives

1. To understand the fundamental concepts and laws of thermodynamics
2. To understand the equations and processes governing the ideal gas behaviour
3. To be able to calculate the steam properties by using steam tables/ Mollie charts
4. To understand the basic working of a steam generator.

Course Outcomes:

After learning this course, learners will be able to:

CO1: Explain the basic terminology and concepts of thermodynamics and Heat transfer.

CO2: Apply the first law of thermodynamics to various processes and systems and draw inferences

CO3: Apply the concepts of the second law of thermodynamics

CO4: Determine heat transfer, work transfer & other important thermodynamic properties for the processes undergone by ideal gas

CO5: Determine the properties of steam

CO6: Describe the working of steam generator

Course content

Unit-1: Basic Concepts and Definitions	**[7 Hrs]**

Fundamentals – Role of thermodynamics in mechanical Engineering, Thermodynamic System, Boundary, Types of system, State of system, Properties of system, Control volume, Process, Temperature, Definition of thermal equilibrium and Zeroth law, Temperature scales, Various Thermometers, Definition of heat, Concept of heat and work, Sign convention and its conversion.

Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. (Simple numerical)

Unit-6: Low Pressure Steam Generators	[7 Hrs.]

Steam Generators: Classification, Constructional details of low-pressure boilers, Primary Features of high pressure (Power) boilers, Location, Construction and working principle of boiler, Boiler mountings and accessories, Instrumentations required for safe and efficient operation, Introduction to IBR Act.

Text Books:

1. P. K. Nag, "Engineering Thermodynamics", Tata McGraw Hill Publications
2. R. K. Rajput, "Engineering Thermodynamics", EVSS Thermo, Laxmi Publications
3. P. L Ballaney, "Thermal Engineering", Khanna Publishers
4. M M Rathore, "Thermal Engineering", Tata McGraw-Hill
5. S. Domkundwar, C.P. Kothandaraman, A. Domkundwar, " A Course in Thermal Engineering", Dhanpat Rai & Co.

Reference Books:

1. Rayner Joel, "Basic Engineering Thermodynamics", AWL-Addison Wesley
2. Cengel and Boles, "Thermodynamics an Engineering Approach", McGraw Hill
3. G.VanWylen, R.Sonntag and C.Borgnakke, "Fundamentals of Classical Thermodynamics", John Wiley & Sons
4. Holman J.P, "Thermodynamics", McGraw Hill
5. M Achuthan, "Engineering Thermodynamics", PHI
6. Incropera, F. P.and Dewitt, D.P., "Fundamentals of Heat and Mass Transfer, John Wiley and Sons, USA.
7. Steam Tables and Mollier chart

Activity (Any One):

1. Visit to any Process Industry/Plant having a Boiler equipped with Accessories. The visit report consists of Details about the Industry/Process Plant. Operational description of the Equipment with specification, its use, capacity, application etc.
2. Poster presentation by a group of 2 to 4 students on any syllabus topics.
3. Seminar: Peer teaching learning.

Course Coordinator | Dept. Autonomy Coordinator | Dept. Academic Coordinator | BOS Chairman

ME25103- Mechanical Workshop

F.Y. B.Tech Mechanical (Sem-II)

Teaching Scheme:	Credit	Examination Scheme:
TH : 01 Hr/Week	**02**	**CAA: 30 Marks**
PR : 02 Hr/Week		**TW: 30 Marks**

The Engineering Workshop course plays a crucial role in vocational and skill enhancement by providing hands-on training in fundamental engineering practices. It bridges the gap between theoretical knowledge and practical application, making it an essential component in first-year engineering education.

Prerequisite: Basic science - concepts of physics (force, motion) and knowledge of basic tools.

Course Objectives:

1. To familiarize students with workshop safety norms, hand tools, measuring instruments, and machining operations.
2. To develop fundamental skills in fitting, carpentry, welding, and sheet metal work for basic fabrication.
3. To impart practical knowledge of machining processes like turning, drilling, tapping, and riveting for component manufacturing.
4. To encourage students to apply workshop techniques in a mini-project, fostering teamwork, documentation, and presentation skills.

Course Outcomes:

On completion of the course, learner will be able to:

CO1: Demonstrate safety precautions and appropriate use of hand tools, measuring instruments, and workshop machinery.

CO2: Develop skills in basic manufacturing processes such as fitting, carpentry, welding, and sheet metal working.

CO3: Apply machining operations like turning, drilling, tapping, and riveting to produce components with desired specifications.

CO4: Fabricate a mini project integrating multiple workshop skills and present findings.

Course content

Unit-1: Introduction of Mechanical Workshop Tools:	**(6 Hrs)**
Introduction to Mechanical workshop, processes and tools required for Sheet metal working, Fitting, Metal joining processes, Carpentry, Forging and Machining.	
Unit-2: Introduction to Lathe, Milling and Drilling Machine:	**(6 Hrs)**
Classification of manufacturing processes, basic machine tools and their operations, Components & Basic Machining operations of Lathe, Milling & Drilling Machine.	
List of workshop practices (Any TEN practical's to be performed)	**[2 Hrs. Each]**

1. Introduction to Workshop Safety: Study of general workshop safety rules, use of personal protective equipment (PPE), and emergency procedures.
2. Carpentry Work: Making a lap joint or T-joint using hand tools like saws, chisels, hammers, etc.
3. Fitting Work: Practice on filling, cutting, drilling, and tapping operations to create a fitting job (square/rectangular fitting).
4. Sheet Metal Work: Development of a small sheet metal component (funnel/box/cylinder) using cutting, bending, and riveting processes.
5. Welding Practice: Hands-on practice on arc welding, gas welding, or spot welding to fabricate a simple welded joint.
6. Power Tools Demonstration: Study and demonstration of different power tools like angle grinders, power saws, drilling machines, power press etc.
7. Assembly & Disassembly Practice: Hands-on practice on assembling and dismantling simple mechanical components (gearbox, bearing assembly, bench vice, etc.).
8. Measurement & Metrology Practice: Hands-on experience with Vernier callipers, micrometres, height gauges, and dial indicators for precision measurement.
9. Demonstration temperature and pressure measuring devices used in various thermal systems.
10. Demonstration of heat pump and refrigerator and calculation of COP.
11. Demonstration of water tube boiler, boiler mountings and accessories.
12. Demonstration of a Household Refrigerator.

13. Demonstration of the Air Conditioning system.

Text Books:

1) Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.
2) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.
3) John, K. C., (2010),"Mechanical Workshop Practice, Prentice Hall Publication, New Delhi.

Reference Books:

1) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2) Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
3) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

1. List of Activities: (30 Mark Each)
2. Along with assignments any of the following activities can be conducted.
3. Mini Project
4. Fabrication of a small product combining multiple workshop processes.
5. Example: A simple toolbox, bracket assembly, or welded frame.
6. Product Development
7. Fabrication of a marketable product using a workshop facility.
8. Example: A chair, stool, table or welding aided furniture.
9. Viva & Report Submission
10. Oral examination to assess practical knowledge and understanding.
11. Submission of workshop reports including sketches, dimensions, and observations.

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