



# ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

## B. Tech. Scheme of Examination & Syllabus 2025-26

### MECHANICAL ENGINEERING

#### GROUP II: SEMESTER I

Sr No.	Course Category	CourseCode	Course Title	Hours per Week			Credits	Maximum Marks				Min Passing marks	No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total		
1.	BSC	25ME101T	Applied Physics	2	-	-	2	10	10	30	50	23	1.5
2.	BSC	25ME101P	Applied Physics Lab	-	-	2	1	-	25	25	50	25	-
3.	BSC	25ME102T	Linear Algebra & Calculus	3	-	-	3	20	20	60	100	45	3
4.	BSC	25ME102P	Linear Algebra & Calculus Lab	-	-	2	1	-	25	25	50	25	-
5.	ESC	25ME103T	Engineering Graphics	2	-	-	2	10	10	30	50	23	1.5
6.	ESC	25ME103P	Engineering Graphics Lab	-	-	2	1	-	25	25	50	25	-
7.	ESC	25ME104T	Engineering Mechanics	2	-	-	2	10	10	30	50	23	1.5
8.	ESC	25ME104P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50	25	-
10.	PCC	25ME105P	Logic Building with C lab	-	-	4	2	-	25	25	50	25	-
11.	AEC	25ME106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	25	-
12.	SEC	25ME207T	Design Thinking #	2	-	-	2	10	10	30	50	23	1.5
13.	CC	25ME107T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	23	-
<b>Total</b>				<b>13</b>	<b>0</b>	<b>14</b>	<b>20</b>	<b>60</b>	<b>260</b>	<b>330</b>	<b>650</b>		

# Course to be taken online through NPTEL

		July 2025	3.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ME101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics and types of materials and their application in engineering and technology. 2. To develop scientific temper and analytical capability.	Students will be able to 1. Explain the fundamental concepts of crystal structure, unit cells, Miller indices, and apply Bragg's law to analyze X-ray diffraction in crystalline solids. 2. Classify different types of magnetic materials and analyze their properties (diamagnetic, paramagnetic, ferromagnetic) along with their practical applications. 3. Illustrate the band theory of solids, differentiate between conductors, insulators, and semiconductors, and calculate Fermi energy for given systems. 4. Distinguish between intrinsic and extrinsic semiconductors and evaluate the working principle and applications of p-n junction diodes in electronic devices.

<b>Unit I CRYSTAL STRUCTURE</b>	<b>[10 Hrs]</b>
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Bragg's Law and its applications.	
<b>Unit II MAGNETIC MATERIALS</b>	<b>[10 Hrs]</b>
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
<b>Unit III SEMICONDUCTORS</b>	<b>[10 Hrs]</b>
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

**Text Books**

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 <sup>th</sup> extended	John-Wiley India
2	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath

**Online Resources**

1	<a href="https://www.britannica.com/science/semiconductor#ref233890">https://www.britannica.com/science/semiconductor#ref233890</a>
2	<a href="https://www.geeksforgeeks.org/semiconductors/">https://www.geeksforgeeks.org/semiconductors/</a>
3	<a href="https://www.sciencedirect.com/topics/chemistry/magnetic-material">https://www.sciencedirect.com/topics/chemistry/magnetic-material</a>
4	<a href="https://www.livescience.com/33816-quantum-mechanics-explanation.html">https://www.livescience.com/33816-quantum-mechanics-explanation.html</a>

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ME101P	Applied Physics Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics and types of materials and their application in engineering and technology. 2. To develop scientific temper and analytical capability.	Students will be able to 1. Illustrate principles/ laws by selecting and using proper measuring instruments, interpret result and draw conclusions. 2. Find various parameters using various properties of light. 3. Demonstrate the concept and working of Semiconductor devices.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

**Text Books**

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath

**Online Resources**

1	<a href="https://www.britannica.com/science/semiconductor#ref233890">https://www.britannica.com/science/semiconductor#ref233890</a>
2	<a href="https://www.geeksforgeeks.org/semiconductors/">https://www.geeksforgeeks.org/semiconductors/</a>
3	<a href="https://www.sciencedirect.com/topics/chemistry/magnetic-material">https://www.sciencedirect.com/topics/chemistry/magnetic-material</a>

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### MECHANICAL ENGINEERING

#### FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ME102T	Linear Algebra & Calculus	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p><b>This course is intended to</b></p> <ol style="list-style-type: none"> <li>Develop students' conceptual understanding and computational skills in Matrix Algebra and Differential Equations for solving mathematical problems.</li> <li>Enable learners to apply Multivariate and Vector Calculus for analyzing functions of several variables and modeling physical phenomena.</li> </ol>	<p><b>Students will be able to</b></p> <ol style="list-style-type: none"> <li>Apply matrix concepts to solve and analyze linear systems.</li> <li>Analyze and solve engineering problems involving eigenvalues, eigenvectors, and functions of matrices.</li> <li>Solve multivariate calculus problems involving partial derivatives, Jacobians, and optimization.</li> <li>Apply first order and higher order differential equations to solve problems in engineering.</li> <li>Evaluate vector calculus operations and their physical applications.</li> </ol>
<b>Unit I</b>	[9Hrs]
<b>Matrix Algebra :</b> Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
<b>Unit II</b>	[9Hrs]
<b>Matrices:</b> Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
<b>Unit III</b>	[9Hrs]
<b>Multivariate Calculus:</b> Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
<b>Unit IV</b>	[9Hrs]
<b>Differential Equations:</b> First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
<b>Unit V</b>	[9Hrs]
<b>Vector Calculus:</b> Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and Irrotational motions, Scalar potential, Line integral & Work done.	

#### Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	38th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Das & Er. Rajnish Verma	1st	S. Chand & CO. Pvt. Ltd., New Delhi

#### Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil	8 <sup>th</sup>	Thomson Asia Pvt. Ltd., Singapore.

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### MECHANICAL ENGINEERING

#### FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ME102P	Linear Algebra & Calculus Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
<p><b>This Course is intended to:</b></p> <ol style="list-style-type: none"><li>To develop students' computational proficiency in solving problems related to linear algebra, calculus, and differential equations using SageMath with an emphasis on symbolic computation and numerical methods.</li><li>To enable students to apply SageMath for solving and visualizing problems in vector calculus through effective use of graphical and analytical tools.</li></ol>	<p><b>Students will be able to:</b></p> <ol style="list-style-type: none"><li>Apply fundamental matrix operations and solve systems of linear equations using SageMath.</li><li>Apply concepts of linear algebra to compute eigenvalues and eigenvectors of matrices using SageMath.</li><li>Evaluate partial derivatives of multivariable functions and solve first and higher-order ordinary differential equations using SageMath.</li><li>Analyze and visualize vector calculus operations including gradient, divergence, curl, and evaluate line and surface integrals using SageMath.</li></ol>

#### List of Experiments:-

Experiment No.	List of Experiment
1	To Implement basic matrix operations using SageMath's symbolic computation tools.
2	To check the consistency of a system of linear equations using augmented matrices and SageMath.
3	To solve systems of linear equations using various within the SageMath environment.
4	To determine eigenvalues and eigenvectors of matrices using built-in SageMath functions.
5	To implement and validate the Cayley-Hamilton Theorem with the aid of SageMath.
6	To compute partial derivatives of various orders for multivariable functions using SageMath.
7	To solve first-order and higher-order differential using SageMath's differential equation solvers.
8	To find maxima and minima of functions of two variables using partial derivatives and the second derivative test implemented in SageMath.
9	To compute and visualize vector differential operations using SageMath.
10	To compute vector integrals in SageMath.

#### Text Books

S.N	Title	Authors	Edition	Publisher
1	Computational Mathematics with SageMath	Paul Zimmermann	1st	SIAM Publications Library.
2	Basics of SageMath : Mathematics(Practicals)	Varun Kumar	1st	Amazon KDP

#### Reference Books

S.N	Title	Authors	Edition	Publisher
1	Mathematics-SageMath Software System	Indrajeet Varhadpande & Dr. Kirti Sahu	1 <sup>st</sup>	Himalaya Publication
2	Applied Mathematics Using SageMath	Dr. Kirti Sahu & Dr. Sajid Anwar	1 <sup>st</sup>	Himalaya Publication

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**B.Tech. Scheme of Examination & Syllabus 2025-26****MECHANICAL ENGINEERING****FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ME103T	Engineering Graphics	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"><li>To expose the students to the area of Engineering Graphics.</li><li>To enable the student to communicate effectively through technical drawings.</li></ul>	Students will be able to <ul style="list-style-type: none"><li>Recognise the application of drawing standards, construct engineering curves and orthographic projections of lines.</li><li>Construct orthographic projections of Planes and solids.</li><li>Apply concepts of projections and convert pictorial isometric views to orthographic views. And vice versa.</li></ul>

Unit I	[8Hrs]
<b>Introduction to Engineering Graphics:</b> Types of lines, standard layout, Lettering, Standard representation of dimensions. <b>Types of Curves</b> - Ellipse, Parabola, Hyperbola, Cycloid, involute and Spiral. Construction of Ellipse (Arcs of circles method), Parabola (Rectangle Method) and Hyperbola (Rectangle Method) <b>Introduction to Orthographic projections-</b> Projection of Points and Lines in the first quadrant. [Problem-solving on lines inclined to one reference plane].	
Unit II	[8Hrs]
<b>Projection of Planes-</b> Projection of planes in the first quadrant. Problem-solving on planes inclined to one reference plane. <b>Projection of Solids-</b> Projection of solids in the first quadrant. Problem-solving for the solids with an axis inclined to one reference plane.	
Unit III	[8Hrs]
<b>Introduction to Orthographic drawings:</b> Conversion of Pictorial / Isometric drawings of machine components to Orthographic drawings. <b>Introduction to Isometric drawings:</b> Isometric concepts of Isometric axes, Isolines, Isometric scale, Isometric projection and Isometric view. Construction of Isometric drawings and views from a given orthographic view.	

**Text Books**

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ME103P	Engineering Graphics Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"><li>To expose the students to the area of Engineering Graphics.</li><li>To enable the student to communicate effectively through technical drawings.</li></ul>	<p>Students will be able to</p> <ul style="list-style-type: none"><li>Apply engineering drawing standards and construct engineering curves and orthographic projections of lines.</li><li>Construct orthographic projections of Planes and solids.</li><li>Apply concepts of projections and convert pictorial views to orthographic views through pencil drawings and CAD.</li><li>Apply concepts of projections and construct isometric views through pencil drawings and CAD.</li></ul>

**A minimum of eight experiments to be performed**

Expt. No.	Title of the experiment
1	Pencil drawings on Engineering Curves
2	Pencil Drawings on the Projection of Lines
3	Pencil Drawings on the Projection of Planes
4	Pencil Drawings on the Projection of Solids
5	Pencil Drawings on Orthographic Projections
6	Pencil Drawings on Isometric Views / Projection
7	Computer-Aided Drawing on Orthographic Views
8	Computer-Aided Drawing on Isometric Views

**Text Books**

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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### MECHANICAL ENGINEERING

#### FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ME104T	Engineering Mechanics	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
To develop the capacity to predict the effects of force while carrying out the creative design functions of engineering. Familiarize the concept of equilibrium and friction. Study and analyze motion of moving particles/bodies	<ul style="list-style-type: none"><li>• Categorize and solve various force systems. Analyze for equilibrium and equivalent force system</li><li>• Illustrate Center of Gravity and Moment of Inertia for various lamina.</li><li>• Correlate to specific type of friction and estimate required force to overcome friction and analyze the motion by plotting the relation.</li></ul>

<b>Unit I</b>	<b>[9Hrs]</b>
<b>Fundamentals of Engineering Mechanics:</b> Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Varignon's theorem, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.	
<b>Unit II</b>	<b>[8Hrs]</b>
Centroid and Centre of Gravity: Centroid of simple figures from first principle, centroid of composite sections, Centre of Gravity and its implications. Moment of Inertia: Moment of Inertia of plane sections from first principles, Moment of inertia of standard sections and composite sections	
<b>Unit III</b>	<b>[9Hrs]</b>
Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. D'Alembert's principle, work-Energy equation – conservative forces and principle of conservation of energy, Impulse – momentum	

#### Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Mechanics (In SI Units)	S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati	2017, 5 <sup>th</sup> edition	McGraw Hill Publishers
2	Engineering Mechanics	K.L Kumar		Tata McGrawHill

#### Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Mechanics	F.L. Singer		Harper & Raw Publication
2.	Engineering Mechanics	A K Tayal		Umesh Publication

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Course Name	Th	Tu	Pr	Credits	Evaluation			
					MSE	CA	ESE	Total
25ME104P	2	-	-	2	-	25	25	50

Course Objectives	Course Outcomes
To understand and apply the concepts of planar force system, structures and simple lifting machines	1. Apply the basic concepts of applied mechanics for solution of problems on planar force system. 2. Analyze pin jointed truss frame structure and beam structure analytically and graphically. 3. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

**Minimum 8 experiments to be performed**

Expt. No.	Title of the experiment
1	Experimental determination of support reactions of a Simply Supported Beam experimentally and analytically.
2	Determination of forces in the members of a Jib Crane Apparatus experimentally and graphically.
3	Determination of coefficient of friction between two surfaces of different material on Plane Friction Apparatus.
4	Determination of coefficient of friction of Coil Friction Apparatus.
5	Determination of forces in members of a Shear Leg Apparatus experimentally and manually.
6	Determination of mass moment of inertia of a fly wheel using Fly Wheel Apparatus
7	Determination of efficiency and law of machine of Differential Axel & Wheel machine.
8	Determination of efficiency and Law of machine of Single Purchase Crab machine.
9	Determination of efficiency and Law of machine of Double Purchase Crab machine.
10	Determination of support reactions of a simply supported beam using graphical method and hand calculation.

**Text Books**

S.N	Title	Authors	Edition	Publisher
01	Engineering Mechanics Practical	A K Sharma	2009	Laxmi Publications
02	Engineering Mechanics	F.L. Singer		Harper & Raw Publication

**Reference Books**

S.N	Title	Authors	Edition	Publisher
01	Engineering Mechanics (In SI Units)	S. Timoshenko, D.H.Young, J.V. Rao and Sukumar Pati	2017, 5th edition	McGraw Hill Publishers

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### MECHANICAL ENGINEERING

#### FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ME106P	Business Communication Skills I Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<b>Students will be able to:</b> 1. apply verbal and non-verbal skills to confidently and effectively deliver presentations. 2. prepare themselves for overall language ability through listening and reading tasks. 3. demonstrate formal writing skills. 4. draft impactful Resumes and Cover Letters. 5. prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

#### Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ME105P	Logic Building With C Lab	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
<b>This course is intended</b> <ul style="list-style-type: none"><li>● To make the students learn a programming language.</li><li>● To learn problem solving techniques.</li><li>● To teach the student to write C programs and to solve the problems.</li></ul>	<b>Student will able to</b> <ul style="list-style-type: none"><li>● Describe the fundamentals of C Programs.</li><li>● Implement branching control structures.</li><li>● Implement loop control structures.</li><li>● Analyse and develop problem solving logic.</li><li>● Analyse and design problems.</li></ul>

Expt. No.	Title
1	To implement operators and variables.
2	To implement simple If and If-else statement.
3	To implement If-else if ladder and nested If control structures.
4	To implement Switch-case statement.
5	To implement While loop structure.
6	To implement Do-while loop structure.
7	To implement for loop structure.
8	To implement Nested loops, break and continue statement.

**Text Books**

S. N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 <sup>nd</sup>	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 <sup>nd</sup>	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1 <sup>st</sup>	BPB
4	Programming With C	Byron S. Gottfried	2 <sup>nd</sup>	Schaum Series
5	How to solve it by Computer	R. G. Dromey	1 <sup>st</sup>	Pearson Education

**Reference Books**

S. N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 <sup>th</sup>	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 <sup>st</sup>	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 <sup>nd</sup>	Pearson Education

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ME207T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> <li>Learn design thinking concepts and principles</li> <li>Use design thinking methods in every stage of the problem</li> <li>Learn the different phases of design thinking</li> <li>Apply various methods in design thinking to different problems</li> </ol>	<ol style="list-style-type: none"> <li>Define key concepts of design thinking</li> <li>Practice design thinking in all stages of problem solving</li> <li>Apply design thinking approach to real world problems</li> </ol>

**Unit I** **[10 Hrs]**

INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project.

UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.

**Unit II** **[10 Hrs]**

IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.

**Unit III** **[10 Hrs]**

TESTING AND IMPLEMENTATION: Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.

FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.

**Text Books**

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	Harper Collins

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

		July 2025	1.0	Applicable for 2025-26
Chairman - BoS	Dean - Academics	Date of Release	Version	