GROUP 2: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
				L	T	P		Continual Assessment	End Sem Examination	Total
1	BSC	ES201T	Engineering Chemistry & Environmental Science	2	-	-	2	15	35	50
2	BSC	ES201P	Engineering Chemistry & Environmental Science Lab	-	-	2	1	25	25	50
3	BSC	ES102T	Applied Mathematics–I	3	1	-	4	30	70	100
4	ESC	ES203T	Engineering Practices-II (Civil & Mechanical)	3	-	-	3	30	70	100
5	ESC	ES203P	Engineering Practices-II Lab (Civil & Mechanical)	-	-	2	1	25	25	50
6	ESC	ES204T	Problem Solving with Python	2	-	-	2	15	35	50
7	ESC	ES204P	Problem Solving with Python Lab	-	-	2	1	25	25	50
8	AEC	ES105P	Business Communication Skills I Lab	-	-	2	1	25	25	50
9	ESC	ES206T	Design Thinking	2	-		2	15	35	50
10	SEC	ES107P	Career Development I		-	2	1	50	-	50
11	PCC	xx101T	Program Foundation I	2	-	-	2	15	35	50
12	CC	ES108T	Co-curricular Course -I	2	-	-	2	50	-	50
13	ELC	ES209P	Tinkering & model Lab	-	-	2	-	-	-	-
		Total		16	1	12	22	320	380	700

GROUP 2: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
				L	T	P		Continual Assessment	End Sem Examination	Total
1	BSC	ES101T	Engineering Physics & Materials Science	**2**	**0**	**-**	**2**	**15**	**35**	**50**
2	BSC	ES101P	Engineering Physics & Materials Science Lab	**-**	**-**	**2**	**1**	**25**	**25**	**50**
3	BSC	ES202T	Applied Mathematics – II	**3**	**1**	**-**	**4**	**30**	**70**	**100**
4	ESC	ES103T	Engineering Practices-I (Electrical & Electronics)	**3**	**-**	**-**	**3**	**30**	**70**	**100**
5	ESC	ES103P	Engineering Practices-I Lab(Electrical & Electronics)	**-**	**-**	**2**	**1**	**25**	**25**	**50**
6	ESC	ES104T	Logic Building with C	**2**	**-**		**2**	**15**	**35**	**50**
7	ESC	ES104P	Logic Building with C Lab	**-**	**-**	**2**	**1**	**25**	**25**	**50**
8	AEC	ES205P	Business Communication Skills II Lab	**-**	**-**	**2**	**1**	**25**	**25**	**50**
9	IKS	ES106T	Indian Knowledge Systems	**2**	**-**	**-**	**2**	**15**	**35**	**50**
10	SEC	ES207P	Career Development II	**-**	**-**	**2**	**1**	**50**	**-**	**50**
11	PCC	xx201T	Program Foundation II	**2**	**-**	**-**	**2**	**15**	**35**	**50**
12	CC	ES208T	Co-curricular Course - II	**2**	**-**	**-**	**2**	**50**		**50**
Total				**16**	**1**	**10**	**22**	**320**	**380**	**700**

SECOND SEMESTER (GROUP-II)

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EI201T	Program Foundation-I (Ethics in AI)	2	-	-	-	-	-	-

Course Objectives	Course Outcomes
To explores the ethical considerations and challenges associated with artificial intelligence (AI) technologies. To examine the ethical implications of AI applications, including privacy, bias, accountability, transparency, and fairness. To develop a comprehensive understanding of the ethical frameworks and principles guiding AI development and deployment.	Understand the fundamental concepts and principles of AI ethics. • Analyze the ethical challenges posed by AI technologies. • Evaluate the impact of AI on societal values, privacy, and human rights. • Develop critical thinking skills to navigate complex ethical dilemmas in AI. • Explore methods for ensuring fairness, accountability, and transparency in AI systems.

Unit I : Introduction to AI Ethics **[6Hrs]**

Definition of AI ethics, Historical context and ethical milestones in AI development, Ethical frameworks and principles in AI, Ethical Implications of AI: Privacy and data protection in AI systems, Bias and discrimination in AI algorithms, Explainability and transparency in AI decision-making.

Unit II:AI and Society **[6Hr**

AI and human values ,AI and human rights, Social and economic implications of AI, Ensuring Fairness and Accountability in AI, Fairness and bias mitigation techniques, Ethical considerations in AI governance and regulation, Ethical guidelines and standards for AI development.

Unit III:AI and Moral Agency **[12Hrs]**

Moral decision-making by AI systems, Legal and ethical liability for AI actions, Ethical considerations in autonomous systems, AI, Policy, and Future Directions, Legal frameworks for AI ethics, International perspectives on AI governance, Future trends and challenges in AI ethics

Unit IV: Case Studies in AI Ethics **[6Hrs]**

Self-driving cars ,Facial recognition ,Social media, Chatbots ,Case studies examining ethical challenges in AI applications, Ethical analysis and discussion of real-world scenarios, Ethical Decision-Making in AI Development, Ethical considerations throughout the AI development lifecycle, Ethical design practices and methodologies.

Unit V:Responsible AI and AI for Good **[6Hrs]**

Responsible AI principles and practices, AI applications for societal benefit and sustainable development, Ethical Reflection and Debates in AI, Ethical controversies and debates in AI ethics ,Ethical reflection on emerging AI technologies and applications.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Ethics of Artificial Intelligence and Robotics	Vincent C. Müller	2nd	Routledge
2	Artificial Intelligence: A Guide to Ethical and Legal Practices	Brent Daniel Mittelstadt, Luciano Floridi, and Mariarosaria, Taddeo	3rd	Wiley
3	Machine Ethics	Michael Anderson and Susan Leigh Anderson	2nd	Cambridge University Press

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Robot Ethics 2.0: From Autonomous Cars to Artificial Intelligence	Patrick Lin, Keith Abney and Ryan Jenkins	2nd	Oxford University Press

GROUP 2: SEMESTER I / GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES201T	Engineering Chemistry and Environmental Science	2	0		2	15	35	50

Course Objectives	Course Outcomes
This course is intended 1. To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry. 2. To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	**Students will be able to** ● Analyse and Compare parameter necessary for various treatment of water. ● Develop innovative ideas for use of advanced materials in sustainable development. ● Knowledge of solid, Liquid and gaseous fuels and their combustion calculations. ● Apply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology- **[7 Hrs]**

Hardness of water, Numericals on Hardness

Industrial Water Treatment-

External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process.

Desalination of sea water- Electrodialysis and Reverse Osmosis process-Principle, Methods and Advantages

Unit II Advanced Materials - **[6Hrs]**

Introduction-Need for Development

Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications,

Conducting Polymers- Polypyrole, PANI Synthesis, Properties and Applications.

Liquid Crystal Polymers- Types, Properties and Applications.

Unit III Fuels and Combustion- **[7 Hrs]**

Introduction- Fractional distillation of liquid fuel

Types of Calorific value (HCV & LCV)- Determination of Calorific value by Bomb and Boys calorimeter.

Calorific value calculations by Dulong's formula.

Alternate Fuel:- H_2 gas as a fuel, Nuclear Fuel, Biofuel

Unit IV Green Chemistry & Waste Management- **[6 Hrs]**

Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO2)- Properties and Applications, Green Building-Introduction, Components, Reuse and safety of

building material and its environmental impact, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples.

Carbon Credit, Carbon Sequestration

Waste Management- Solid waste management- Nuclear & e-waste- Sources, Impact & its control

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,		S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain		DhanpatRai and Sons, New Delhi.
3	Materials Chemistry	A.V. Bharati and Walekar,		Tech Max Publications, Pune.

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

B. Tech. Scheme of Examination & Syllabus 2023-24

ENGINEERING, SCIENCES AND HUMANITIES

GROUP 2: SEMESTER I / GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES201P	Engineering Chemistry and Environmental Science			2	1	25	25	50

Course Objectives	Course Outcomes
1. To Make the students aware about various techniques available for Analysis of Material. 2. To Impart the skill of handling chemicals and apparatus.	• List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments. • Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment. • Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance- Any FIVE
1	Preparation of Different Solutions (Molar,Normal and Percent solutions) (Learning by Doing)
2	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
3	Measurement of Turbidity of Water & its Flock setting velocity
4	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
5	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
6	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
	Demonstration - Any ONE
7	Measurement of pH of sample from different sources by Digital pH Meter.
8	Determination of calorific Value of fuel By Bomb Calorimeter.
	Virtual Experiment - Any ONE
9	Determination of Alkalinity of Water Sample.
10	Study of Lambert-Bears Law
11	Estimation of DO content of Water sample.
	Activity - Any One
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
4	Visit to Solar Power Plant.
5	Visit to Water Treatment Plant/Effluent Treatment Plant.

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and	S.S. Dara		S.Chand

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	calculation in engineering chemistry			

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES202T	Applied Mathematics - II	3	1	0	4	30	70	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of • Differential & Integral calculus • Vector calculus • Probability distributions	**Students will be able to:** • Apply numerical integration methods and find analytical solutions to difference equations. • Understand the concept of multivariable differential calculus & apply the knowledge of applications of differentiation. • Implement concept of vector calculus to solve engineering problems. • Evaluate improper Integrals and apply concept of multiple integrals in engineering field. • Apply concept of probability distributions to engineering problems.

Unit I	**[7Hrs]**
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constantcoefficients.	
Unit II	**[7Hrs]**
Multivariate Calculus: 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.	
Unit III	**[8Hrs]**
VectorCalculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotationalmotions, Scalar potential, Line integral & Work done.	
Unit IV	**[7Hrs]**
IntegralCalculus: Beta and Gamma functions, Differentiation of definite integral, Elementary double integrals (cartesian & polar).	
Unit V	**[6Hrs]**
Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution**.**	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S. N.	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray R. Spiegel	4th	McGraw-Hill Education.

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GROUP 1: SEMESTER II / GROUP 2: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES203T	Engineering Practices-II (Civil & Mechanical)	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To develop the capacity to predict the effects of force while carrying out the creative design functions of engineering. ● To expose the students in area of Engineering graphics.	**Students will be able to** ● Compute resultant force and moment for a given system of forces. ● Calculate the centroid, centre of gravity and moment of inertia of various sections. ● Recognize the application of drawing standards, construct engineering curves and orthographic projections of lines. ● Construct orthographic projections of Planes and solids. ● Apply concepts of projections and convert orthographic views in to isometric views and vice-versa.

Unit I	**[9 Hrs]**
Fundamental of Engineering Mechanics: Resolution & resultant of co-planar force system. Equilibrium of co-planar force system, Concept of Free Body Diagram.	
Unit II	**[9 Hrs]**
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.	
Unit III	**[10 Hrs]**
Introduction to Engineering Graphics: Types of lines, standard layout, Lettering, Standard representation of Dimension. Types of Curves - Ellipse, Parabola, Hyperbola, Cycloid, involute and Spiral. Construction of Ellipse (Arcs of circles method), Parabola (Rectangle Method) and Hyperbola (Rectangle Method) Introduction to Orthographic projections- Projection of Points and Lines in first quadrant. [Problem solving on lines inclined to one reference plane].	
Unit IV	**[10 Hrs]**
Projection of Planes- Projection of planes in first quadrant. Problem solving on planes inclined to one reference plane. **Projection of Solids-** Projection of solids in first quadrant. Problem solving on axis of solid inclined to one reference plane].	
Unit V	**[10 Hrs]**
Conversion of Pictorial/ Isometric drawings to Orthographic drawing. Construction of Isometric drawings from given orthographic view.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Elementary Engineering Drawing	N. D. Bhatt		Charotor Publishing House
2	Engineering Drawing	D. N. Johle		Tata McGraw-Hill Publishing
3	Engineering Mechanics: Statics	W.F. Riley and L.D. Sturges	2nd Edition	John Wiley and Sons, Inc., New York.
4	Engineering Mechanics: Statics	Hibbeler	2001	Prentice Hall.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Engineering Mechanics	Ferdinand. L. Singer		Harper – Collins.
2	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI Publications
3	Programming and Problem Solving	M. Sprankle	2nd	Pearson Education

GROUP 1: SEMESTER II / GROUP 2: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES203P	Engineering Practices-II Lab (Civil & Mechanical)	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended ● To make the students learn a programming language. ● To learn problem solving techniques. ● To teach the student to write C programs and to solve the problems.	**Student will able to** ● Develop problem soving logic. ● Analyse and design problems. ● Understand the fundamentals of C Programs. ● Implement decision making control structures. ● Implement loop control structures.

Expt. No.	Title
1	To determine reactions at simple supports of a beam.
2	Determination of Law of Machine of Single Purchase Crab Winch
3	Determination of Law of Machine of Double Purchase Crab Winch.
4	To draw a single line plan of a single storey residential building.
5	Demonstration of Rebound Hammer Test.
6	Use of Digital Planimeter to measure area of a give region
7	Study and demonstration of tools and machine tools in the workshop.
8	Study and demonstration of 3D Printing machine.
9	Study and demonstration of CNC Lathe and CNC Milling machine.
10	Study and demonstration of Solar Power Plant and E- Vehicles
11	Simple job based on Welding process.
12	Simple job based on Fitting process.
13	Simple job based on Carpentry process.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Vector Mechanics for Engineers: Statics	Beer and E. R. Johnson	6th Edition	McGraw-Hill.
2	Theory of Machines	S.S. Ratan	4th Edition	McGraw Hill
3	Engineering Mechanics: Statics	W.F. Riley and L.D. Sturges	2nd Edition	John Wiley and Sons, Inc., New York.
4	Engineering Mechanics: Statics	Hibbeler	2001	Prentice Hall.

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Engineering Mechanics	Ferdinand. L. Singer		Harper – Collins.
2	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
ES204T	Problem Solving with Python	2	-	-	2	15	35	50

Course Objectives	Course Outcomes
This course is intended ● To Focuses on paradigms of programming language. ● To Enhancing programming environment. ● To study various programming language. ● To study the python as one of the important programming languages	**Student will able to** ● Remember and understand the concept of problem-andproblem-solving algorithm. ● Analysis the program using fundamental of python. ● Develop a python code using sequential concept. ● Develop a python code using non- sequential concept. ● Implement the program using conditional and looping

Unit I	**[6Hrs]**
Introduction: Mathematical Problem - Euclidian problem, Fibonacci series, factorial. Step to solve problem - Algorithm, Flowchart. **Introduction to Python**-What, why, feature, implementation and python editor.	
Unit II	**[6Hrs]**
Language Fundamental: Keywords, Identifier, Datatype – int, float, bool, none. Operators –Types, program using input function, literals/constant.	
Unit III	**[6Hrs]**
Sequence Data Type: List – Syntax, list using index and slicing, list methods. Tuple – Syntax. Range, String - methods.	
Unit IV	**[6Hrs]**
Non- Sequence Data type: Set – types, syntax, read element, method, operation. Dictionary - How to create dictionary? Read using for loop and key.	
Unit V	**[6Hrs]**
Control Statement: Conditional Statement – simple if, if else, if_elif_else, nested if. Looping Statement – while and for loop – syntax, flowchart. Break, continue & pass.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition2.1	Swaroop C H

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

GROUP 2: SEMESTER I / GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES204P	Problem Solving with Python Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To Focuses on paradigms of programming language. • To Enhancing programming environment. • To study various programming language. • To study the python as one of the important Programming language	**Student will able to** • Develop a program using python operators • Develop a python code using sequential concept. • Develop a python code using non- sequential concept. • Implement the program using conditional and looping

Expt. No.	Title
1	(A). Installation of Latest Python version from Genuine Website, its installation process, path setting & its testing. (B) Implementation of some python program on interaction mode
2	Introduction to inbuilt IDE. Implementation of python programming in batch mode.
3	Implementation of Python programming on various conditional operators.
4	Implementation of Python programming on various arithmetic operators.
5	Implementation of Python programming on various Loops.
6	Implementation of Python programming on functions.
7	Implementation of Python programming on List.
8	Implementation of Python programming on Tuples
9	Implementation of Python programming on Dictionary
10	Implement a program to find the greatest number among 3 number entered by user.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition2.1	Swaroop C H

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

SECOND SEMESTER (GROUP-I / GROUP-II)

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES205P	Business Communication Skills II 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.	**Students would be able to:** 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & SunitaMIshra	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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ENGINEERING, SCIENCES & HUMANITIES

FIRST SEMESTER (GROUP : II) / SECOND SEMESTER (GROUP : I)

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
ES206T	Design Thinking	2	-	-	2	15	35	50

Course Objectives	Course Outcomes
1. Learn design thinking concepts and principles 2. Use design thinking methods in every stage of the problem 3. Learn the different phases of design thinking 4. Apply various methods in design thinking to different problems	1. □ Define key concepts of design thinking 2. □ Practice design thinking in all stages of problem solving 3. □ Apply design thinking approach to real world problems

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	HarperCollins

Reference Books

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

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