Annexure – I

CREDIT FRAMEWORK STRUCTURE

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	7	7							14
Engineering Science Course		6	6							12
Program Core Course (PCC)	Program Courses	2	2	13	10	7	4	6		44
Program Elective Course (PEC)						4	6	6	4	20
Multidisciplinary Minor (MDM)	Multidisciplinary Courses			2	3	3	3	3		14
Open Elective (OE) Other than a particular program						2	3	3		08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2		1	1	2	2			08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	1	1			2				04
Entrepreneurship/Economics/Management Courses				2	2					04
Indian Knowledge System (IKS)			2							02
Value Education Course (VEC)				2	2					04
Research Methodology	Experiential Learning Courses								4	04
Comm. Engg. Project (CEP)/ Field Project (FP)					2					02
Project							2	2		04
Internship/OJT									12	12
Co-curricular Courses (CC)	Liberal Learning Courses	2	2							04
Total Credits (Major)		20	20	20	20	20	20	20	20	160

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Chairman - BoS	Dean – Academics	Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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

B. Tech. Scheme of Examination & Syllabus 2026-27

ROBOTICS AND ARTIFICIAL INTELLIGENCE

FIRST SEMESTER

Sr. No.	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Min Passing marks	Duration
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total		No. of Hrs. for ESE
1	BSC	26RA101T	Applied Physics	2	-	-	2	10	10	30	50	23	1.5
2	BSC	26RA101P	Applied Physics Lab	-	-	2	1	-	25	25	50	25	-
3	BSC	26RA102T	Linear Algebra and Calculus	3	-	-	3	20	20	60	100	45	3
4	BSC	26RA102P	Linear Algebra and Calculus Lab	-	-	2	1	-	25	25	50	25	-
5	ESC	26RA103T	Engineering Mechanics	2	-	-	2	10	10	30	50	23	1.5
6	ESC	26RA103P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50	25	-
7	ESC	26RA104T	Logic Building with C and Python	2	-		2	10	10	30	50	23	1.5
8	ESC	26RA104P	Logic Building with C and Python Lab	-	-	2	1		25	25	50	25	-
9	PCC	26RA105T	Fundamentals of Robotics	2	-	-	2	10	10	30	50	23	1.5
10	AEC	26RA106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	25	-
11	SEC	26RA207T	Design Thinking#	2	-	-	2	10	10	30	50	23	1.5
12	CC	26RA108P	Co-curricular Courses - I	-	-	4	2	-	50	-	50	25	-
Total				13		14	20	70	245	335	650	-	-

#: To be conducted through online MOOC (NPTEL)

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA101T	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.

Unit I CRYSTAL STRUCTURE	**[10 Hrs]**
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 - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	**[10 Hrs]**
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	**[10 Hrs]**
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	8th 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	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
26RA101P	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	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA102T	Linear Algebra and Calculus	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended to 1. Develop students' conceptual understanding and computational skills in Matrix Algebra and Differential Equations for solving mathematical problems. 2. Enable learners to apply Multivariate and Vector Calculus for analyzing functions of several variables and modeling physical phenomena.	**Students will be able to** 1. Apply matrix concepts to solve and analyze linear systems. 2. Analyze and solve engineering problems involving eigenvalues, eigenvectors, and functions of matrices. 3. Solve multivariate calculus problems involving partial derivatives, Jacobians, and optimization. 4. Apply first order and higher order differential equations to solve problems in engineering. 5. Evaluate vector calculus operations and their physical applications.

Unit I	**[9Hrs]**
Matrix Algebra : Introduction to matrices, , Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	**[9Hrs]**
Matrices: 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.	
Unit III	**[9Hrs]**
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 IV	**[9Hrs]**
Differential Equations: 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.	
Unit V	**[9Hrs]**
Vector Calculus: 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	8th	Thomson Asia Pvt. Ltd., Singapore.

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
26RA102P	Linear Algebra and Calculus Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This Course is intended to: 1. 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. 2. To enable students to apply SageMath for solving and visualizing problems in vector calculus through effective use of graphical and analytical tools.	**Students will be able to:** 1. Apply fundamental matrix operations and solve systems of linear equations using SageMath. 2. Apply concepts of linear algebra to compute eigenvalues and eigenvectors of matrices using SageMath. 3. Evaluate partial derivatives of multivariable functions and solve first and higher-order ordinary differential equations using SageMath. 4. Analyze and visualize vector calculus operations including gradient, divergence, curl, and evaluate line and surface integrals using SageMath.

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	1st	Himalaya Publication
2	Applied Mathematics Using SageMath	Dr. Kirti Sahu & Dr. Sajid Anwar	1st	Himalaya Publication

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA103T	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	1. Categorize and solve various force systems. Analyze for equilibrium and equivalent force system 2. Illustrate Center of Gravity and Moment of Inertia for various lamina. 3. Correlate to specific type of friction and estimate required force to overcome friction and analyze the motion by plotting the relation.

Unit I **[9Hrs]**

Fundamentals of Engineering Mechanics: 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.

Unit II **[8Hrs]**

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 **[9Hrs]**

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	2017,5th 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

FIRST SEMESTER

	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
26RA103P	Engineering Mechanics Lab	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	2017,5 th edition	McGraw Hill Publishers

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA104T	Logic Building With C and Python	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To make the students learn a programming language. 2. To learn problem solving techniques. 3. To teach the student to write C programs and to solve the problems.	**Student will able to** 1. Describe the fundamentals of C and Python Programs. 2. Implement branching and looping control structures. 3. Analyse and develop problem solving logic in C & Python.

Unit I	**[7Hrs]**
Fundamentals of C: C Character Set, Identifiers, Keywords, Data Types, Constants, Variables, Declarations, Expressions, Statements, Symbolic Constants. **Operators and Expressions:** Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, Conditional Operators, Hierarchy of operations. **Data Input/Output and Control Structures:** Data Input and Output library functions in C	
Unit II	**[8 Hrs]**
Decision Making Control Structures: if, if-else, nested if statements, Forms of if, Switch Case Statement. Loop Control Structures: For Loop, While Loop, Do-While Loop, Nesting of Loops, break and continue statement.	
Unit III	**[7 Hrs]**
Fundamentals of Python: Keywords, Identifier, Datatypes, Operators, program using input function, Program using Python fundamentals.	

Text Books

S. N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2nd	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1st	BPB
4	Programming With C	Byron S. Gottfried	2nd	Schaum Series

Reference Books

S. N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2nd	Pearson Education
4	Python: The Complete Reference	Martin C. Brown	1st	Oxford University Press

SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
26RA104P	Logic Building With C and Python Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To make the students learn a programming language. 2. To learn problem solving techniques. 3. To teach the student to write C programs and to solve the problems.	**Student will able to** 1. Describe the fundamentals of C Programs. 2. Implement branching and looping control structures. 3. Analyse and develop problem solving logic. 4. Describe the fundamentals of Python Programs

Expt. No.	Title
1	Implementation of C programming on operators and variables.
2	Implementation of C programming on simple If, If-else and If-else if ladder and nested If statement.
3	Implementation of C programming on Switch-case statement.
4	Implementation of C programming on While loop structure.
5	Implementation of C programming on Do-while loop structure.
6	Implementation of C programming on for loop structure with break and continue.
7	Implementation of Python programming on functions.
8	Implementation of Python programming on list, tuples, sets, dictionary

Text Books

S. N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2nd	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1st	BPB
4	Programming With C	Byron S. Gottfried	2nd	Schaum Series
5	How to solve it by Computer	R. G. Dromey	1st	Pearson Education
6	Python Programming using problem solving Approach	Reema Theraja	1st	Oxford University Press
7	A Byte of Python	C. H. Swaroop	2nd	Swaroop C H

Reference Books

S. N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2nd	Pearson Education
4	Python: The Complete Reference	Martin C. Brown	1st	Oxford University Press

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA105T	Fundamentals of Robotics	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
Objectives of this course are : 1. To explain the history of robotics, its evolution, and its role in modern industry, along with an approach for implementation. 2. To provide a foundational understanding of the types of robots, the terminologies used in robotics, robot motion, robot components, and their applications. 3. To motivate students to build a strong foundation in robotics and automation to develop a career path as per the needs of the modern industry.	1. Explain the foundational concepts of robotics, including its historical context, robot anatomy, motion, drive systems, and the critical performance parameters like precision and repeatability. 2. Describe the types and functions of end effectors and sensors, and also explain robot programming methods to define and control robot motion in a three-dimensional space. 3. Identify and describe robot work cells, explain the applications of robots, and state the approach for the implementation of robotics.

Unit I	**[10Hrs]**
Introduction: robotics and automation, history, robot anatomy and configurations, Robot motion: DoF, Robot joint notations, Work Volume, drive systems, motion speed , load carrying capacity, types of robots control, Precision of movement , repeatability.	
Unit II	**[10Hrs]**
Robot end effectors: Types, Gripper mechanisms, Tools as end effectors, Physical support, consideration in gripper selection and design. Sensors for robotics: Types and uses, robot drives, actuators for robots Robot Programming: Methods, robot program as path in space, Methods of defining positions in space.	
Unit III	**[10Hrs]**
Robot work cell design and control: types of layout, Multiple robots and machine interface, considerations in work cell design, work cell control, Interlocks, Error detection and recovery. Robot applications: Material transfer and machine loading-unloading, Processing operations, Assembly, Inspections, others Robot implementation: Approach for implementing robotics, Safety, training, maintenance and quality	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Industrial Robotics	Mikell Groover, Mitchel Weiss, Roger Nagel, Nicholas Odrey, Ashish Dutta	2-e	McGraw Hill Education (India) Private Ltd.
2.	An Introduction to Robotics	KC Jain, PL Verma, Rajesh Khodre	1st 2023	Khanna Publishers
3.	Foundations of Robotics & Automation (Theory & Practice)	A. B. Bhattacharya and Debasish Roy	1st 2025	Khanna Publishing House

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Robotics for the Students of B.Tech., B.E., and B.Sc. (Engg.)	Chikesh Ranjan & Kaushik Kumar	2024	S. Chand Publishing
2.				

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
26RA106P	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.	**Students will be able to:** 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 & 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

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
26RA207T	Design Thinking	2	-	-	2	10	10	30	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