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

COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Minimum Passing Marks	Duration
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total		
1	BSC	**25CS201T**	Engineering Physics and Materials Science	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**23**	**1.5**
2	BSC	**25CS201P**	Engineering Physics and Materials Science Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
3	BSC	**25CS202T**	Statistics and Probability	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
4	BSC	**25CS202P**	Statistics and Probability Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
5	ESC	**25CS203T**	Programming in Python	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**23**	**1.5**
6	ESC	**25CS203P**	Programming in Python Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
7	ESC	**25CS204T**	Introduction to Computer Network	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
8	PCC	**25CS205P**	Computer Workshop – II	**-**	**-**	**4**	**2**	**-**	**25**	**25**	**50**	**25**	**-**
9	AEC	**25CS206P**	Business Communication Skills – II Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
10	SEC	**25CS207T**	Design Thinking #	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**23**	**1.5**
11	CC	**25CS208P**	Co-curricular Courses – II	**-**	**-**	**4**	**2**	**-**	**50**	**-**	**50**	**25**	**-**
Total				**12**	**0**	**16**	**20**	**70**	**245**	**335**	**650**	-	-

Note: # Course should be conducted online through NPTEL

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

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25CS201T	Engineering Physics and Materials Science	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics 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 solid-state physics including free electron theory, band formation, semiconductors, magnetic materials, and their applications in electronic and storage devices. 2. Analyze the principles of optical communication by understanding light propagation in optical fibers, numerical aperture, modes of propagation, fiber losses, and fiber optic sensors. 3. Apply the concepts of quantum physics such as wave–particle duality, de Broglie hypothesis, uncertainty principle, and wave function to physical systems. 4. Evaluate the role of semiconductors, magnetic materials, optical fibers, and quantum mechanics in modern technologies, including communication systems, storage devices, and quantum computing applications.

Unit I BASICS OF SOLID-STATE PHYSICS	**[11 Hrs]**
Semiconductors: 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, Applications of solid state devices - p-n junction diode and transistor. **Magnetic materials**: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.	
Unit II OPTICAL COMMUNICATION	**[11 Hrs]**
Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V -Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)	
Unit III QUANTUM PHYSICS	**[08 Hrs]**
Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing.	

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	Electronic Engineering Materials and Devices	John Allision	10th edition reprint	TMH
3	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	Optical Fiber Communication - Principles & Practice	John M. Senior	3rd Edition	Prentice Hall
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

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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SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25CS201P	Engineering Physics and Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics 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	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	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. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

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
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

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

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25CS202T	Statistics and Probability	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This Course is intended to 1. To equip students with the skills to analyze, interpret, and model statistical data using appropriate computational and analytical techniques. 2. To equip learners with the skills to analyze random phenomena, compute expectations, and interpret results using probability distributions.	**Students will be able to** 1. Solve numerical integration and find analytical solutions to difference equations. 2. Apply statistical methods such as regression, correlation, and least squares fitting to analyze data. 3. Apply probability theory and expectations to analyze data and solve engineering problems. 4. Apply probability distributions to model and interpret random phenomena.

Unit I	**[9hrs]**
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 constant coefficients.	
Unit II	**[9hs]**
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, Multiple regression.	
Unit III	**[9hrs]**
Probability: Random Variable: Discrete & Continuous random Variable, Probability function, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.	
Unit IV	**[9hrs]**
Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.	
Unit V	**[9hrs]**
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	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 Publications, New Delhi.
2	A Text Book of Engineering Mathematics	Peter O' Neil	8th	Thomson Asia Pvt. Ltd., Singapore.

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SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25CS202P	Statistics and Probability Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This Course is intended to: 1. To develop students' ability to analyze and interpret statistical data using SageMath. 2. To enable students to model, simulate, and interpret probability distributions and compute associated measures using SageMath's computational tools.	**Students will be able to:** 1. Apply symbolic and numerical computation techniques using SageMath to solve problems in calculus and discrete mathematics. 2. Analyze and interpret mathematical models using data fitting, correlation, and regression techniques. 3. Evaluate and interpret statistical parameters for joint and marginal probability distributions using SageMath. 4. Model, compute, and visualize discrete probability distributions using SageMath tools.

List of Experiments:-

Experiment No.	List of Experiment
1	To compute factorial polynomials for a given algebraic function with the help of SageMath.
2	To evaluate definite integrals by employing SageMath using Numerical Techniques.
3	To fit linear and quadratic models by means of the SageMath environment using least squares method.
4	To calculate the correlation coefficient and derive regression lines through the use of SageMath tools.
5	To determine Spearman's rank correlation coefficient with the help of SageMath.
6	To evaluate statistical parameters of a given probability distribution with the help of SageMath.
7	To construct and interpret joint and marginal distributions Using SageMath functionality.
8	To model and visualize the Poisson distribution executed through SageMath.
9	To compute and plot the Binomial distribution within the SageMath platform.
10	To analyze the Normal distribution using SageMath's statistical and graphical tools.

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 Math Software System	Indrajeet Varhadpande & Dr. Kirti Sahu	1st	Himalaya Publication
2	Applied Mathematics Using SageMath	Dr. Kirti Sahu and Dr. Sajid Anwar	1st	Himalaya Publication

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25CS203T	Programming in Python	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To introduce Python programming syntax, features, operators, and control flow concepts. 2. To develop programming skills using sequential and non-sequential data types with built-in functions. 3. To enable learners to design modular Python programs using built-in and user-defined functions for practical problem solving.	**Students will be able to** 1. Explain Python syntax, features, data types, operators, and control flow statements for basic problem solving and cybersecurity applications. 2. Apply operations and built-in methods on sequential data types such as strings, lists, and tuples. 3. Implement programs using non-sequential data types and Python functions

Unit I **[10Hrs]**

Introduction and Syntax of Python Program: Features of Python, Applications of Python in Cyber Security, Python building blocks -Identifiers, Keywords, Indentation, Variables, Comments, Python variables. Python Data Types: Numbers, Strings, Tuples, Lists, Dictionaries. Declaration and use of datatypes, Built-in Functions.
Python Operators and Control Flow statements: Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence. Control Flow: Conditional Statements (if, if...else, nested if), Looping in Python (while loop, for loop, nested loops), loop manipulation using continue, pass, break, else.

Unit II **[10Hrs]**

Sequential Data Types:
String: Concept, escape characters, String special operations, String formatting operator, Built-in String methods. Lists: Defining lists, accessing values in lists, deleting values in lists, updating lists, Basic List Operations, and Built-in List functions. Tuples: Accessing values in Tuples, deleting values in Tuples, and updating Tuples, Basic Tuple operations, and Built-in Tuple function

Unit III **[10Hrs]**

Non-Sequential Data Types:
Sets: Accessing values in Set, deleting values in Set, and updating Sets, Basic Set operations, Built-in Set functions. Dictionaries: Accessing values in Dictionary, deleting values in Dictionary, and updating Dictionary, Basic Dictionary operations, Built-in Dictionaries functions.**Python Functions:** Use of Python built-in functions (e.g., type/data conversion functions, math functions, etc.), user-defined functions: Function definition, Function call, function arguments and parameter passing, Return statement, Scope of Variables: Global variable and Local Variables.

Books

S.N	Title	Authors	Edition	Publisher
1	Python for Everybody: Exploring Data Using Python 3	Charles R. Severance	1st Edition	CreateSpace Independent Publishing Platform, 2016.
2	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	2nd Edition	Green Tea Press, 2015.
3	Python Programming	Ch Satyanarayana	1st Edition	universities press (India) private limited 2018.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using problem-solving approach	Reema Thareja	2nd Edition	Oxford university press,2017
2	Programming Python	Mark Lutz	4 Edition	O'Reilly Media,

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GROUP – I: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25CS203P	Programming in Python Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To focus on paradigms of programming language. 2. To Enhancing programming environment. 3. To study various programming languages. 4. To study the python as one of the important 5. programming languages	**The student will be able to** 1. Develop a program using Python operators 2. Develop a Python code using the sequential concept. 3. Develop a Python code using a non-sequential concept. 4. Implement the program using conditional and looping

Expt. No.	Title
1	(A). Installation of the latest Python version from the genuine website, its installation process, path setting, & its testing. (B) Implementation of a 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	Implement a program to find the greatest number among 3 number entered by the user.
7	Implementation of Python programming on a list.
8	Implementation of Python programming on Tuples
9	Implementation of Python programming on a dictionary
10	Implementation of Python programming on functions
11	Develop a Mini project using Python.

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 – I: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25CS204T	Introduction to Computer Network	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
The course is intended 1. To Introduce the fundamental concepts of each layer in the OSI and TCP/IP models. 2. To implement, and troubleshoot local area networks (LAN), wide area networks (WAN), and hybrid networks. 3. To examine the transport layer protocols and their role in ensuring reliable data transfer. 4. To Investigate modern applications and technologies used in computer networks.	**Students will be able to** 1. Design basic computer network by choosing appropriate devices, protocols, and topologies to meet specific requirements as per OSI and TCP/IP layer functionality. 2. Apply the concepts of data link layer protocols (Ethernet) and error detection and correction mechanisms. 3. Implement and evaluate network routing algorithms such as RIP, OSPF, and BGP. 4. Implement transport layer protocols like TCP, UDP and analyze their role in data transfer and network technologies. 5. Understand and explain application-layer protocols and

Unit I	**[10 Hrs]**
Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division, and Wave division	
Unit II	**[10 Hrs]**
Data Link Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ.	
Unit III	**[8 Hrs]**
Network Layer: Internet Protocol (IP) – Logical Addressing: IPV4, IPV6; Address mapping: ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	
Unit IV	**[8 Hrs]**
Transport Layer: Elements of Transport protocols: Addressing, Connection establishment, Connection release, Crash recovery, User Datagram Protocol (UDP), Transmission Control Protocol (TCP). TCP congestion control.	
Unit V	**[9 Hrs]**
Application Layer: Domain Name Space (DNS), DDNS, File Transfer Protocol (FTP), WWW, HTTP, Bluetooth, Firewalls, SDN Network.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Networks	Andrew S. Tanenbaum, David J. Wetherall	5th Edition	Pearson Education
2	Data Communication and Networking	Behrouz Forouzan	4th Edition	Mic Graw Hill Publ.

Reference Book

S.N	Title	Authors	Edition	Publisher
1	Computer Networking: A Top-Down Approach	James F. Kurose, Keith W. Ross	7th Edition	Pearson Education
2	Network Security Essentials	William Stallings	5th Edition	Pearson Education

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SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25CS205P	Computer Workshop - II	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. Develop an understanding of advanced C programming concepts such as pointers, structures, and files. 2. Introduce object-oriented programming principles through C++ (classes, objects, constructors, and destructors) 3. Implement advanced C++ features such as inheritance, polymorphism, templates, and exception handling. 4. Manage file handling and persistent data storage using C/C++.	Students will be able to 1. Apply advanced features of C programming such as pointers, dynamic memory allocation, structures, and file handling for solving real-world problems. 2. Implement modular programming concepts using functions, arrays, pointers, and callback mechanisms. 3. Design and develop object-oriented programs in C++ using classes, objects, constructors, destructors, and operator overloading. 4. Implement inheritance and polymorphism and file handling operations to promote code reusability and dynamic behavior in software design.

Expt. No.	Title of the experiment
1	To develop a program to implement call by value and call by reference.
2	To write a program in C to demonstrate dynamic memory allocation using malloc(), calloc(), realloc(), and free()
3	To write a program to store and retrieve **employee records** using **structures, pointers to structures, and file handling** in C.
4	To write a C++ program to demonstrate the concept of classes and objects using a simple Bank Account Management example.
5	To design a C++ program demonstrating default, parameterized, and copy constructors, and the use of destructors.
6	To implement a C++ program to overload arithmetic operators for a Complex number class.
7	To write a C++ program demonstrating single and multiple inheritance, and runtime polymorphism using virtual functions.
8	To develop a C++ program demonstrating the use of function templates, class templates, and exception handling for robust applications.
9	To implement a C++ program that stores and retrieves student information objects using file streams (fstream) for persistent data storage.
10	STL Containers & Iterators: Implement a program using vector, map, and list containers.
11	Develop a mini project using C++.

Required Software

- Turbo C++, https://www.youtube.com/watch?v=y-oLhL3qQGQ

Text Books

S.N	Title	Authors	Edition	Publisher
1	The C Programming Language	Brian W. Kernighan & Dennis M. Ritchie	2nd Edition	Prentice Hall
2	C Programming Absolute Beginner's Guide	Greg Perry & Dean Miller	3rd Edition	Que Publishing / Pearson Education
3	The C++ Programming Language	Bjarne Stroustrup	4th Edition	Addison-Wesley

Reference Books

S.N	Title	Authors	Edition	Publisher
1	C++: The Complete Reference	Herbert Schildt	5th Edition	McGraw-Hill Osborne Media
2	Mastering C++ Programming	W. Arthur Chapman	1st Edition	Red Globe Press / Bloomsbury

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GROUP – I: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25CS206P	Business Communication Skills – II Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. 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

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25CS207T	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

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