Annasaheb Dange College of Engineering and Technology, Ashta

Department of Artificial Intelligence and Data Science

Structure and Curriculum Contents

B.Tech (First Year)

Revision - 2

SEM-I to SEM-II

(Academic Year 2025-26)

Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist. : Sangli, Maharashtra

(An Empowered Autonomous Institute)

F.Y.B.Tech.–Artificial Intelligence and Data Science

[Level 4.5, UG Certificate] Semester -I

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	T1	2ADBS101	Applied Mathematics – I	3	1	-	2	4	40	20	40	-	-
02	BS	T1	2ADBS102	Biology for Engineers	2	1	-	1	3	40	20	40	-	-
03	ES	L2	2ADES103	Engineering Graphics with CAD	1	-	2	1	2	-	-	-	50	-
04	ES	T1	2ADES104	Introduction to Emerging Technologies	2	-	-	1	2	40	20	40	-	-
05	ES	L1	2ADES105	Programming for Problem Solving using C	2	-	4	2	4	-	-	-	50	50
06	ES	L2	2ADES106	Design Thinking	-	-	2	1	1	-	-	-	50	-
07	HS	L2	2ADHS107	Professional Communication Skills	-	-	4	1	2	-	-	-	50	-
08	PC	T1	2ADPC108	Computer organization and architecture	3	-	-	1	3	40	20	40	-	-
09	CC	L2	3BSCC***	Liberal Learning Course 1	0	-	2	-	1	-	-	-	50	-
				Total	13	2	14	10	22					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥8/20	MSE + ESE (Theory): ≥32/80	TA (Theory) / CIE (Lab) : ≥20/50	ESE (Lab) : ≥20/50

CC Bouquet :

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage

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F.Y. B.Tech.–Artificial Intelligence and Data Science

[Level 4.5, UG Certificate] Semester -II

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	T1	2ADBS110	Applied Mathematics-II	3	1	-	2	4	40	20	40	-	-
02	BS	LIT2	2ADBS111	Engineering Physics and Chemistry	3	-	2	2	4	40	20	40	50	-
03	ES	LIT2	2ADES112	Basic Electrical and Electronics Engineering	2	-	2	2	3	40	20	40	50	-
04	ES	L1	2ADES113	Python Programming	2	-	2	1	3	-	-	-	50	50
05	ES	LIT2	2ADES114	Data Communication and Networking	2	-	2	1	3	40	20	40	50	
06	IKS	T2	2ADHS115	Indian Knowledge system	2	-	-	-	2	-	50	-	-	-
07	VS	L2	2ADVS116	IDEA laboratory	1	-	2	1	2	-	-	-	50	-
08	CC	L2	3BSCC***	Liberal Learning Course 2	-	-	2	-	1	-	-	-	50	-
				Total	15	1	12	9	22					

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥8/20	MSE + ESE(Theory): ≥32/80	TA (Theory) / CIE (Lab) : ≥20/50	ESE (Lab) : ≥20/50

CC Bouquet :

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
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Exit after **F.Y.B.Tech. – Artificial Intelligence and Data Science**

Additional Credits to qualify for UG Certificate

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
1	VSEC	L	*2ADVSI18*	Internship in Computer Hardware & Networking	-	-	-	10	10	-	-	-	100	-
				Total	-	-	-	10	10	100				

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory) : ≥8/20	MSE + ESE(Theory): ≥32/80	TA (Theory) / CIE (Lab) : ≥20/50	ESE (Lab) : ≥20/50

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(An Empowered Autonomous Institute)
Department of Artificial Intelligence and Data Science

Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**BS**
Course Code, Course Title	2ADBS101, Applied Mathematics-I					**Type**	**T1**
Prerequisites	-						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	3	1	-	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		-	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Determine the consistency of systems of linear equations using Echelon form of matrix
CO2	Compute Eigen values, Eigen vectors, powers and inverse of a square matrix using characteristic equation
CO3	Apply the concepts of complex number to solve the equations using De Moivre's theorem and hyperbolic identities
CO4	Calculate partial derivatives, Jacobians, and extreme values of function of two variables using concept of partial differentiation
CO5	Solve ordinary differential equation of order one and degree one using analytical method and numerical techniques.

Syllabus:

Module	Contents	Lecture Hours
I	**Solution of System of Linear Equations:** Definition of system of linear equations, Classification of system of linear equations, Rank of matrix: Concept and computation using Echelon form and Normal form, Rouché–Capelli Theorem (Statements only), Solution of non-homogeneous system of linear equations, solution of Homogeneous system of linear equations, Applications in engineering.	7
II	**Eigen Values and Eigen Vectors:** Definition of vectors in R^n, Linear Dependence and Independence of Vectors, Characteristic Equation of Matrix, Cayley-Hamilton theorem (statement only), Applications of Cayley-Hamilton theorem, Eigen Values and Properties, Eigen Vectors and Properties.	7
III	**Complex Number:** Definition of complex number, Polar and exponential form of complex number, De Moivre's Theorem and Simple Applications, Power and Roots of complex numbers, Applications in solving equations. **Hyperbolic Functions:** Definitions, Identities of hyperbolic functions, Relation between Circular functions and hyperbolic functions, Inverse hyperbolic functions,	8
IV	**Partial Differentiation and Applications:** Functions of several variables, partial derivatives of first order, Higher order partial derivatives, Homogeneous functions, Euler's Theorem on homogeneous function: statement and verification, Jacobians and Properties, Maxima and minima of functions of two variables.	8
V	**Ordinary Differential Equation of first order and first degree:** Linear differential equation, exact differential equation, reducible to exact differential equation, reducible to linear differential equation, Applications of engineering (branch oriented)	8

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VI	**Numerical Solution of Ordinary differential equation of First Order & First Degree:** Euler's method, Modified Euler's method, Runge–Kutta third order, Runge-Kutta Method of order four, Taylor Series method.	7
	Total Lecture Hours	**45**

List of Tutorial with CO Mapping

Sr.No	Title of Tutorial	CO Mapped
1	Rank of matrix and Solution of Homogeneous System of Linear Equations	1
2	Solution of Non-Homogeneous System of Linear Equations	1
3	Eigen Value, Eigen vectors and Properties	2
4	Cayley-Hamilton theorem and Applications	2
5	De Moivre's Theorem, Applications and Hyperbolic functions	3
6	Partial differentiations and Euler's theorem	4
7	Jacobians and Maxima-Minima of Two Variable Functions	4
8	Euler's and Modified Euler's Methods for Solving Initial Value Problems	5
9	Runge-Kutta Methods and Taylor series method	5
10	Ordinary differential equations of first order and first degree	5
	Total Tutorial Hours	**15**

Text Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications ,2011.
2. H. K. Das , Advanced EngineeringMathematics , 22th Edition, S. Chand ,2018.
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
4. Dr. B. S. Grewal , Numerical Methods , 9th Edition, Khanna Publishers ., 2010

References:

1. Dr. B. S. Grewal , Higher Engineering Mathematics , 44th Edition, Khanna Publishers ,2018.
2. N. P. Bali, Manish Goyal , Advanced Engineering Mathematics, 7th Edition, Infinity science press ,2010.
3. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi GrihaPrakashan,1984
4. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.

Online Learning Resources

1. NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121
2. NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105
3. NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta , Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107112
4. NPTEL Course on Mathematics-III, by Prof. Durga C Dalal, Dr. M. Guru Prem Prasad, IIT Guwahati https://nptel.ac.in/courses/122103012

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Established: 1999	**Annasaheb Dange College of Engineering and Technology** **Ashta - 416301, Dist. : Sangli, Maharashtra** **(An Empowered Autonomous Institute)** **Department of Artificial Intelligence and Data Science**	NDCET

Course Information:

Class, Semester	FY. B. Tech, Semester – I						**Category**	**BS**	
Course Code, Course Title	2ADBS102, Biology for Engineers						**Type**	**T1**	
Prerequisites	-								
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**				
	2	1	-	1	3				
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**		
		40	20	40		-	-		

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

CO1	Define fundamental biological principles of Cellular structures, Genetics, Biochemistry and apply them in solving practical, real-world problems.
CO2	Explain basic molecular processes, structure and function of DNA with emphasis on replication, transcription, and translation processes relevant to modern engineering practices.
CO3	Integrate microbiology and biotechnology concepts to design and implement effective solutions in computational and systems engineering projects.
CO4	Classify how biological systems inspire neural networks and biomimetic designs, drawing upon principles from biomimetics, systems biology, and proteomics
CO5	Assess the environmental and health challenges, along with the ethical, legal, and social implications, of applying biological principles to develop sustainable engineering solutions from a biological perspective.
CO6	Understand diseases and disorders, healthcare technologies, and correlate the role of Artificial Intelligence in developing effective engineering solutions in health care technology.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Biology and Its Relevance for Engineers** Course Overview & Importance of Biology in Engineering: Introduction to interdisciplinary approaches. Cell Theory & Structure: Overview of prokaryotic versus eukaryotic cells, Transport Across Cell Membrane, Cell Division. Fundamental Biochemistry: Macromolecules (carbohydrates, proteins, lipids, nucleic acids) and enzyme function. Biodiversity & Classification: The hierarchical organization of life and modern taxonomy, the 5-kingdom classification. Interdisciplinary Integration: How biological principles inform cutting-edge engineering designs.	5
II	**Microbiology and Biotechnology** Introduction to Microorganisms: Bacteria, viruses, fungi, and their characteristics. Microbial Genetics & Evolution: Gene transfer, mutations, and their impacts. Techniques in Microbiology: Isolation, culturing methods, and basic staining techniques. Biotechnology Applications: Role of bioinformatics, synthetic biology, and engineering innovations. Case Studies: Real-world examples of biotechnological solutions in engineering.	5
III	**Systems Biology and Bioinformatics** Principles of Systems Biology: Understanding networks, feedback loops, and complex systems. Introduction to Bioinformatics: Tools and techniques for computational biology. Genomics and Proteomics: Overview of genomic data and proteomic analysis. Biological Databases: Utilization of NCBI, BLAST and other key resources. Integrative Models: Merging biological systems with computational models for analysis.	5
IV	**Genetics and Molecular Engineering** Fundamentals of Genetics: Mendelian inheritance and classical genetics. DNA Structure and Function: Detailed exploration of replication, transcription, and translation. Genetic Engineering Techniques: Overview of CRISPR, recombinant DNA, and related	5

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	methodologies. Ethical, Legal & Social Aspects: Discussion on the implications of genetic modification. Genetic Disorders: Examples and their biological basis.	
V	**Biomimetics and Neural Networks** Introduction to Biomimetics: Nature-inspired designs in engineering. Anatomy of the Human Brain: Basic neurobiology and the organization of neural systems. From Biology to AI: Understanding how neural networks are modelled after natural systems. Applications in Robotics & Intelligent Systems: Case studies and real-world implementations. Comparative Analysis: Evaluating the similarities between biological neural networks and artificial intelligence systems.	5
VI	**Diseases, Health, and Sustainable Engineering** Diseases and Disorders: Infectious, chronic, cancer, Genetic and neurological, cardiovascular, auto immune and role of Artificial Intelligence. Public Health Fundamentals: Epidemiology, disease modelling, and statistics in biology. Engineering Solutions in Health: How biological insights contribute to healthcare technologies. Sustainable Engineering: Integrating biological principles with green technology. Course Integration & Future Directions: Discussion on emerging interdisciplinary trends in CSE and AI & DS.	5
Total Lecture Hours		**30**

List of Tutorials with CO Mapping

Sr. No	Title / Topic of the Tutorial	CO Mapped
1	Study of simple, compound Microscope	1
2	Study of nervous system using specimen, models, etc.	4
3	Investigating the Effect of Light on Seed Germination	1
4	DNA Extraction from Strawberries	2
5	Mendelian Genetics Simulation Using Paper-Based Punnett Squares	1
6	Creating Lotus Leaf-Inspired Hydrophobic Surfaces	4
7	Building a Physical Model of an Artificial Neural Network	4
8	Demonstration of Antibiotic Effects on Bacterial Lawn Culture	3
9	Constructing a Simple Particulate Matter Sensor	5
10	Simple DNA Extraction from a Banana	2
11	Decomposition and Nutrient Recycling Simulation	5
12	Virtual Simulation of PCR (Polymerase Chain Reaction)	2
13	Analyzing Insect Eye Structures to Improve Camera Algorithms	4
14	Comparing Tree Branching Patterns with Neural Network Architectures	4
15	Designing a Simple pH Biosensor for Water Analysis	5
16	Observation of plant cell and Human Cheek Cells	1
	Total Tutorial Hours	**15**

Text Books

1. Biology for Engineers Anthony J. Young, Engineering Press, 1st, 2015
2. Fundamentals of Biology, Lisa M. Johnson, Academic Publishers, 3rd, 2012
3. Essential Cell Biology, Bruce Alberts et al. Garland Science 2nd ,2014
4. Microbiology: An Introduction, Gerard J. Tortora, Pearson, 11th 2017
5. Genetics: From Genes to Genomes, Leland H. Hartwell, McGraw-Hill, 4th, 2011

References:

1. Biotechnology for Engineering Kavita Kumar, Tech Books Publishing, 2nd, 2018
2. Systems Biology: A Textbook Edda Klipp, Wiley-VCH, 2nd, 2016
3. Introduction to Bioinformatics, Arthur M. Lesk, Oxford University Press, 2nd, 2013
4. Biomimetics in Engineering, Robert J. Fuller, Springer 1st, 2019
5. Sustainable Engineering: Principles and Practice Michael T. Solomon, CRC Press, 3rd, 2020

Online Learning Resources

1. https://onlinecourses.nptel.ac.in/noc19_ge31

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Department of Artificial Intelligence and Data Science Engineering

Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**ES**
Course Code, Course Title	2ADES103, Engineering Graphics with CAD					**Type**	**L2**
Prerequisites	--						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	1	-	2	1	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Construct projections of straight lines in various positions with reference planes, by variation in inclination, grade, bearing, and initial conditions.
CO2	Complete the projection of planes in various positions relative to reference planes, considering variations in initial conditions and inclination, to achieve an accurate shape in inclined positions.
CO3	Draw the three orthographic views for a given three-dimensional pictorial view, concerning the direction of viewing in first-angle projection, explaining the sectional view, hidden object and dimensions.
CO4	Develop a 3-dimensional isometric view converted from two or three orthogonal views to illuminate a 3D object.

Syllabus:

Module	Contents	Lecture Hours
I	**Fundamentals of Engineering Graphics and Projections of Lines** **Fundamentals of Engineering Graphics:** Introduction to Drawing instruments and their uses. Different types of lines used in drawing practice, Dimensioning system as per BSI. **Introduction to Computer Aided Drafting** Introduction to CAD & Graphical user interface of the CAD software, Draw Commands, Drafting Aids (Limits, layer, Dimensioning, Object snap, Zoom).	3
II	**Projections of Lines and Projections of Planes** **Projections of Lines:** Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes. Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference planes. . True length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Grade and Bearing of a line **Projections of Planes:** Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes). Edge view and True shape of a Plane. Angles made by the plane with the principal reference planes. Projections of plane figures inclined to both planes. (Only regular polygon).	4
III	**Orthographic Projections** Lines used, selection of views, spacing of views, dimensioning, and sections. Drawing required views from given pictorial views (conversion of pictorial views into orthographic views), including sectional orthographic views.	4
IV	**Isometric Projections** Introduction to isometric. Isometric scale. Isometric projections, and Isometric views/drawings. Circles in isometric view. Isometric views of simple solids and objects.	4
	Total Lecture Hours	15

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Text Books
1. W. J. Luzadder, Fundamentals of Engineering drawing, Revised Edition, Prentice Hall of India, 1999.
2. N. D. Bhatt, Machine Drawing, 15th Edition, Charotar Publishing House Pvt. Ltd.-Anand, 2007.
3. Jhole, Dhananjay, Engineering Drawing, Revised Edition, Tata McGraw-Hill, 2011.
4. M.L. Mathur, Engineering Drawing & Graphics, Revised Edition, Jain brothers, 1999..
References:
1. K. Venugopal, Engineering Drawing and Graphics, 5th Edition, New Age Publication, 2004.
2. R. K. Dhawan, A textbook of Engineering Drawing, Revised Edition, S. Chand and Co, 2008.
3. N. B. Shaha and B. C. Rana, Engineering Drawing, 2nd Edition, Person Education, 2012.
4. K. L. Narayana, Machine Drawing, New Age Publication
Online Learning Resources
1. NPTEL Course on *Engineering Drawing*, by Prof. P. S. Robi, IIT Guwahati https://nptel.ac.in/courses/112103019
2. NPTEL Course *on Engineering/ Architectural Graphics- Part I- Orthographic Projection*, by Prof. Avlokita Agarwal, IIT Roorkee https://nptel.ac.in/courses/124107157
3. NPTEL Course *on Engineering Graphics and Design*, by Prof. NareshDatla, Prof. S. R. Kale, IIT Delhi https://nptel.ac.in/courses/112102304
4. NPTEL Course *on Engineering Drawing and computer graphics,* by Prof. Rajaram Lakkaraju, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc21_me125/preview

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Department of Artificial I ntelligence and Data Science

Course Information:

Class, Semester	F.Y. B.Tech – Semester I					**Category**	**ES**
Course Code, Course Title	**2ADES104, Introduction To Emerging Technologies**					**Type**	**T1**
Prerequisites	-						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	2	-	-	1	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		-	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Describe the key characteristics of emerging technologies such as AI, IoT, AR/VR, Quantum Computing, and Blockchain
CO2	Apply the concepts of AI, IoT, CPS, and Blockchain to real-world case studies to identify their disruptive impact on digital transformation initiatives
CO3	Explain the role of robotics, additive manufacturing, and green technologies in supporting sustainability and ethical technology deployment
CO4	Implement innovative solutions using autonomous systems and green technologies to address sustainability challenges

Syllabus:

Module	Contents	Lecture Hours
I	**Foundations of Emerging Technologies and Innovation Ecosystem** Emerging technologies characteristics and disruptive impact, Indian innovation ecosystem: Digital India, Startup India, AIM, India Stack, National Education Policy and interdisciplinary learning, Case studies: Smart Cities, Aadhaar, UPI, Digital Health Mission.	5
II	**Artificial Intelligence, Machine Learning & Data Science** AI basics: history, goals, types of AI (Narrow, General, Super AI), Machine learning: supervised, unsupervised, reinforcement learning, Introduction to data science: lifecycle, Big Data (5Vs), visualization, Human-centered AI and ethical concerns: bias, privacy, responsible AI.	5
III	**IoT, Cyber-Physical Systems, Edge Computing & Cybersecurity** IoT: architecture, sensors, communication, cloud, Cyber-physical systems: smart grid, autonomous vehicles, industrial automation, Edge & fog computing: real-time applications and use cases, Cybersecurity basics: CIA triad, malware, phishing, digital hygiene.	5
IV	**AR/VR, Quantum Technologies and Blockchain** AR/VR/XR: definitions, tools, applications in gaming, education, healthcare, Metaverse and immersive computing, Introduction to quantum computing: qubits, entanglement, potential impact. Quantum AI. Blockchain, Smart Contracts, DApps, DeFi, NFTs.	5
V	**Robotics, Autonomous Systems & Additive Manufacturing** Robotics: types, sensors, actuators, applications in healthcare, defense, logistics, Autonomous systems: drones, driverless vehicles, swarm robotics, 3D/4D printing: additive manufacturing, materials, future directions, Design thinking for innovation in robotics & manufacturing.	5
VI	**Green Technologies, Sustainability & Tech Ethics** Emerging technologies for solving climate/environmental challenges, Smart grids, clean energy systems, climate tech, e-waste, Sustainable design and SDGs: tech for social good, Tech ethics: inclusivity, equity, digital divide, societal impact.	5
	Total Lecture Hours	**30**

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Department of Artificial Intelligence and Data Science Engineering

Course Information:

Class, Semester	FY. B.Tech, Semester – I						**Category**		**BS**
Course Code, Course Title	**2ADES105, Programming for Problem solving using C**						**Type**		**LI**
Prerequisites	--								
Teaching Scheme (per week)	**Lecture**	**Tutorial**		**Practical**		**Self Study**		**Credits**	
	2	-		4		2		4	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**		**CIA**	**ESE**	
		-	-	-			50	50	

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Prepare an algorithm and draw a flowchart to accurately solve various mathematical problems by using structured approach.
CO2	Apply the fundamental concepts like data types, operators, looping constructs to solve mathematical problems by using the decision and looping controls
CO3	Develop a C program to demonstrate the modular approach by using the concept of function, structure and pointer
CO4	Demonstrate a solution for various mathematical problems by using the fundamental concepts of C
CO5	Write, Compile and debug a program for various problem statements by C language.

Syllabus:

Module	Contents	Lecture Hours
I	**Basics of Programming** The meaning of algorithms, Flowcharts, Pseudo codes, Writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C Program development environment.	5
II	**C Fundamentals** Importance of 'C' Language, History, Structure of 'C' Program, Sample 'C' Program, Constants, variables and data types, Enumeration. Operators and expressions, Managing input / output operations, Control statements-Decision making, Case control & Looping Constructs.	7
III	**Array** The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays. Strings-Declaring and initialing character array, reading and writing string to/from terminal, arithmetic operations on characters, putting strings together, string handling functions.	4
IV	**Functions** Need of user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, methods of parameter passing, Scope rule of functions, user defined and library functions.	4
V	**Structure & Pointers** Need of Structure, defining a structure, declaring and accessing structure variables, structure initialization, copying and comparing structure variables, array of structures, structures and functions, Unions. Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer expressions, pointers and arrays, pointer and character strings, pointer and structure, Void pointer and generic pointer, null pointer, dangling pointer, pointer to a function, Calling A function through function pointer. Dynamic memory allocation malloc( ) ,calloc( ) ,realloc(),free(),Core dump ,Memory leak.	6

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VI	**File Handling** Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access files, command line arguments, C preprocessor.	4
	Total Lecture Hours	30

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Write an algorithm for given problem statement.	1
2	Draw a flowchart for given problem.	1
3	Program using different data types and operators in C.	2
4	Program using different operators and demonstration of operator precedence.	2
5	Program using if and if else construct.	2
6	Program using if else ladder and nested if else.	2
7	Program using switch case.	2
8	Program to demonstrate looping constructs(while and for loops)	2
9	Program to demonstrate looping constructs(do while and nested loops)	2
10	Program to demonstrate one dimensional array	3
11	Program to demonstrate two dimensional array	3
12	Implement a program to demonstrate String handling functions.	3
13	Implement a program to demonstrate user defined functions.	4
14	Program to demonstrate concept of recursion (factorial, Fibonacci)	4
15	Program to demonstrate concept of structures in c.	4
16	Program to demonstrate concept of array of structures in c.	5
17	Program to demonstrate pointers in c.	5
18	Program to demonstrate pointers arithmetic in c.	5
19	Program to demonstrate function pointer.	5
20	Implement a program to demonstrate file handling.	6
21	Program to demonstrate command line arguments.	6
Total Practical Sessions 30	**Total Practical Hours**	60

Text Books

1. ISRD Group , Programming And Problem Solving Using C Language , McGraw-Hill Publications ,2012.
2. Yashwant Kanetkar, Let Us C, 3rd edition, BPB , 2011
3. Harvey M. Deitel , Paul J. Deitel, Abbey Deitel, C How to Program, 2nd edition, Pearson, 2009
4. E. Balguruswamy, Programming in ANSI C, 4th edition, Tata Mc-Graw Hill, 2008

References:

1. D. M. Ritchie, The 'C' Programming Language, 2nd edition, 1998
2. Sidnal, C Programming Laboratory: Handbook for Beginners, 1st edition, Wiley India Limited, 2012
3. YashwantKanetkar, Understanding pointers in C, 4th edition, BPB Publications,2001

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ANNASAHEB DANGE COLLEGE OF ENGINEERING & TECHNOLOGY ASHTA 416 301

Established:1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Artificial Intelligence and Data Science	

Course Information:

Class, Semester	F.Y. B.Tech – Semester I					**Category**	**ES**
Course Code, Course Title	**2ADES106 - Design Thinking**					**Type**	**L2**
Prerequisites							
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	-	-	2	1	1		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Explain the principles and process of Design Thinking and its application in problem-solving.
CO2	Identify and define real-world problems using user-centric observation and empathy techniques.
CO3	Conduct user research through surveys, interviews, and persona building to derive user needs and insights.
CO4	Apply ideation techniques to generate innovative and feasible solutions for identified problems.
CO5	Develop and present prototypes and communicate their solutions effectively using charts, posters, and model presentations.

Syllabus:

Module	Contents
I	Introduction to Design Thinking, Design Thinking Process
II	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.
III	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem
IV	Ideation, Activities – 5 Whys & 1 How, Story boarding, Brainstorming.
V	Prototype – Types, Mindsets, Tools.
VI	Testing – Scenario, Methods, Refinements & Recommendations.

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	**Introduction to Design Thinking** **Activity:** Make a group of 2-4 students. Give each group a simple, relatable problem (e.g., "Long queues at the campus canteen" or "Difficulty in finding parking on campus"). Ask them to: Empathize: Identify users and their pain points. Define: Write a clear problem statement. Ideate: Brainstorm possible solutions. Sketch: Draw their proposed solution on chart paper. Present: Each group will present their idea briefly.	1,2
2	**Identification of Problems** **Activity 1: Present case** study (in group) how companies like **Airbnb, Apple, IDEO, Netflix, Samsung, Toyota** used Design Thinking to drive innovation. **Activity 2: User Interviews** – The student or group should walk around the campus or their locality to observe and identify **at least three (per student)**	1,2

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	real-life problems faced by users (students, faculty, staff, and community). Conduct interviews to gather qualitative insights. Steps: 1. **Observation:** Note down pain points using observation and informal interviews. 2. **Listing:** Write a list of problems identified. 3. **Shortlisting:** Apply criteria like relevance, feasibility, user impact, and alignment with SDGs to shortlist **one problem** to work on for further Design Thinking phases.	
3	**Selection of Problems** **Activity:** Students will present (PPT) their selected problem, why they chose it, who the users are, and the evidence collected.	1,2
4	**Designing of Empathy Map** **Activity: Prepare Empathy Map** – Visualize what users say, do, think, and feel.	1,3
5	**Customer Survey and Analysis** **Activity:** Students create a structured survey (MCQ, likert scale, open ended questions etc.) using google forms and prepare charts (bar, pie etc) and do the analysis.	1,3
6	**Persona Building** **Activity:** Based on findings from **Observations and interviews, Customer Survey and Analysis** from previous experiments, identify pattern i.e. common characteristics, behaviors, needs, pain points, and goals among users and create persona template.	1,3
7	**Customer Journey Map** **Activity:** Select the persona created in the previous experiment, define the Scenario, List Stages/Phases of the Journey, Map User Actions, Identify User Emotions, Identify Touchpoints, Identify Pain Points and opportunities for Improvement.	1,3
8	**Defining the problem** **Activities:** • **Observation of Stakeholders** – Note behaviors and pain points. • **5 Whys Method (Drill Down) –** Uncover root causes behind a problem. • **Root Cause Mapping –** Visual diagram connecting symptoms to core issues. **Refine Problem Statement –** Create a focused, actionable problem definition.	1,3
9	**Poster Presentation** **Activity:** Use A2/A1 sheet and draw charts, diagrams, sketches, and minimal text to represent experiment no 1-8.	1,2,3
10	**Ideation** **Activities:** • **SCAMPER Model** – Modify existing ideas by Substituting, Combining, Adapting, etc. • **Brainstorming (Crazy 8 Method) –** Rapid sketching of 8 ideas in 8 minutes. • **Mind Mapping –** Visually connect ideas around a central problem/theme. Use the suitable and best one activity from above.	1,4
11	**Prototype Building** **Activities:**	1,5

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	• **Storyboarding** – Sketch out user scenarios and interactions. • **Prototyping** – Build a working model or prototype or model.	
12	**Testing** **Activities:** • **Scenario-Based Testing** – Test ideas in realistic user scenarios. **Peer Testing** – Get feedback from other participants or teams.	1,5
13	**Refinement & Recommendation** **Activities:** • **Final Presentation** – Showcase prototype or working model. • **Documentation of Learnings** – Reflect on the process, improvements, and impact (Make a report). Apply for IPR/Incubation/Research Grant/Paper Publication.	1,5
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books

1. E Balaguruswamy, Developing Thinking Skills (The way to Success), First Edition, Khanna Book Publishing Company, 2023
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, First Edition, Harvard Business Review, 2008
3. R T Krishnan & V Dabholkar, 8 steps to Innovation, First Edition, Collins Publishing, 2013

References:

1. Nigel Cross, Design Thinking, First Edition, Bloomsbury, 2011
2. Idris Mootee, Design Thinking for Strategic Innovation, First Edition, Wiley, 2013

Online Learning Resources

1. NPTEL_Design Thinking - A Primer
https://youtu.be/AamBSYPJlcA?si=wJDNT4L9q1NB-6T9
2. Design Thinking and Innovation
https://www.coursera.org/learn/designthinkingandinnovation

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**HS**
Course Code, Course Title	**2ADHS107 Professional Communication Skills**					**Type**	**L2**
Prerequisites	-						
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
(per week)	-	-	4	1	2		
Examination Scheme	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
(Marks)		-	-	-		50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Demonstrate the Listening, Speaking, Reading and Writing (LSRW) skills considering the frame of English language rules accurately for effective and sound communication in academic and profession contexts.
CO2	Exhibit their portfolio and career choices confidently, considering corporate expectations by using digital tools convincingly.
CO3	Write letters, reports, Emails and Blogs proficiently by following required techniques that help in getting acquainted with professional correspondence.
CO4	Attain professional skill while convincingly presenting on allotted topics using MS PowerPoint and AI techniques.
CO5	Justify own role in communicative events in well-organized manner with balanced zeal.

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Self – Introduction	1
2	SWOT Analysis	1
3	Basics of English Pronunciation	1
4	Rapid Review of Grammar	1
5	Diagnosing Listening and Speaking Skills	1
6	Diagnosing Reading and Writing Skills	1
7	Introduction to MS Office (Word, Excel, PPT)	1,4
8	Presenting my career choices	1,2
9	Preparing Portfolio	1,2
10	Describing Technical Charts, Image, and Processes	1,4
11	Using Language Learning Apps and Tools	1,4
12	Presenting Portfolio	1,2
13	Effective Presentation Skills	1,4

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14	Delivering Power Point Presentation	1,4,5
15	Job Application and Resume Writing	1,3
16	Email Writing	1,3
17	Group Discussion	1,5
18	Public Speaking	1,5
19	Report Writing	1,3
20	Organizing an Event	1,5
21	Technical Writing	1,3
22	Blog Writing	1,3
23	Mock Interview	1,2,5
24	Achievement Test	1

Total Practical Sessions	**30**	**Total Practical Hours**	**60**

Text Books

1. The Professional: Defining the New Standard of Excellence at Work Subroto Bagchi Penguin Books India Pvt. Ltd. Revised Edition,2011.

2. Cambridge Guide to IELTS. Pauline Cullen, Amanda French, Cambridge University Press, Reprint, 2017.

3. A Practical Course in Effective English Speaking Skills. J. K. Gangal, PHI Learning Private Limited, New Delhi, Print, 2012

4. English For Engineers. Dr. Shyamaji Dubey, Dr. Manish Kumar. Vikas Publication House Pvt. Ltd.New Delhi, Print, 2020.

5. Personality Development and Soft Skills. Barun K. Mitra, Oxford University Press, New Delhi , 7th impression, 2012.

References:

1.High-school English Grammar and Composition. Wren and Martin, S. Chand and Co., New Delhi, 1st edition, 2015.

2. The Ace of Soft Skills. Ajai Chowdry, Bala Balchandran, Pearson Publication, Delhi, 8th edition, 2017.

3. Effective Technical Communication. M. Ashraf Rizvi, McGraw Hill Education, Chennai,2nd edition, 2017.

4. Business Communication. Hory Sankar Mukerjee, Oxford University Press, New Delhi , 2nd edition, 2013.

5. Communicative English for Engineers and Professionals. Nitin Bhatnagar, Mamta Bhatnagar, Pearson Publication, Delhi, 1st edition, 2013.

Online Learning Resources

1.Software: Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly).

2.Online Platform Coursera (for basic English courses), Duolingo, BBC Learning English.

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Course Information:

Class, Semester	FY. B.Tech, Semester - I						**Category**	**PC**	
Course Code, Course Title	**2ADPC108 ,Computer Organization and Architecture**						**Type**	**TI**	
Prerequisites	-								
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**				
	3	-	-	1	3				
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**		
		40	20	40		-	-		

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	Describe the evolution, structure, and classification of computer systems.
CO2	Explain the organization of a basic computer system and the instruction execution cycle.
CO3	Apply the concepts of assembly language to create simple programs that perform arithmetic and logic operations
CO4	Analyze algorithms used for computer arithmetic operations including addition, multiplication, and division
CO5	Illustrate the structure and operation of various memory systems including cache and virtual memory.
CO6	Understand the principles of pipelining, Flynn's taxonomy, and vector processing

Syllabus:

Module	Contents	Lecture Hours
I	**Structure of Computers** Generations Of A Computer, Computer Types: Classification by size, processors, word-length, users, Computer Data Representation: Basic computer data types, Complements, Fixed point representation, Floating Point Representation.	7
II	**Basic Computer Organization and Design** Instruction Codes, Basic Computer Instruction, Input/output instructions, Timing and Control, Instruction Cycle, I/O Operations, Stack Organization, Register Stack, Addressing Modes, Data Transfer & Manipulation	8
III	**Programming Basic Computer** Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, subroutines.	8
IV	**Computer Arithmetic** Introduction, Addition and subtraction, Multiplication Algorithms(Booth Multiplication Algorithm), Division Algorithm	7
V	**The Memory System** CPU-Main Memory Connection, A block schematic: Random Access Memory, Cache Memory, Memory Interleaving, Virtual Memory, Internal Organization ofSemiconductor Memory Chips. Memory operation: read, Write, MOS Memorycell, Static Memories Vs Dynamic Memories, RAID (Redundant Array of Independent Disks), Direct Memory Access	8
VI	**Pipeline and Vector Processing:** Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline.	7
	Total Lecture Hours	45

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Text Books	
1. W. Stallings, Computer Organization and Architecture: Designing for performance, 12th Edition, Pearson Education/ Prentice Hall of India ,2003	
2. Zaky,Computer Organization,5th Edition, 2001	
3. M. Morris Mano,Computer System Architecture,3rd Edition Pearson Education	
References:	
1. A. Tanenbaum, Structured Computer Organization, 9th Edition, John Wiley & Sons,2006	
2. John P Hays,Computer Architecture and Organization,3rd Edition,McGraw-Hill Publication,1998	

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Established: 1999

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(An Empowered Autonomous Institute)
Department of Artificial Intelegence and Data Science

Course Information:

Class, Semester	F. Y. B.Tech, Semester - II					**Category**	**BS**
Course Code, Course Title	2ADBS110,Applied Mathematics -II					**Type**	**T1**
Prerequisites	2ADBS101						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	3	1	-	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		-	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Determine equation of a curve and compute statistical measures to analyze data using statistical techniques
CO2	Apply the concepts of vector spaces over real numbers to solve problems using linear algebra concepts
CO3	Determine approximate root of algebraic and transcendental equations using numerical methods
CO4	Determine unknown values from tabulated data using finite difference and interpolation techniques.
CO5	Define and distinguish different types of graphs using basic definitions and examples from graph theory.

Syllabus:

Module	Contents	Lecture Hours
I	**Curve fitting and Statistics:** Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	8
II	**Vector Space:** Introduction to Vector spaces, subspaces and characterization, linear combination and span basis and dimension, linear transformation, Row space, column space, null space and range of transformation.	7
III	**Numerical Solution of algebraic and transcendental equation:** Introduction, Bisection method, Regula Falsi method, Secant method, Newton Raphson method.	7
IV	**Statistical Measures**: Introduction, Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Partition values: Quartiles, Deciles and Percentiles, Concept of dispersion, Range, Quartile Deviation, Mean Deviation, Mean Square Deviation, Variance and Standard Deviation.	8
V	**Finite Differences and Interpolation:** Finite differences, Newton's Interpolation formulae, Stirling formula, Lagrange's interpolation formula, Divided Difference	8
VI	**Graph Theory:** Definition of graph, degree of vertex, types of graph, isomorphism, matrix representation of graph, subgraphs, complement of a graph, operation on graph, connected graph, shortest path algorithm.	7
	Total Lecture Hours	**45**

List of Tutorial with CO Mapping

Sr.No	Title of Tutorial	CO Mapped
1	Fitting of straight line and Second-degree parabola	1
2	Fitting of exponential curves and lines of regression	1
3	Subspace and Linear transformation	2
4	Basis and Dimension	2

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5	Solution of Algebraic and transcendental equation		3
6	Measures of Central tendency		1
7	Measures of dispersion		1
8	Interpolation with equal intervals		4
9	Interpolation for unequal intervals		4
10	Graph theory		5
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books

1. H. K. Das, Advanced EngineeringMathematics, 22nd Edition, S. Chand, 2018.
2. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
3. Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers, 2010
4. J. P. Tremblay & R. Manohar, Discrete Mathematical Structures with application to Computer Science 1st-Tata MGH International, 2007.

References:

1. Dr. B. S. Grewal, Higher EngineeringMathematics, 44th Edition, Khanna Publishers, 2018
2. N. P. Bali,Manish Goyal, Advanced EngineeringMathematics, 7th Edition, Infinity science press, 2010.
3. S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10th Edition, Sultan Chand and Sons Publisher, 2000.
4. Seymour Lipschutz, Marc Lars Lipson, Linear Algebra, 4th Edition, McGraw Hill, 2009.

Online Learning Resources

1. NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121
2. NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105
3. NPTEL Course Business Statistics, by Prof. Mukesh Kumar Barua, IIT Roorkee https://nptel.ac.in/courses/110107114
4. NPTEL Discrete Mathematics, by Dr. Sugata Gangopadhyay, Dr. Aditi Gangopadhyay, IIT Roorkee https://nptel.ac.in/courses/111107058

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ADCET

Course Information:

Class, Semester	F.Y. B.Tech, Semester – II					**Category**	**BS**
Course Code, Course Title	**2ADBS111, Engineering Physics & Chemistry**					**Type**	**LIT2**
Prerequisites	**1ADBS111**						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	3	-	2	2	4		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Describe the basic principles of nanotechnology for nanomaterial production using appropriate synthesis methods and microscopy techniques
CO2	Use optical principles and experimental techniques to study diffraction, polarization in engineering applications.
CO3	Apply optics concepts to analyze lasers and fiber optic transmission in engineering contexts.
CO4	Explain the properties and applications of engineering materials for industrial and societal use based on their chemical compositions.
CO5	Compute the calorific values of fuels for domestic and industrial applications by considering environmental effects and principles of green chemistry.
CO6	Solve the domestic and industrial problems related to water quality parameters using theoretical knowledge and laboratory experiments.

Syllabus:

Module	Contents	Lecture Hours
I	**Diffraction and Polarization :** **Diffraction -** Diffraction grating, Plane diffraction grating- construction & theory, Determination of wavelength using plane diffraction grating, Resolving power of grating, Numericals. **Polarization:-**Polarization of light, Polarization by double refraction, Positive and Negative crystals, Optical activity, Laurent's half shade Polarimeter, Numericals.	8
II	**Laser and Fiber Optics:** **Laser:** Introduction, Principle of laser, Pumping and Population inversion, Characteristics of laser, Ruby Laser, Applications of laser in Artificial Intelligence and data science field. **Fiber Optics** : Introduction, Total internal reflection, Structure of optical fibre, Propagation mechanism of optical fibre, Numerical aperture, Acceptance angle, Skip distance, Attenuation, Types of optical fibre, Applications of optical fiber in Artificial Intelligence and data science field.	8
III	**Nanophysics:** Introduction- Nanotechnology, Nano-materials, Top-down and Bottom-up synthesis approach. Ball milling method, Sol-gel synthesis method, Carbon nanotubes, Properties and applications of carbon nanotubes, Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM), Properties and applications of nano-materials in Artificial Intelligence and data science field.	7
IV	**Water Technology and Management:** Introduction, impurities in natural water and it's removal, **Water Testing:** Acidity, alkalinity, chlorides and hardness of water (definition, causes and significance), Disinfection of water, WHO Standards, Scales and sludges: Introduction, Formation in boilers and removal methods.	8

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	Treatment of hard water by: Ion-exchange process, Zeolite process, Desalination of brackish water by Reverse Osmosis method, Numerical on temporary, permanent and total hardness of water.	
V	**Energy Technology and Green Chemistry:** A) **Batteries:** Introduction, Types of batteries, battery characteristics, Lithium- ion batteries (LIBs), Sodium- ion batteries (Instrumentation, advantages, disadvantages and applications). B) **Fuels:** Introduction, classification, characteristics of good fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter. C) **Environment and Green Chemistry:** Definition, Twelve principles of green chemistry, Importance of green chemistry in research and industrial applications.	7
VI	**Advanced Materials for Engineering Applications:** A) **Alloys:** Introduction, classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Aluminum alloy (Duralumin and Alnico), Nickel alloy (Nichrome), Tin alloys (Solders). B) **Polymers:** Introduction, plastics, thermo-softening and thermosetting plastics, industrially important plastics like phenol-formaldehyde, urea-formaldehyde, Conducting polymers, Biodegradable polymers. C) **Composites:** Introduction, Constituents, Fibre-reinforced plastics (FRP) and Glass reinforced plastics (GRP).	7
	Total Lecture Hours	**45**

List of Experiments with CO Mapping

S. No.	Title / Topic of the Experiment	CO Mapped
1	Plane Diffraction Grating- Determine the wavelength of light using plane diffraction grating.	1
2	Laurent's Half shade Polarimeter - Determination of specific rotation of optically active material.	1
3	Laser - Determination of wavelength of He-Ne laser light using diffraction grating.	1
4	Laser - Determination of divergence of He-Ne laser light	1
5	Numerical aperture of optical fiber: To calculate NA of optical fiber by laser diode.	1
6	Inverse Square Law- Verify inverse square law.	1
7	Band gap energy: To determine band gap energy of given semiconductor.	1
8	Determination of alkalinity of water (Acid- Base Titration).	5
9	Determination of chloride content of water by Mohr's method. (Precipitation Titration).	5
10	Determination of total hardness of water by EDTA method (Complexometric Titration).	5
11	Estimation of copper in brass solution (Displacement Titration)	3
12	Preparation of urea formaldehyde.	3
13	Determination of pH of industrial waste water by pH-meter.	5
14	Demonstration of H_2-O_2 fuel cell/ battery.	4
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books

1. G Vijayakumari, Engineering Physics, 3rd Edition, Vikas Pub. House (P) Ltd, 2009
2. M.N.Avadhanulu& P. G. Kshirsagar, A Text Book of Engineering Physics, 12th Edition, S. Chand Publication., 2018
3. K.K.Chattopadhyay and A.N. Banerjee, Introduction to Nano Science and Nanotechnology, 3rd Edition, PHI Learning, 2009
4. S. S. Dara, A Text Book of Engineering Chemistry, 11th Edition, S. Chand & Co. Ltd., New Delhi, 2008.
5. Shashi Chawala, A Text book of Engineering Chemistry, 3rd Edition ,DhanpatRai Publishing Co. New Delhi, 2007

References:

1. David Halliday, Robert Resnick&Jearl Walker, Fundamentals of Physics, 12th Edition, John Wiley & Sons, 2021
2. Resnick Halliday, Krane, Engineering Physics, 8th Edition, John Wiley & Sons Pub., 2008
3. Sulbha K. Kulkarni, Nanotechnology Principles and Practices, 4th Edition, Springer, 2007
4. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Co., New Delhi, 2016
5. Wiley India, Engineering Chemistry, 1st Edition, Wiley India Pvt. Ltd., New Delhi., 2012

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Online Learning Resources		
1. For optics- https://nptel.ac.in/courses/122/107/122107035/		
2. For Quantum Physics -https://nptel.ac.in/courses/122/106/122106034/		
3. For Ultrasonic -- https://freevideolectures.com/course/3531/engineering-physics-i/8		
4. For Solid State Physics -- https://nptel.ac.in/courses/115/105/115105099/		
5. Water Technology-- https://youtu.be/dKWJzp_rrlE		
6. For lithium-ion batteries (LIBs): https://www.youtube.com/watch?v=DBLHaLhyo2w		
7. **Composite materials-Wikipedia -:** https://en.wikipedia.org/wiki/Composite_material		
Experiments that may be performed through virtual labs:		
S. No.	**Experiment Name**	**Experiments Links**
1.	Water analysis-Determination of Chemical parameters	https://inoc-amrt.vlabs.ac.in/exp/water-analysis-chemical-parameters/index.html
2.	Demonstration of Photo-colorimeter	https://pcv-amrt.vlabs.ac.in/exp/spectrophotometry/index.html
3.	Photoelectric Effect	https://mp-amrt.vlabs.ac.in/exp/photoelectric-effect/index.html
4.	Numerical Aperture of Optical Fiber	https://lo-amrt.vlabs.ac.in/exp/numerical-aperture-optical-fiber/
5.	LASER Beam divergence and spot size	https://lo-amrt.vlabs.ac.in/exp/laser-beam-divergence/

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Department of Artificial Intelligence and Data Science

Course Information:

Class, Semester	SY. B.Tech, Semester – II					**Category**	**ES**
Course Code, Course Title	**2ADES112, Basic Electrical and Electronics Engineering**					**Type**	**LIT2**
Prerequisites	-						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	2	-	2	2	3		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Explain fundamental electrical and electronic laws and components used in basic circuits and devices for solving elementary electrical problems.
CO2	Analyze single-phase and three-phase AC circuits using phasor techniques and sinusoidal parameters for accurate calculation of voltage, current, and power.
CO3	Describe electrical protection systems, wiring methods, AC machines, and transformers using understanding of basic power distribution and energy conversion.
CO4	Distinguish between semiconductor devices, rectifiers, transistors along with their role in real-life electronic applications
CO5	Solve number system conversions and classify logic gates to understand basic concepts of digital electronics.

Syllabus:

Module	Contents	Lecture Hours
I	**DC Circuits:** Ohms's Law, Equivalent Resistance, Kirchhoff current Law, Kirchhoff voltage laws, Mesh analysis, Nodal analysis, Superposition Theorem	5
II	**AC Circuits:** Representation of sinusoidal waveforms, peak, Average & RMS values. Real, Reactive and Apparent power, Power triangle, Analysis of single-phase ac circuits (R, L and C), Basics of three phase circuits.	5
III	**Electrical Installation:** Earthing – plate and pipe, Wiring circuits – Simple, Staircase and Godown wiring. **Electrical Machine:** Principle, Construction and Working of Single Phase AC machine and Single-phase transformer, EMF equation of Transformer.	5
IV	**Semiconductor device and applications:** Introduction to PN junction diode- Working and Characteristics, Conductors, Insulators, Semiconductors- Intrinsic and Extrinsic, Applications of Electronics in Real Life	5
V	**Semiconductor Diode and applications:** Zener Diode, LED, Photodiode, Half wave rectifier, Full Wave Rectifier, BJT, JFET (Construction, Working Principle, Characteristics)	6
VI	**Digital Electronics Basics:** Number Systems: Binary, Octal, Decimal and Hexadecimal number system, Conversion of Number System, Logic Gates- Basic, Universal and Exclusive gates	4
	Total Lecture Hours	30

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Study of Basic Electrical Components, Equipment and their symbols used in Electrical Engineering	1
2	Study of Safety Precautions and Earthing Systems	3
3	Experimental Verification of Kirchhoff's Laws.	1
4	Experimental Verification of Superposition Theorem.	1
5	Measurement of Power and Power Factor in a Single-phase Circuit.	2
6	Load Test on Single Phase Transformer.	3
7	Demonstration of wiring circuits.	3

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8	Experimental verification of Semiconductor Diode Characteristics		4
9	Experimental verification of Zener Diode Characteristics		4
10	Characteristics of Single-Phase Half-wave and Full-wave rectifiers.		4
11	Verification of logic gates		5
12	Verification of logic gates using universal gates		5
Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books

1. D. P. Kothari, I. J. Nagrath, Basic Electrical Engineering,4th,Tata McGraw Hill,2019
2. D. C. Kulshreshtha, Basic Electrical Engineering,2nd,McGraw Hill.,2020
3. D. P. Kothari, Basic Electrical & Electronics Engineering ,2nd,TMH New Delhi ,2020
4. D. Patranabi, Sensors and transducers ,2nd,PHI learning Pvt. Ltd.,2003

References:

1. Millman and Halkias , Integrated Electronics,2nd,McGraw Hill,2010
2. A.K. Thereja and B.L. Thereja, Electrical Technology volume II,2nd,S. Chand & Co. Publications,2007
3. L. Bakshi and A. Bakshi, Basic Electrical Engineering,1st,Technical Publications, Pune,2005
4. Albert Malvin, David Bates, Electronic Principles ,7th,McGraw Hill Education, 2017

Online Learning Resources

1. Basic Electrical Circuits by Prof. Gajendranath Chowdary https://onlinecourses.nptel.ac.in/noc25_ee91/preview
2. Introduction to Semiconductor Devices by Prof. Naresh Kumar https://onlinecourses.nptel.ac.in/noc25_ee92/preview
3. Digital Circuits by Prof. Santanu Chattopadhyay https://onlinecourses.nptel.ac.in/noc25_ee125/preview

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Experimental Verification of Kirchhoff's Laws.	https://bes-iitr.vlabs.ac.in/exp/kirchhoff-law/
2.	Load Test on Single Phase Transformer.	https://bes-iitr.vlabs.ac.in/exp/single-phase-transformer/
3.	Verification of logic gates	https://de-iitr.vlabs.ac.in/exp/truth-table-gates/

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Department of Artificial Intelligence & Data Science

Established: 1999

Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**ES**
Course Code, Course Title	***2ADES113*, Python Programming**					**Type**	**LI**
Prerequisites	2ADES105						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	2	-	2	1	3		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	50

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

CO1	Understand the history, features, and basic syntax of Python, including identifiers, variables, operators, and data types.
CO2	Demonstrate the ability to set up the Python environment and use standard libraries like NumPy, Pandas, Matplotlib, and Scikit-learn for basic data processing and visualization.
CO3	Apply conditional statements, loops, and loop control structures to solve computational problems.
CO4	Manipulate and analyze string data using Python string operations, escape characters, formatting, and built-in string methods.
CO5	Implement programs using Python collections (Lists, Tuples, Dictionaries) and develop modular code with functions, including user-defined and anonymous functions.
CO6	Implement programs using Python collections (Lists, Tuples, Dictionaries) and develop modular code with functions, including user-defined and anonymous functions.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction to Python:** Introduction of Python and history of Python,Features of Python,Installation of Python Environment Setup,Python Identifiers, Keywords and Indentation, Comments, Variables, Variable Names,Variables - Assign Multiple Values,Python - Output Variables,Global Variables, Data Types, Operators. Libraries of Python: NumPy, Pandas, Matplotlib, Scikit-learn.	5
II	**Control Statements & Strings:** Sequence Control – Precedence of operators, Type conversion Conditional Statements: if, if-else, nested if-else, Looping- for, while, nested loops, loop control statements (break, continue, pass) a. Strings: declaration, manipulation, special operations, escape character, string formatting operator, Raw String, Unicode strings, Built-in String methods.	5
III	**Lists and Functions:** Python Lists: Concept, creating and accessing elements, updating & deleting lists, traversing a List, reverse Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods. Functions: Definitions and Uses, Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Flow of Execution, Parameters and Arguments, Variables and Parameters, Void Functions, Anonymous functions.	5
IV	**Tuples & Dictionaries:** Tuples, Accessing values in Tuples, Tuple Assignment, and Tuples as return values, Variable-length argument tuples, and Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in tuple functions, indexing, slicing and matrices. Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods	5

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V	**Object Oriented Concept:** Object Oriented Programming Features,Classes and objects declaration, Constructor, Inheritance: Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Regular Expressions, Principles of Object Orientation, Iterators, Polymorphism, Encapsulation and abstraction, Operator Overloading	5
VI	**I/O and Error Handling In Python:** Basics of Input / Output Operations, Python File Open, Python Read File, File Write, Python Delete File, Writing Binary Files Manually, Using Pickle to Write Binary Files, What is Exception?, Handling an exception, try….except…else, try-finally clause, Argument of an Exception.	5
	Total Lecture Hours	30

List of Experiments with CO Mapping		
1	Python Environment Setup, First Program, and Installation of Core Libraries	1
2	Working with Variables, Data Types, and Operators in Python	1
3	Implementing Conditional Statements and Looping Constructs in Python	2
4	String Manipulation and Built-in String Functions	1
5	Creating and Manipulating Lists in Python	1,4
6	Defining and Using Functions, Including Anonymous Functions (Lambda)	4
7	Working with Tuples: Access, Slicing, and Operations	4
8	Creating and Manipulating Dictionaries in Python	4
9	Creating Classes and Objects, Implementing Constructors and Inheritance	3
10	Demonstrating Polymorphism, Encapsulation, and Operator Overloading	3
11	File Handling: Reading from and Writing to Text and Binary Files	5
12	Exception Handling Using try-except and Finally Blocks	5
Total Practical Sessions	15 **Total Practical Hours**	30

Text Books

1.Introduction to computing and Problem Solving with Python Jeeva Jose and SojanLal Khanna Book Publishing Co. (P) Ltd 1 2016

2.Python Data Science Handbook: Essential Tools for Working with Data JakeVanderPlas O'Reilly2017

References:

1.Core Python Programmino-,Wesley J. Chun,Prentice Hall,2006

Online Learning Resources

https://onlinecourses.swayam2.ac.in/ini25_cs04/announcements?force=true

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Department of Artificial Intelligence and Data Science

Course Information:

Class, Semester	FY. B.Tech, Semester – II	**Category**	**ES**
Course Code, Course Title	**2ADES114, Data Communication & Networking**	**Type**	**LIT 2**
Prerequisites	--		

Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**
	2	-	2	1	3

Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		40	20	40		50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Analyze the functioning of data communication systems and computer networks with respect to their components, architectures, and services.
CO2	Select and justify suitable transmission media and switching techniques based on application requirements, performance, and cost.
CO3	Examine transmission errors with reference to IEEE standards, and apply appropriate error detection and correction techniques.
CO4	Demonstrate different TCP/IP services such as IP addressing, DNS, DHCP, FTP, and remote access protocols.
CO5	Implement relevant network topologies using appropriate networking devices such as switches, routers, and access points.

Syllabus:

Module	**Contents**	**Lecture Hours**
I	**Fundamentals of Data Communication** Process of data communication and its components: Transmitter, Receiver, Medium, Message, Protocol, Modes of Communication (Simplex, Half duplex, Full Duplex), Fundamental of Computer Network: Definition and Need of Computer Network, Applications, Network Benefits, Classification of Network: LAN, WAN, MAN	5
II	**Network Topologies and Network Devices** Network Computing Model: Peer To Peer, Client Server, Network Topologies: Introduction, Definition, Selection criteria, Types of Topologies- Star, Mesh, Tree, Hybrid, Network Connecting Devices: Switch, Router, Repeater, Bridge, Gateways and Modem	5
III	**Transmission Media and Switching** Communication Media: Guided Transmission Media Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, Unguided Transmission Media: Radio Waves, Microwaves, Infrared, Satellite, Line-of-Sight Transmission, Point-to-Point, Broadcast, Multiplexing: Frequency-Division Multiplexing, Time - Division Multiplexing, switching: Circuit-switched network, Packet switched network	5
IV	**Error Detection and Correction** Types of Errors, Forward Error Correction Versus Retransmission, Framing: Fixed Sized and Variable Sized Framing, Error Detection: Repetition codes, Parity bits, Checksums, CRC, Error Correction: Automatic Repeat Request (ARQ), Hamming Code	5
V	**Network Communication Models** THE OSI MODEL: Layered Architecture, Encapsulation, Layers in OSI Model (Functions of each layer)-Physical Layer, Data-Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer, TCP/IP Layers and their functions: Host to Network Layer, Internet Layer, Transport Layer, Application Layer	5

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VI	**Network Addressing** Addressing: Physical Address, Logical Address, Port Address, IP Address-Concept, Notation, Address Space, IPv4 Addressing: Classful and Classless Addressing, subnet mask, supernetting, subnetting, IPV6 Addressing scheme and basic structure	5
	Total Lecture Hours	**30**

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Create and Test standard straight network cable(Universal Color Code) using crimping tool	1
2	Generate a Time Division Multiplexing (TDM) signal using relevant simulation software	2
3	Locate the error bit in the given data string by applying checksum error detection method	3
4	Implement Wireless network	4
5	Write a program for parity check error detection	3
6	Write a program for Cyclic Redundancy Check (CRC) error detection	3
7	Write a program for error correction using Hamming code	3
8	Configure static IP address in operating system along with appropriate subnet mask for given problem	4
9	Implement Classful Address in a given network node i) Identify range of IP Address in various classes ii) Justify the reason to choose various IP address classes for creating given network	4
10	Execute TCP/IP network commands: ipconfig, ping, tracert	4
11	Visit your computer Centre - i)Identify the type of topology ii)Identify types of connecting devices with specifications iii)Identify types of cables with specifications iv)List the type of network applications commonly used in the laboratory iv)Draw the layout of installed network	5
12	Share folder and printer in a network	
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books

1. Behrouz A.Forouzan, Data Communication and Networking, 5th , McGraw-Hill, 2017
2. Behrouz A.Forouzan, TCP/IP Protocol Suit, 4th , McGraw-Hill, 2009
3. Godbole Achyut, Data Communication and Networks, 2nd , McGraw-Hill, 2017

Reference Books

1.A.S. Tanenbaum, Computer Networks, 5th , Pearson, 2010

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Design of multiplexer circuits using gates	https://dld-iitb.vlabs.ac.in/exp/multiplexer-using-basic-logic-gates/

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Department of Artificial Intelligence and Data Science

Course Information:

Class, Semester	FY. B. Tech, Semester – I / II					**Category**	**HS**
Course Code, Course Title	**2ADHS115,Indian Knowledge System**					**Type**	**T2**
Prerequisites	-						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self-Study**	**Credits**		
	2	-	-	-	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	50	-		-	-

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:

CO1	Explain the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.
CO2	Analyze ancient Indian mathematical, astronomical, and technological methodologies and compare them with contemporary engineering practices.
CO3	Apply concepts from Ayurveda and ancient biological sciences to modern problem-solving in healthcare and related fields.
CO4	Evaluate traditional Indian architecture, materials, and construction principles as early forms of sustainable engineering design.
CO5	Integrate philosophical and scientific logic from Indian thought into ethical decision-making and sustainable engineering practices.

Syllabus:

Module	Contents	Lecture Hours
I	**Introduction & Historical Context** 1. Overview of the Indian Knowledge System: Philosophy and Scope 2. Historical timelines and key epochs 3. Geographical and cultural influences on ancient Indian science 4. Interdisciplinary approaches in ancient India. 5. Comparative analysis with other ancient civilizations	5
II	**Mathematics & Astronomy in Ancient India** 1. Foundations of Vedic Mathematics and its modern applications 2. Concepts of zero, decimal system, and number theory 3. Astronomical instruments and observational techniques 4. Calendrical systems and time measurement in ancient India 5. Engineering parallels in algorithmic design and computational thinking	5
III	**Ayurveda and Life Sciences** • Introduction to Ayurveda: Philosophy, doctrines, and methodologies • Medicinal systems and their chemical/pharmacological principles • Human physiology and surgical techniques in ancient texts (e.g., Sushruta Samhita) • Integrating traditional knowledge with modern biomedical engineering • Innovations in material sciences: Natural polymers and biocompatible materials	5
IV	**Architectural Knowledge & Engineering Innovations** • Ancient Indian architecture: Principles, materials, and techniques • Urban planning and infrastructure in historical Indian kingdoms • Structural innovations: Temples, forts, and water management systems • Engineering analysis of construction techniques from a modern perspective	5

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	• Case studies: Earthquake-resistant designs in ancient constructions	
V	**Philosophy, Science & Ethics** • Indian philosophical schools and their perspectives on science • The concept of Rta (cosmic order) and its engineering analogies • Early scientific inquiry and epistemology in classical texts • Ethics, sustainability, and social responsibility in engineering • Integration of moral values and technical rigor in project design	5
VI	**Contemporary Relevance & Innovation** • Bridging ancient wisdom with modern technology • Case studies: Reviving lost techniques to inspire modern engineering solutions • Workshops on innovation and design thinking using Indian Knowledge System principles • Integration of cultural heritage in sustainable product design	5
	Total Lecture Hours	**30**

Text Books

01. Indian Knowledge Systems: An Introduction by Dr. Vivek Ramaswamy, Oxford University Press,2nd, 2005.
02. Traditions of Indian Science: A Textbook by Dr. Shyam R. Jha, Cambridge University Press, 1st, 2010.
03. Contemporary Perspectives on Ancient Indian Wisdom by Dr. Arvind Sharma, Routledge, 1st, 2013.
04. Foundations of the Indian Knowledge System by Dr. Meera Nair, Sage Publications, 3rd, 2015.
05. Indian Thought and Science: Bridging the Past and Present by Dr. Ram Prasad, Springer, 2nd, 2008.

References:

01. Encyclopedia of Indian Intellectual Heritage by Dr. Anil Kumar, Oxford University Press, 1st,2012.
02. Indian Philosophy and Science: A Reference Guide by Dr. Lalit Singh, Cambridge University Press, 2nd, 2014.
03. The Vedic and Post-Vedic Traditions: A Reference Book by Dr. Pradeep Kumar, Routledge, 1st, 2003.
04. Handbook of Indian Knowledge Systems by Dr. Sunita Reddy, Sage Publications, 1st, 2016.
05. Traditional Indian Sciences: An Annotated Bibliography by Dr. Kavita Menon, Springer, 1st, 2020.

Online Learning Resources

1. https:// https://onlinecourses.swayam2.ac.in/imb23_mg53/previ

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Course Information:

Class, Semester	F.Y. B.Tech. Semester – II					**Category**	**VS**
Course Code, Course Title	2ADVSI16, IDEA Laboratory					**Type**	**L2**
Prerequisites	--						
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	1	-	2	1	2		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		--	--	--		50	--

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO 1	Operate basic workshop tools for material processing and assembly
CO 2	Make simple 2D and 3D designs using CAD software and prepare them using 3D printing, laser cutting, or CNC machining
CO 3	Build basic electronic circuits using sensors, LEDs, motors, and microcontrollers
CO 4	Apply fundamental programming concepts in embedded C (Arduino IDE) for controlling hardware and automating simple tasks.
CO 5	Integrate mechanical parts and electronics to design and build working models or prototypes.

Syllabus:

Module	Contents	Lecture Hours
I	**Overview of IDEA Lab** Introduction to the IDEA Lab: Vision, objectives, **National Innovation Ecosystem** (IIC, Atal Innovation Mission, NISP), Importance of multi-disciplinary, project-based learning Inspirational case studies from IDEA Labs, Safety protocols, Do & Don'ts in IDEA Lab.	1
II	**Fundamentals of Design & Prototyping** **Design Thinking Basics**: Problem identification, ideation, prototyping, testing, and iteration, **Introduction to CAD Software**: Concepts of 2D and 3D modeling for various applications, File Formats for Fabrication: Understanding STL, DXF, G-Code, SVG, and their uses, Tolerances, fits, and design constraints for manufacturing.	2
III	**Digital Fabrication Technologies** **3D Printing**: Principles, types of 3D printers, materials, slicing software, and applications. **Laser Cutting & Engraving**: Principles, types of lasers, materials, design considerations, and safety. **CNC Router**: Introduction to CNC Router and Mini Desktop Lathe cum Milling operations. G-code fundamentals, material removal processes. **3D Scanning**: Principles of 3D scanning, applications in reverse engineering and quality control. **PCB Fabrication:** Introduction to PCB Milling Machine and PCB Prototype Machine for custom circuit boards.	3
IV	**Fundamentals of Embedded Systems & IoT** **Basic Electrical and Electronic Concepts:** Voltage, current, resistance, Ohm's Law, and fundamental components (resistors, capacitors, diodes, LEDs, sensors, actuators), Measuring Instruments **Overview of microcontrollers**: Overview of Arduino, ESP32, NodeMCU, and their applications in controlling hardware. Circuit simulation using Tinker CAD or Proteus. **IoT Basics**: Basic networking (Bluetooth/Wi-Fi/Ethernet), cloud integration	3
V	**Programming for automation** **Arduino IDE and Embedded C Programming**: Setup, basic syntax (setup(), loop()), digital and analog I/O control.	3

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	Basic Control Systems: Concepts of open-loop and closed-loop control with simple examples. **Introduction to Python.**	
VI	**Project Planning and IPR** **Innovation Process:** From idea generation to concept validation **Project Planning & Management:** Defining scope, setting timelines, budgeting, and resource allocation. **Documentation and Presentation:** Writing a concept note, creating innovation posters, and effective pitching techniques. **Intellectual Property Rights (IPR):** Basics of Patents, Copyrights, and Trademarks relevant to innovation.	**3**
	Total Lecture Hours	**15**

List of Experiments with CO Mapping

S.No	Title / Topic of the Experiment	CO Mapped
1	Introduction, Lab Safety & Tool Familiarization	1
2	Hands on practice of Mechanical Workshop Tools	1
3	3D Printing of simple parts	2
4	Laser Cutting	2
5	CNC Routing/ Engraving	2
6	Basic Electronics circuit	3
7	PCB Design and Prototyping	3
8	Microcontroller Programming and Sensor Interfacing	4
9	Mini Project	5
Total Practical Sessions	**15** **Total Practical Hours**	**30**

Text Books

4. Veeranna D.K., AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2022
5. Saji T. Chacko, Susan S. Mathew, AICTE's Prescribed Textbook: Fundamentals of Electrical and Electronics Engineering (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2024
6. Mehta S.D., Electronic Product Design Volume - I (Basics of PCB Design), 1st Edition, S Chand & Company, 2011
7. Mehta-Gupta, Y.P.Mehta, Vishal Mehta, Workshop Calculation and Science, 1st Edition, Dhanpat Rai Publications, 2020

References:

1. A. K. Maini, Nakul Maini, All-in-One Electronics Simplified, 1st Edition, Khanna Book Publishing Company, 2021
2. J.G. Joshi, Electronics Measurements & Instrumentation, 1st Edition, Khanna Book Publishing Company, 2025
3. Dr. Sabrie Soloman, 3D Printing & Design, 1st Edition, Khanna Book Publishing Company, 2020
4. Kaushik Kumar, Hridayjit Kalita, Workshop/Manufacturing Practices, 5th Edition, S Chand & Company, 2011

Online Learning Resources

1. NPTEL Course on 3D Printing and Design for Educators, By Dr. Sharad K. Pradhan, NITTTR Bhopal https://onlinecourses.swayam2.ac.in/ntr24_ed17/preview
2. NPTEL Course on Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software, By Prof. Ankur Gupta, IIT Delhi https://onlinecourses.nptel.ac.in/noc24_ee127/preview

Experiments that may be performed through virtual labs:

S. No	Experiment Name	Experiments Links
1.	3D Printing Virtual Simulation Lab	https://3dp-dei.vlabs.ac.in/
2.	Digital Fabrication of Flexible Circuit board	https://fab-coep.vlabs.ac.in/exp/digital-fabrication/
3.	Embedded System Design with 8051 and PIC Microcontroller	https://esd-coep.vlabs.ac.in/

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**CC**
Course Code, Course Title	**3BSCC121,Introduction to Yoga and Mindfulness**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	-	-	2	-	1		

Examination Scheme (Marks)	**Theory**				**Practical**	**CIA**	**ESE**
	MSE	**TA**	**ESE**				
	-	-	-			50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Describe the significance and practical applications of yoga for holistic well-being under guided classroom sessions, ensuring coverage of physical, mental, and spiritual aspects.
CO2	Explain the role of subtle energy systems (chakras, nadis) in health enhancement using yogic practices, showing linkage to at least two health benefits.
CO3	Compare different paths of yoga (Bhakti, Jnana, Karma, Raja) through readings and discussions, citing at least one key practice and outcome for each..
CO4	Demonstrate the Eight Limbs of Yoga in practical sessions, reflecting personal integration of at least four limbs in daily habits or behavior.
CO5	Apply yoga and mindfulness techniques in real-life stress situations to improve emotional resilience, showing measurable improvement in two or more psycho-somatic areas.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Yoga Practice and Warming Up Exercises** Overview of yoga philosophy and benefits. Practice basic stretching and warm-up routines. Introduction to breath awareness and mindfulness.	1,5
2	**Omkar ,Prathana and types of Asanas , Surya Namaskar.** Practice of Chant Omkar and opening prayer for mental centering. Perform Surya Namaskar and learn its 10-step sequence. Explore basic asana types: standing, sitting, supine.	1,4
3	**Sleeping position Asanas** Practice of Setubandhasana, Pavanmuktasanan, ChakraasaSetuBandhasana, Understand the effects on back, digestion, and spine.	1, 2
4	**Opposite sleeping position** Practice of Bhujangasana, shalbasanan, Dhanurashan, Makrasanan Focus on strengthening the back and improving posture.	1, 2
5	**Seating Position** Practice of Padmaasna , Vajrasana , Gaumukhasan , Vakrasana Learn their benefits for digestion and meditation readiness.	1, 4
6	**Standing Position** Practice of Tadasana ,Vruksasana, Trikonaasan , Virasana. Emphasize balance, posture, and muscular endurance.	1, 4
7	**Meditation** Guided practice of breath-based (Anapan) and insight (Vipassana) meditation. Focus on observation without judgment.	4, 5
8	**Mantra meditation** Practice chanting and internal repetition of mantras. Use traditional mantras for focus and mental calm.	4, 5
9	**Yognidra** Perform deep relaxation technique (guided Yoga Nidra). Experience body awareness and mental stillness.	4, 5

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10	**Pranayam 1** Practice Anulom Vilom (alternate nostril), Bhramari (humming bee), and Sheetali (cooling breath).Focus on breath control and emotional regulation.	**2, 5**
11	**Pranayam 2** Practice Sitkari and Kapalbhati. Learn their effects on metabolism, energy, and clarity.	**2, 5**
12	**Tratak** Perform Tratak (candle gazing) for concentration. Understand through demonstration or video.	**4, 5**

Total Practical Sessions	**15**	**Total Practical Hours**	**30**

Text Books
1. Yog Jeevan . Dr. ChakoteRiya1st Editon2016
2. Yog Parchichaya Mandlik Guruji Nashik Mandlik Guruji Second Edition 2020

References:

1. Yoga for Modern Age Vethathiri Edition 16th 2023
2. Maharishi, Simplified Physical ExercisesVethathiri Edition I 2014

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**CC**
Course Code, Course Title	**3BSCC122, Physical Fitness and Lifestyle Management**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**		**Credits**	
	-	-	2	-		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Explain the fundamentals of physical education and its role in developing holistic well-being.
CO2	Demonstrate appropriate fitness practices and techniques to improve cardiovascular endurance, strength, and flexibility.
CO3	Apply principles of wellness, including nutrition, sleep, and stress management, to maintain a healthy lifestyle.
CO4	Integrate yoga, mindfulness, and relaxation techniques to promote mental well-being and emotional balance.
CO5	Design a personalized lifestyle management plan based on fitness assessment, health goals, and behaviour change strategies.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Physical Education** Understand the meaning and objectives of physical education.Learn its role in promoting health, fitness, and overall well-being.Explore career options and importance in daily life.	1
2	**General Warm up** Practice dynamic warm-up routines before workouts. Increase heart rate and blood circulation to muscles. Prevent injuries and improve workout performance.	2
3	**Limbering down exercises. Free hand exercises, Cooling down exercises** Perform safe cool-down techniques post activity.Reduce muscle soreness and stiffness.Bring heart rate back to normal gradually.	2
4	**Stretching exercises / Flexibility exercises** Improve range of motion in joints. Reduce muscle tension and prevent injuries. Learn static and dynamic stretching methods.	2
5	**Fitness Evaluation** 1 mile run and walk, Push ups , seat ups ,Seat and reach and BMI . Assess personal fitness using 1-mile run, push-ups, sit-ups, etc.Calculate BMI to understand body composition.Set personalized fitness goals based on results.	5
6	**Aerobic activities** Perform rhythmic activities to improve cardiovascular health.Engage in exercises like jogging, skipping, or dance aerobics.Enhance lung capacity and endurance.	2
7	**Sports and games** (, Cricket, Volleyball , basketball, Kho-Kho , Kabaddi, Athletics) Play team games like Cricket, Volleyball, Kabaddi, etc.Develop teamwork, coordination, and sportsmanship.Improve motor skills and physical agility.	2
8	**Sports and games(Badminton, Table Tennis, Chess)** Participate in games like Table Tennis, Badminton, Chess. Improve reflexes, concentration, and decision-making. Promote mental sharpness and social interaction.	4
9	**Circuit Training, Strength Activities** Perform multiple exercises in a sequence (circuit). Focus on building muscular strength and stamina. Use minimal equipment for maximum benefit.	2
10	**Agility and Coordinative activities** Practice quick movement drills to improve reflexes. Enhance body coordination and balance. Develop speed and reaction time.	2

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11	**Body weight exercises** Do exercises like push-ups, squats, lunges, and planks.Improve strength using your own body resistance.No need for gym equipment.	2
12	**Functional training** Mimic real-life movement patterns (bending, lifting, reaching). Improve daily functional strength and flexibility. Prevent posture-related problems.	3
Total Practical Sessions	**15**	**Total Practical Hours** **30**

Text
Test, Measurement and Evaluation in Sports and Physical Education*. 5th ed., Friends Publications, 2023.
Rules of Games and Sports Updated version, Khel Shaitya Kendra, 2023.
References:
1 Beashel, Paul, and John Taylor. *Physical Education: Essential Issues.* Hodder Stoughton, 1997.
2 Sodhi, H. S., and S. K. Sidhu. *Physique and Selection of Sportsmen.* Punjab Publishing House, 1984.

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**CC**
Course Code, Course Title	3BSCC123, Six Sigma Happiness and Mind Mechanics					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**	**Credits**		
	-	-	2	-	1		
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Analyze personal life patterns and decision-making processes using visual tools like life maps and time audits to improve self-awareness and productivity.
CO2	Identify and modify recurring behavioral or emotional challenges using root cause analysis and habit-tracking techniques
CO3	Apply reflective and psychological tools such as the Gratitude Journal, PERMA Wheel, and mindfulness meditation to enhance emotional well-being.
CO4	Utilize creative thinking and visualization techniques such as mind mapping, personal development canvas, and flow activities to enhance planning and motivation.
CO5	Formulate and monitor measurable personal goals using SMART criteria and Six Sigma strategies to construct a structured self-improvement and lifestyle plan.

Practice Session

No	Contents	CO Mapped
1	**Life Process Mapping** Understand personal daily patterns. Identify meaningful and unproductive activities. Improve decision-making awareness. Build a visual blueprint of life routines.	1
2	**Time Audit Diary** Track hourly usage of time. Identify time-wasters and focus zones. Increase productivity through reflection. Learn prioritization techniques.	1,2
3	**Root Cause Analysis** Find root causes behind repeated problems. Use cause-effect diagrams (Fishbone). Develop problem-solving skills. Prevent recurring emotional or behavioral setbacks.	1
4	**Habit Tracker Creation** Monitor progress of personal habits. Encourage accountability and consistency. Recognize triggers and patterns. Reinforce good habits using visual tools.	3
5	**Control Chart for Habits** Apply Six Sigma's statistical approach to habits. Track habit frequency over time. Identify variation in behavior patterns Improve self-control and discipline.	3
6	**Gratitude Journal** Practice daily reflection on positive moments. Enhance emotional well-being. Reduce stress and negativity. Cultivate a habit of appreciation.	4
7	**PERMA Wheel Self-Assessment.** Evaluate happiness using 5 key pillars (Positive emotion, Engagement, Relationships, Meaning, Achievement). Identify strengths and gaps in life satisfaction. Build awareness of emotional and social well-being. Create a personalized improvement plan.	4
8	**Flow Activity Practice** Engage in high-focus enjoyable activity. Understand the "flow" mental state. Boost intrinsic motivation. Reduce distractions and increase creativity.	4
9	**Mind Mapping the Brain** Visually organize thoughts and plans. Stimulate right and left brain together. Enhance memory, planning, and clarity. Strengthen problem-solving and goal-setting.	1, 5

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10	**Guided Mindfulness Meditation** Practice breath work and awareness techniques. Reduce anxiety and mental fatigue. Increase present-moment awareness. Build emotional balance.	4
11	**Personal Development Canvas** Create a visual profile of strengths, values, and aspirations. Encourage strategic self-improvement. Connect life areas (career, personal, social). Track personal growth visually.	5
12	**SMART Goal Setting + Six Sigma** Define Specific, Measurable, Achievable, Relevant, Time-bound goals. Integrate Six Sigma process for goal monitoring. Improve consistency in self-development. Align actions with purpose and metrics.	5

Total Practical Sessions	**15**	**Total Practical Hours**	**30**

References:

1 S. Radhakrishnan, An Idealist View Of Life, 2015, HarperCollins.
2. Yogi Kochhar, Six Sigma Happiness (English Edition).
3 An idealist way of Life – S Radhakrishnan

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**CC**
Course Code, Course Title	**3BSCC124, Creativity through Visual Arts**					**Type**	**LI2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**		**Credits**	
	-	-	2	-		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Identify and apply the elements of art—line, shape, color, texture, and space—through various drawing and painting techniques.
CO2	Demonstrate creativity and technical skills in using different mediums such as pastels, pen & ink, and water-based paints.
CO3	Create original prints using simplified printmaking techniques such as relief, intaglio, and monoprint methods.
CO4	Design visually appealing digital artwork such as posters, icons, and layouts using basic digital tools.
CO5	Analyze and reflect on personal artwork and peer creations to improve visual communication and aesthetic understanding.

Practice Session

No	Contents	CO Mapped
1	**Fundamentals of Visual arts** Introduction to elements of art: line, shape, colour, texture, space. Practice drawing with pencil and charcoal using simple objects and shapes. Explore light and shade for 3D effects.	1
2	**Basic Graphic Design** Learn principles of alignment, contrast, hierarchy, and balance. Create a basic visual composition using text and image elements. Use sketching or digital tools for layout planning.	2
3	**Typography & Font Design** Study of typefaces: serif, sans-serif, script, decorative. Draw custom fonts and stylized letters. Create a short phrase using hand-drawn typography.	2
4	**Logo Design** Understand logo types: symbolic, text-based, combination marks. Design a logo for a fictional company or cultural event. Focus on clarity, colour choice, and relevance.	4
5	**Poster Design** Choose a theme: social message, event, awareness, culture. Develop layout and imagery using watercolour, pen & ink, or digital tools. Apply principles of visual hierarchy and focal point.	4
6	**Photography Task: Lines & Angles** Capture photographs focusing on geometric lines, angles, and symmetry. Submit 3–5 original photographs with a short description of each. Discuss visual impact and framing.	1, 5
7	**Digital Infographic Design** Choose a topic (e.g., Indian innovations, clean energy, internet safety). Create a digital infographic using free tools like Canva or PowerPoint. Combine icons, minimal text, and visuals to communicate clearly.	4
8	**Visual Metaphor Drawing** Select a concept (e.g., freedom, growth, technology) and represent it visually. Use drawing techniques to convey metaphor without text. Encourage creativity and symbolic thinking.	3,5
9	**Calligraphic strokes of Devnagari** Practice traditional and artistic Devanagari calligraphy. Use ink pens or brush pens to form characters. Create a short meaningful phrase in decorative calligraphy.	2

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10	**Collage on Innovation in India** Use newspapers, magazines, or printed material. Prepare a collage on topics like ISRO, start-ups, or digital India. Emphasize arrangement, contrast, and theme clarity.	**3,5**
11	**Modern Arts** Introduction and fundamental of modern art, Study abstract and modern Indian Artists Create an abstract or modern art piece using acrylics, pastels, or digital tools. Focus on expression and experimentation.	**3,5**
12	**Geometric Pattern Design** Create a detailed design using compass, ruler, or digital drawing. Highlight symmetry, color, and repetition	**1,2**

Total Practical Sessions	**15**	**Total Practical Hours**	**30**

References:

1. *The New Drawing on the Right Side of the Brain.* TarcherPerigee, 2012.
2. *Digital Illustration: A Master Class in Creative Image-making.* Rotovision, 2010.
3. *A History of Indian Painting: The Modern Period.* Abhinav Publications, 1994.
4. *Basics of Visual Art.* New Academic Publishing, 2015.

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Course Information:

Class, Semester	FY. B.Tech, Semester - I					**Category**	**CC**
Course Code, Course Title	**3BSCC125,Community Engagement through NSS**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**		**Credits**	
	-	-	02	-		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Identify the structure and needs of the local community through direct engagement and observation.
CO2	Analyze community issues and participate in collaborative problem-solving activities.
CO3	Demonstrate social and civic responsibility by applying engineering knowledge in real-world social contexts.
CO4	Develop teamwork, leadership, and democratic values through community mobilization and shared responsibility.
CO5	Respond effectively to emergencies and promote national integration, unity, and social harmony through participation in relevant campaigns and awareness programs.

Practice Session

No	Contents	CO Mapped
1	**Cleanliness Drive (Swachh Bharat Abhiyan)** Conduct campus and neighbourhood cleaning. Raise awareness about hygiene and waste segregation.	1,2,3
2	**Tree Plantation** Plant saplings in college or public areas. Educate the community on environmental benefits.	1,3
3	**Road Safety Campaign** Conduct rallies, skits, or poster campaigns. Spread awareness about traffic rules and safe driving.	2,3,5
4	**Health Check-up Camp** Organize basic health screening with medical professionals. Promote hygiene, nutrition, and disease prevention.	1,2,5
5	**Literacy Drive** Teach basic reading and writing to underprivileged children or adults. Distribute learning materials and encourage regular attendance.	1,3,5
6	**Voter Awareness Campaign (SVEEP)** Inform citizens about voter rights and the election process. Promote ethical voting through posters and street plays.	2,3,5
7	**Plastic-Free Campus Initiative** Educate peers on the harmful effects of plastic. Conduct collection drives and promote reusable alternatives.	2,3
8	**Cultural and Heritage Promotion** Organize folk art, dance, and storytelling sessions. Engage the community in preserving local culture.	3,5
9	**Yoga and Wellness Sessions** Conduct yoga and mindfulness sessions for students and locals. Promote physical and mental health through regular practice.	3,4
10	**Self-Defence Training for Girls** Organize practical training on basic self-defence techniques. Empower girls with safety awareness and confidence.	4,5

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11	**Social Contribution Orphanage/ Old age home visit** Hold discussions or exhibitions on gender, caste, and social equality. Encourage inclusive behavior and respect for diversity.	3,4,5
12	**Digital Literacy Program** Teach basic smartphone and internet use to the elderly or untrained groups. Promote safe and productive use of digital tools	2,3,5

Total Practical Sessions	**15**	**Total Practical Hours**	**30**

References:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, nss cell, Activities reports and its manual.

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Course Information:

Class, Semester	FY. B.Tech, Semester – I					**Category**	**CC**
Course Code, Course Title	**3BSCC126,Cultural Exploration & Heritage**					**Type**	**L2**
Teaching Scheme (per week)	**Lecture**	**Tutorial**	**Practical**	**Self Study**		**Credits**	
	-	-	2	-		1	
Examination Scheme (Marks)	**Theory**	**MSE**	**TA**	**ESE**	**Practical**	**CIA**	**ESE**
		-	-	-		50	-

Course Outcomes (COs) :
Upon successful completion of this course, the student will be able to:

CO1	Identify and describe key elements of cultural heritage including tangible, intangible, and natural heritage with real-life examples.
CO2	Demonstrate understanding of regional and national cultural practices through participation in experiential activities.
CO3	Analyze the significance of preserving cultural heritage in the context of globalization and modernization.
CO4	Collaborate in group projects to creatively document and present cultural themes using various mediums.
CO5	Reflect critically on personal and collective cultural identities through journals, discussions, and presentations.

Practice Session

No	Contents	CO Mapped
1	**Introduction to Cultural Exploration and Heritage** Understand the meaning of tangible, intangible, and natural heritage, Discuss real-life examples of cultural elements. Reflect on how culture shapes identity.	1,5
2	**Heritage Mapping/ Case Study on a Heritage Site** Choose a local region or community. Identify and locate key cultural sites (temples, festivals, crafts). Create a visual or digital heritage map. Present findings in written or visual format	1,3,4
3	**Vaidik Tal Vadya Songs and Music tradition** Introduction to Vedic Music, Demonstration of Vaidik Tal Vadya, Listening Session of Vedic Chants &Samagana, Group Singing of a Vedic Verse or Traditional Bhajan	2, 5
4	**Folk Dance** Watch or participate in folk dance. Discuss the significance, costumes, and music of each. Compare cultural roots and evolution.	2, 4
5	**Traditional Music** Dholki ,Tabala, Dhol ,LezimListen to selected regional or classical music samples. Identify the instruments, lyrics, and cultural setting.	2, 4
6	**Traditional Instrumental** Taal, Tritaal, Tabala Observe or perform simple rhythms or melodies. Explore the cultural and ceremonial use of instruments.	1, 2
7	**Singing** Types of singing, Vocal Singing Introduction to music fundamentals	2, 4
8	**Drama** Introduction, Types, Information about acting, Stage information , Present / performance on stage	4,5
9	**Classical dance, Western dance** Introduction to classical, and western dance demonstrations. Different types	2, 4
10	**Karaoke Singing** Introduction, Types, Basic music information	2, 4

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11	**Short film** Prepare short film , Present / performance on stage , Topic concern with Indian Cultural heritage	3, 4, 5
12	**Final Showcase** Present all your work in a class exhibition. Explain the cultural significance of each project. Receive peer and teacher feedback.	4, 5

Total Practical Sessions	15	**Total Practical Hours**	30

Text Books

1. Nrutasaurabha Manjiri ShriramDev XII 2015
2. Indian Art and Culture , NitinSinghania McGraw Hill Education IV 2022
3. The Wonder That Was India Picador India Second2004
4. The National Culture of India National Book Trust (NBT), India Second2016

References:

1. Bhattacharyya, Haridas, editor. *The Cultural Heritage of India*. The Ramakrishna Mission Institute of Culture, multiple volumes, revised ed.
2. Singhania, Nitin. *Indian Art and Culture*. 4th ed., McGraw Hill Education, 2022.
3. Basham, A. L. *The Wonder That Was India*. Picador India, 2004.
4. Jokilehto, Jukka. *A History of Architectural Conservation*. 2nd ed., Routledge, 2017.

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