



TAKSHASHILA UNIVERSITY

(Tamil Nadu State Private University)
ONGUR, TINDIVANAM TK, VILLUPURAM DT

FACULTY OF ENGINEERING AND TECHNOLOGY SCHOOL OF COMPUTATIONAL ENGINEERING

Department of Artificial Intelligence and Data Science

(IBM)

REGULATION – R25 NEP CURRICULUM & SYLLABI I Semester



VISION AND MISSION OF UNIVERSITY

VISION:

To create change makers and world leaders similar to the ancient Takshashila University.

MISSION:

The brightest minds and the best resources are used to nurture and develop the leaders of tomorrow, where they are encouraged to be eternally curious and ethically sound.

DEPARTMENT VISION AND MISSION

VISION:

To be a center of excellence in Artificial Intelligence and Data Science by fostering transformative education, interdisciplinary research and innovation to develop intelligent, ethical, and sustainable solutions that address global challenges and contribute to societal progress.

MISSION:

M1: Academic Excellence	Deliver a contemporary, outcome-based curriculum that equips students with strong foundations in Artificial Intelligence, Data Science and computational thinking to solve complex real-world problems.
M2: Research and Innovation	Promote interdisciplinary research, innovation, and the adoption of emerging AI and data-driven technologies to develop impactful solutions for industrial and societal needs.
M3: Industry Readiness and Entrepreneurship	Strengthen employability and entrepreneurial capabilities through industry collaborations, experiential learning, internships, professional certifications and start-up incubation.
M4: Ethics and Lifelong Learning	In still ethical values, responsible AI practices, professional integrity, and a commitment to lifelong learning to develop socially responsible leaders capable of driving sustainable technological advancement.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis

Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning

Recognize the need for, and have the preparation and ability to engage in continuous learning in the face of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Competitive Platform

To create a competitive platform for solving critical problems in a wide variety of fields.

PEO2: Exploration

Enthusiastic participation in learning, understanding, designing and applying new innovative research ideas as the field evolves.

PEO3: Career

Applying cutting-edge technology that improves knowledge and to commit students for life-long learning to reach the leading positions in the career.

PEO4: Professional Values

Simulate the graduates to hold the responsibilities in the context of technology, ethics, society and humanity.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: AI and Data Analytics Competency

Apply the principles of Artificial Intelligence and Data Science to develop intelligent, data-driven solutions for complex real-world problems.

PSO2: Research and Innovation

Design and implement AI-based and data-centric solutions using modern tools, emerging technologies and research methodologies to address industrial and societal challenges.

PSO3: Professional Competence

Demonstrate professional ethics, entrepreneurial mind-set and lifelong learning to excel in careers, higher education, research, and innovation in Artificial Intelligence and Data Science.



FACULTY OF COMPUTATIONAL ENGINEERING
B.TECH. IN ARTIFICIAL INTELLIGENCE AND DATA SCIENCE (IBM)
(REGULATION – R25 NEP)
SEMESTER – I

Sl. No.	Course Code	Course Title	Category	Periods			Cre dits	Hrs.	Max. Marks								
				L	T	P			CAT Theory (Best of two)	ASS	MCQ	ATT	SEM	PRA C	CAM	ESM	Total
1	U25EN02T	Communicative English	HS	3	0	0	3	45	20	5	5	5	5	-	40	60	100
2	U25MA01T	Calculus and Linear Algebra	BS	3	1	0	4	60	20	5	5	5	5	-	40	60	100
3	U25PH02B	Quantum Mechanics for Engineers	BS	3	0	2	4	75	20	5	5	5	5	10	50	50	100
4	U25GE02T	Design Thinking	ES	3	0	0	3	45	20	5	5	5	5	-	40	60	100
5	U25AD81B	Application Using Python Programming	PC	3	0	2	4	75	20	5	5	5	5	10	50	50	100
6	U25GE01P	Engineering Graphics	ES	0	0	4	2	60	-	-	-	-	-	-	50	50	100
Total							20	360							280	320	600
7	U25VA02P	Physical Wellness and Yoga	VAC	0	0	2	1	30	-	-	-	-	-	-	100	-	100
Total:							1	30							100	-	100
Semester Total:							21	390							380	320	700

Note:

L – Lecture

T – Tutorial

P – Practical

CAT – Continuous Assessment Test

ESM – End Semester Exam Marks

ASS – Assignment

ATT – Attendance

CAM – Continuous Assessment Marks

SEM – Seminar

PW – Project Work

BoS Chairman

U25EN02T	Communicative	L	T	P	C	Total
		3	0	0	3	45

COURSE OBJECTIVES:

• To Develop an understanding of the fundamentals of effective communication
• To Enhance listening and reading skills using appropriate comprehension strategies
• To Improve speaking skills for effective interpersonal and professional communication
• To Develop writing skills for academic, professional, and workplace communication
• To Build confidence in using English effectively in real-life and career-oriented situations.

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Explain the fundamentals and principles of effective communication.
CO2:	Apply listening and reading strategies to comprehend and interpret spoken and written texts.
CO3:	Demonstrate effective speaking skills with appropriate fluency, pronunciation and vocabulary.
CO4:	Produce clear and coherent written documents for academic and professional purposes.
CO5:	Prepare professional documents such as resumes, cover letters and formal correspondence.

UNIT I: FOUNDATIONS OF LANGUAGE AND COMMUNICATION	9 Hrs.
Introduction to Communication: Definition, process, importance, types (verbal, non-verbal, formal, informal) - 7 Cs of effective communication - Barriers to Communication: Semantic, psychological, physical, cultural, and how to overcome barriers.	

UNIT II: RECEPTIVE SKILLS I: LISTENING	9 Hrs.
Listening Skills: Importance of active listening - Types of listening - Intensive, Extensive, Attentive - Strategies for listening comprehension - Listening for gist, specific information, inference - Listening to short talks, news snippets and simple conversations - Note-taking.	

UNIT III: PRODUCTIVE SKILLS I: SPEAKING	9 Hrs.
Intrapersonal and Interpersonal Communication and Differences - Speaking sub-skills: Fluency, Accuracy, Vocabulary and Pronunciation - Factors influencing Speaking Skills: Performance conditions, Affective factors, Listening Skill, Feedback, Linguistic Components and Speaking – Form, Content and Use.	

UNIT IV: RECEPTIVE SKILLS II: READING	9 Hrs.
Reading Skills: Types of reading - skimming, scanning, intensive, extensive - Strategies for reading comprehension - Identifying main ideas, topic sentences, supporting details, inferencing - Summarizing and paraphrasing short passages.	

UNIT V: PRODUCTIVE SKILLS II: WRITING	9 Hrs.
Paragraph Writing: Elements of a good paragraph (topic sentence, supporting sentences, concluding sentence) - Cohesion and coherence; Types of paragraphs (descriptive, narrative, persuasive - basic) - Letter Writing: Formal letters (application for leave, complaint letter, simple inquiry letter) - Informal letters (personal letter to a friend/relative). Resume/CV Writing: Crafting compelling resumes/CVs - Cover Letter Writing: Composing persuasive cover - Job Search Correspondence: Writing effective follow-up emails, thank-you notes and enquiry letters.	

Total Hours: 45

TEXT BOOKS:	
1.	C.Richards, Jack and Theodore S.Rodgers. Approaches and Methods in Language Teaching. 2nd Edition. Cambridge: Cambridge University Press, 2010.
2.	Adler, Ronald B., et al. <i>Understanding Human Communication</i> . 13th ed., Oxford University Press, 2013.
3.	Hacker, Diana, and Nancy Sommers. <i>A Writer's Reference</i> . 9th ed., Bedford/St. Martin's, 2018.
4.	H.H, Stern. Fundamental Concepts of Language Teaching. New York: Oxford University Press, 2015.

REFERENCE BOOKS:	
1.	Alrasheedi, S. Investigation of Factors Influencing Speaking Performance of Saudi EFL

	Learners. Arab World English Journal, 11(4), 66–77, 2020.
2.	Konar, N. How to Teach Vocabulary in ELT Classroom? The Journal of English Language Teaching (India), 8-12, 2009.
3.	Savignon, S. J. Communicative Language Teaching: State of the Art. TESOL Quarterly, 25(2), 261–278, 1991.

WEB REFERENCES:

1.	https://www.manage.gov.in/studymaterial/ec.pdf
2.	https://in.indeed.com/career-advice/career-development/active-listening-skills
3.	https://www.scribd.com/document/825761181/Complete-Notes-Module-1-to-5-Communicative-English-BENGK106
4.	https://tefl-tesol-certification.com/blog/types-of-reading
5.	https://www.slideshare.net/slideshow/unit41paragraph-writing/239345788

COs/POs/PSOs Mapping:

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	–	–	–	–	–	–	1	3	–	1	1	–	3
2	2	3	–	–	–	–	–	–	2	3	–	2	1	–	3
3	1	2	–	–	–	–	–	1	3	3	–	2	–	–	3
4	1	2	–	–	–	–	–	–	2	3	–	2	–	1	3
5	1	2	–	–	1	–	–	–	2	3	1	2	–	1	3

Correlation Level: 1-Low, 2-Medium, 3- High, '–' - no correlation


BoS Chairman

U25MA01T	Calculus and Linear Algebra	L	T	P	C	Total
		3	1	0	4	60

COURSE OBJECTIVES:

To develop the ability to transform complex systems into simplified diagonal structures for easier computation and analysis
To understand the consistency of a matrix
To learn linear differential equations of higher order with constant coefficients
To understand the concept of partial differentiation
To introduce the concepts of curl, divergence and integration of vectors in vector calculus

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Enable the transformation of higher-dimensional linear systems into computationally efficient forms for easier analysis and interpretation.
CO2:	Develop the ability to examine whether a given set of equations representing a physical system possesses a valid solution, and classify the nature of such solutions.
CO3:	Acquire techniques to solve equations that describe time-dependent phenomena, such as oscillations, growth, and decay in engineering systems.
CO4:	Extend calculus principles to functions involving several variables, enabling the identification of optimal points under given constraints.
CO5:	Build a foundation to understand how quantities like flow, rotation, and expansion behave in space, and connect localized behavior to overall system properties.

UNIT I: MATRICES	12 Hrs.
Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties of Eigen values and Eigen vectors - Diagonalization of matrices.	

UNIT II: CONSISTENCY OF MATRIX	12 Hrs.
Cayley - Hamilton Theorem (without proof) Problems Only - Rank of a Matrix - Consistency of system of linear equations.	

UNIT III: DIFFERENTIAL EQUATIONS	12 Hrs.
Linear differential equations of higher order with constant coefficients - The Operator D - Method of variation of parameter.	

UNIT IV: PARTIAL DIFFERENTIAL EQUATIONS	12 Hrs.
Partial Derivatives - Partial differential equations of higher order with constant coefficients - Maxima and Minima of two variables - Lagrangian Multiplier.	

UNIT V: VECTOR CALCULUS	12 Hrs.
Gradient - Divergence and Curl - Directional Derivative - Irrotational and Solenoidal vector fields - Gauss Divergence Theorem (without proof) - Stoke's Theorem (without proof).	

Total Hours: 60

TEXT BOOKS:	
1.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 45th edition, 2024.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 11th Edition, John Wiley & Sons, 2021.

REFERENCE BOOKS:	
1.	B. V. Ramana, Higher Engineering Mathematics, 2nd Edition (Reprint), McGraw Hill Education, 2022.
2.	Dennis G. Zill, Advanced Engineering Mathematics, 8th Edition, Jones & Bartlett Learning, 2023.
3.	R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa Publishing, 2021.
4.	H. K. Dass, Advanced Engineering Mathematics, 22nd Edition, S. Chand Publishing, New Delhi, 2023.

5.	C W. Evans, "Engineering Mathematics", A Programmed Approach, 3rd Edition, 2019.
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WEB REFERENCES:	
1.	http://www.digimat.in/nptel/courses/video/111105121/L49.html
2.	http://www.digimat.in/nptel/courses/video/111108157/L41.html
3.	https://www.youtube.com/watch?v=f7LTec8-XbY
4.	https://nptel.ac.in/courses/111105121
5.	https://nptel.ac.in/courses/111105122

COs/POs/PSOs Mapping:															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	-	1	-	-	-	-	-	-	1	2	1	-
2	3	3	1	2	-	-	-	-	-	-	-	1	1	-	-
3	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
4	3	2	1	-	-	-	-	-	-	-	-	1	-	-	1
5	3	3	-	-	-	-	-	-	-	-	-	1	-	-	-

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation


BoS Chairman

U25PH02B	Quantum Mechanics for Engineers	L	T	P	C	Total
		3	0	2	4	75

COURSE OBJECTIVES:

To critically analyze the experimental failures of classical physics, including Black-Body Radiation, the Photoelectric Effect, and the Specific Heat of Solids
To introduce students to the fundamental concepts of quantum mechanics
To introduce students to the fundamental concepts of to understand the wave-particle duality
To apply the Schrodinger equation to solve one-dimensional and three-dimensional quantum mechanical problems with various potential energy
To apply the free electron theory and band theory of solids

COURSE OUTCOME:

After completion of the course, the students will be able to

CO1:	Planck's Quantum Hypothesis to explain the quantized nature of energy emission and absorption.
CO2:	It explains time – dependent and Independent schrodinger equations, wave – packets and Uncertainty principle.
CO3:	Students will be able to accurately calculate expectation values for physical observables.
CO4:	Students will be able to derive and interpret the quantized energy levels and wave functions for particles in a box and square well potentials.
CO5:	Students will be able to calculate and interpret the Fermi energy and density of states for a free electron gas.

UNIT I:	ORIGIN OF QUANTUM MECHANICS	9 Hrs.
Limitations of Classical Physics - Black – Body Radiation Photoelectric Effect - Specific Heat of Solids – Planck’s Quantum Hypothesis - Compton Effect - Quantum theory of Specific Heat - Bohr Atom Model of Hydrogen Atom - Inadequacy of (Old) Quantum Theory - Young’s double slit experiment.		

UNIT II:	WAVE NATURE OF PARTICLE AND SCHRODINGER EQUATION	9 Hrs.
Wave nature of particles, time-dependent and time-independent Schrodinger equation for wave function, Expectation values, Free – particle wave function and wave – packets, Uncertainty principle.		

UNIT III:	APPLICATIONS OF SCHRODINGER EQUATION	9 Hrs.
Particle in a box, Square – well potential - Schrodinger equation for one-dimensional problems for different potentials - Scanning tunneling microscope - Particle in three-dimensional box and related examples, Angular momentum operator, Rigid Rotor, Schrodinger equation for spherically symmetric potentials.		

UNIT IV:	INTRODUCTION TO MOLECULAR BONDING	9 Hrs.
Particle in double delta – function potential, molecules (hydrogen molecule, valence bond and molecular orbitals picture), singlet / triplet states, chemical bonding, hybridization.		

UNIT V:	INTRODUCTION TO SOLIDS	9 Hrs.
Free electron theory of metals, Fermi level, density of states, application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig–Penney model and origin of energy bands Numerical solution for energy in one–dimensional periodic lattice by mixing plane waves.		

Total Hours: 45

LIST OF EXPERIMENTS:
1. Determine the Thickness of the given thin wire by using Air Wedge.
2. Determine the Refractive index of a solid prism by using Spectrometer.
3. Determine the wavelength of the mercury spectrum using spectrometer grating.
4. Determine the i-d curve for a given prism and hence to calculate the refractive index of the material of the prism.
5. Young's Modulus μ of the material of a beam- By non-uniform bending using Pin and Microscope.

6.	Young's Modulus q of the material of a beam- By uniform bending using Pin and Microscope.
7.	Rigidity Modulus n of the material of a wire -Torsion Pendulum.
8.	Determine the acceptance angle and Numerical aperture of the given optical fiber.
9.	To determine the particle size of the given lycopodium powder using laser diffraction method.
10.	Determine the wavelength of the given laser light using the diffraction grating.

Total Hours: 30

TEXT BOOK:	
1.	Aithal, P. S., & Ravindra, H. J., "Textbook of Engineering Physics". Acme Learning Pvt. Limited, 1st edition, 2011.
2.	Eisberg.R & Resnick. R (2022). "Quantum physics of atoms, molecules, solids, nuclei and particles". Wiley India Reprint, 2nd edition, 2022,
3.	Beiser, Arthur. "Concepts of modern physics". McGraw-Hill, 6th edition, 1995.
4.	Pillai, S. O. (2006). "Solid state physics". New Age International, 6th edition, 2005.
5.	Avadhanulu, M. N. (2008). "A textbook of engineering physics". S. Chand Publishing, 22nd edition, 2014.

REFERENCES BOOKS:	
1.	David J. Griffiths & Darrell F. Schroeter, "Introduction to Quantum Mechanics", Cambridge University Press, 3rd edition, 2020.
2.	Walter Greiner, "Quantum Mechanics: An Introduction", Springer, 2nd edition, 2021.
3.	Charles Kittel, "Introduction to solid state physics", Wiley India Reprint, 9th edition, 2023.
4.	Zettili, N. "Quantum mechanics: concepts and applications". Wiley, 2nd edition, 2009, Wiltshire.
5.	Sakurai, J. J., & Napolitano, J. "Modern quantum mechanics". Cambridge university press, 2nd edition, 2011.

WEB REFERENCES:

1	https://learn.mit.edu/search?q=Introduction+to+Solid+State+Chemistry&resource=3923&resource_title=quantum-physics-i&utm
2	https://learn.mit.edu/video/10607/lecture-4-expectations-momentum-and-uncertainty?utm=&playlist=10603
3	https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014/resources/lecture-13-molecular-orbital-theory/?utm
4	https://alan.ece.gatech.edu/ECE6451/Lectures/StudentLectures/King_Notes_Density_of_States_2D1D0D.pdf?utm
5	https://www.homepages.ucl.ac.uk/~ucapahh/teaching/3C25/Lecture14s.pdf?utm

COs/POs/PSOs Mapping:

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	1	-	-	-	-	-	-	1	1	2	1	1
2	3	3	1	2	1	-	-	-	-	-	1	1	2	2	1
3	3	3	1	2	1	-	-	-	-	-	1	1	2	2	1
4	3	3	2	2	1	-	-	-	-	-	1	1	2	2	2
5	3	2	2	3	2	1	-	-	-	-	2	1	3	2	2

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation

BoS Chairman

U25GE02T	Design Thinking	L	T	P	C	Total
		3	0	0	3	45

COURSE OBJECTIVES:

• To Understand the Fundamentals of Design Thinking
• To Develop Empathy and Divergent Thinking Skills
• To Learn the Design Thinking Tools
• To Explore and Apply Design Thinking Processes
• To Integrate Design Thinking in Product Design

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Understand the fundamental knowledge of the concepts of design thinking and its uses.
CO2:	Compare and classify the various learning styles and memory techniques.
CO3:	Learn various tools for design thinking and choose them for a specific problem.
CO4:	Understand the design thinking processes and apply them for problem solving.
CO5:	Apply the process for developing innovative products using design thinking approach.

UNIT I:	DESIGN THINKING BACKGROUND	9 Hrs.
Design Thinking Background – Definition of Design Thinking – Business uses of Design Thinking – Variety within the Design Thinking Discipline – Design Thinking Mind-set.		

UNIT II:	FUNDAMENTAL CONCEPTS	9 Hrs.
Empathy – Ethnography – Divergent Thinking – Convergent Thinking – Visual Thinking – Assumption Testing – Prototyping – Time for Learning and Validation.		

UNIT III:	DESIGN THINKING TOOLS	9 Hrs.
Visualization – Journey Mapping – Value Chain Analysis – Mind Mapping – Rapid Concept Development – Co-Creation – Learning Launches – Story Telling – Case Study.		

UNIT IV:	DESIGN THINKING PROCESSES	9 Hrs.
Numerous Approaches – Double Diamond Process – 5-Stage School Process – Designing for Growth Process – Role of Project Management.		

UNIT V:	PROCESS OF PRODUCT DESIGN	9 Hrs.
Process of Engineering Product Design – Design Thinking Approach – Stages of Product Design – Examples of best product designs and functions.		

Total Hours: 45

TEXT BOOK:	
1.	E. Balaguruswamy, “Developing Thinking Skills (The Way to Success)”, Khanna Publications, First Edition, 2022
2.	Daniel Mcquarrie, ‘Quantum Chemistry’ Viva Pvt. Ltd, 2016.
3.	Manisha Agrawaal, Engineering Chemistry, Khanna Publishing House, 2024

REFERENCES BOOKS:	
1	Yousef Haik and Tamer M.Shahin, “Engineering Design Process”, CengageLearning, Second Edition, 2011.
2	Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).
3	Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
4	John. R. Karsnitz, Stephen O’Brien and John P. Hutchinson, “Engineering Design”, Cengage learning (International edition) Second Edition, 2013.

WEB REFERENCES:	
1.	https://nptel.ac.in/courses/110106124
2.	https://onlinecourses.swayam2.ac.in/e-learning/preview/aic23_ge17

3.	https://elearn.nptel.ac.in/category/all-products
4.	https://elearn.nptel.ac.in/product-page/design-thinking-plus-ai-building-innovative-human-centered-solutions
5.	https://nptel.ac.in/courses/110106124

COs/POs/PSOs Mapping:															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	2	-	-	-	-	1	-	-	1	3	1	1
2	2	3	3	-	-	-	-	1	2	-	-	1	3	1	2
3	2	2	3	3	2	-	-	-	2	-	-	1	3	1	2
4	2	2	3	3	2	-	-	-	2	-	2	1	3	2	3
5	3	3	3	2	2	-	2	-	2	-	3	1	3	2	2

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation

S. Mangayath
BoS Chairman

U25AD81B	Application Using Python Programming	L	T	P	C	Total
		3	0	2	4	75

COURSE OBJECTIVES

To introduce students to the fundamentals of Python programming, including installation, syntax, and interactive execution
To develop proficiency in control flow, data structures, and file handling for solving computational problems
To provide knowledge of Python libraries such as Pandas and their applications in data analysis
To explore advanced topics including regular expressions, parsing, and regression analysis with practical case studies
To equip students with skills in regression techniques and machine learning algorithms for real-world applications

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Demonstrate understanding of Python basics, variables, operators, and interactive programming.
CO2:	Implement control structures, data structures (lists, tuples, dictionaries), and file operations effectively.
CO3:	Apply Python libraries (Pandas, Matplotlib, Scikit-Learn) for data analysis, visualization, and regression tasks.
CO4:	Analyze and solve problems using regression techniques and evaluate model performance with case studies.
CO5:	Design and implement machine learning algorithms such as Support Vector Machines and Random Forests for predictive modelling.

UNIT I:	PYTHON PROGRAMMING FUNDAMENTALS	9 Hrs.
Python- Advantages and disadvantages of Python-its different Versions- Analysing the variables, strings and functions- Use the mathematical operators and functions- different statement like if, for.		

UNIT II:	PYTHON LIBRARIES AND DATA ANALYSIS	9 Hrs.
Python Libraries – Using Pandas–the Python data analysis library – Series and Data Frames – Grouping aggregating and applying – Merging and joining. Error Handling – Dealing with syntax errors – Exceptions.		

UNIT III:	DATA VISUALIZATION AND MACHINE LEARNING	9 Hrs.
Visualization using matplotlib, Advance Machine Learning Algorithms- Support vector machine- Random Forest, churn analysis with Use case.		

UNIT IV:	PYTHON CONTROL STRUCTURES AND FUNCTIONS	9 Hrs.
Basic variables and strings in python, Mathematical operators in python, Use Boolean, use If and elif statement, use while loop, lists, functions		

UNIT V:	REGRESSION ANALYSIS AND DATA ANALYTICS	9 Hrs.
Evaluating in different ways- Boolean and other statements, use of pandas' library for data analysis, deal with miscellaneous, regression analysis.		

Total Hours: 45

LIST OF EXERCISE:
1. Analyzing how to run python scripts.
2. Analyzing how to use variables, string operator and functions.
3. Creating more in depth working of python like inputting the data.
4. Understanding and working with Boolean and other statements.
5. Understanding to provide the use of pandas' library for data analysis.
6. Understanding how to deal with different type of errors that one can encounter while working with python.
7. Understanding and finding how to deal with miscellaneous things in python and regression analysis with the help of a use case.

8.	Understanding the try, throw, catch, throwing an exception, catching an exception.
9.	Understanding the exploratory data analysis and correlation matrix and the visualization using matplotlib.
10.	Understanding different topics which are important from the point of view of data analytics and analyzing some advance data analytics techniques.

Total Hours: 30

TEXT BOOKS:	
1.	Software Foundation Course with Python Programming © Copyright International Business Machines Corporation 1993, 2009. US Government Users Restricted Rights– Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

REFERENCES BOOKS:	
1	E Balagurusamy., “Python programming concepts”, Tata McGraw-Hill 2015, India.
2	Robert Lafore, “Programming in Python”, Waite Group, December 2013.
3	Herbert Schildt, “Python - The Complete Reference”, Tata McGraw-Hill 2014, NewDelhi.
4	Bjarne Stroustrup: “The Python Programming Language” (4th Edition). Addison-Wesley.May 2012.
5	Elements of Programming Interviews in Python: The Insiders' Guide, 2nd edition by 15September 2016.

WEB REFERENCES:	
1	https://skillsbuild.org/learn/course/python
2	https://matplotlib.org/stable/tutorials/index.html
3	https://developers.google.com/machine-learning/crash-course
4	https://onlinecourses.nptel.ac.in/noc25_cs91/preview
5	https://nptel.ac.in/courses/106106182

COs/POs/PSOs Mapping:															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	1	2	-	-	-	1	-	-	2	3	1	2
2	3	2	1	1	3	-	-	-	1	-	-	2	3	1	2
3	3	3	2	2	3	-	-	-	1	-	-	2	3	2	3
4	3	3	2	3	3	1	-	-	1	-	-	2	3	2	3
5	3	3	3	3	3	1	1	1	1	1	1	3	3	3	3

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation



BoS Chairman

U25GE01P	Engineering Graphics	L	T	P	C	Total
		0	0	4	2	60

COURSE OBJECTIVES:

To understand the basic Concept of Drawings, Curves used in Engineering and the dimensioning
To enable students to visualize and represent points, lines, and planes inclined to both principal planes
To develop the ability to interpret and convert pictorial views into orthographic multi-view drawings and project solids
To equip students with the skills to visualize and draw sectional views of solids and develop their surfaces for practical applications
To develop the ability to create isometric and perspective projections of objects and introduce the application of CAD tools in engineering drawing

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Apply BIS standards to perform basic geometric constructions and dimensioning in engineering drawing.
CO2:	Construct projections of points, lines, and planes inclined to principal planes.
CO3:	Generate multi-view and orthographic projections of solids.
CO4:	Create sectional views and develop true shapes and surfaces of solids for design applications.
CO5:	Develop isometric and perspective projections and utilize CAD software for engineering drawings.

UNIT I	BASIC GEOMETRIC CONSTRUCTIONS AND DIMENSIONING	12 Hrs.
Importance of engineering drawing - drawing practice as per BIS code - drawing instruments: drawing board, mini drafter, drawing sheets, drawing pencils, set squares, etc. Bisect a straight line, an arc and an angle – divide a straight line and circle into a number of equal divisions - Perpendicular to a Line – construct an arc touching two straight lines at any angle – construct an arc touching two arcs - Construction of Regular Polygons - Construction of a geometric curves		

(ellipse, parabola, Hyperbola by eccentricity method, Involutess of square and Involutess of circle)
– Dimensioning - need for dimensioning - terms and notations as per BIS.

UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACE	12 Hrs.
Principal Planes- Projection of points - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by Reference line method and traces - Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by Reference plane method.		
UNIT III	VISUALIZATION CONCEPTS AND PROJECTION OF SOLIDS	12 Hrs.
Orthographic projection - Pictorial View and Multi-View - Multi-View Drawing - Features of First Angle Projection and Third Angle Projection - General Preparation for Multi-View Drawings - Conversion of Pictorial View into Orthographic Views - Classification of solids - Projections of Solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.		
UNIT IV	SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES	12 Hrs.
Section Planes and its types - Sectioning of simple solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other plane - obtaining true shape of section - Classification of Surfaces - Methods of Development – Development of Lateral Surfaces of simple solids – Applications.		
UNIT V	ISOMETRIC PROJECTIONS, PERSPECTIVE PROJECTIONS AND COMPUTER AIDED DESIGN (CAD)	12 Hrs.
Principle of Isometric Projection - Isometric View of Planes - Four Centre Method to Draw Ellipse and Elliptical Arcs - Conversion of Orthographic Views into Isometric Views - Isometric projections of simple solids - Perspective projections and its Applications - Perspective projections of simple solids by visual ray method- Applications of AutoCAD in Engineering Drawing.		

Total Hours: 60

TEXT BOOKS:	
1	N.D. Bhatt – Engineering Drawing, Publisher: Charotar Publishing House, 2026.
2	K. R. Gopalakrishna – Engineering Drawing (Vol. I & II), Publisher: Subhas Publications, 2010.

REFERENCES BOOKS:

1	Dhananjay A. Jolhe – Engineering Drawing with an Introduction to AutoCAD Publisher: Tata McGraw Hill Combines manual drawing techniques with CAD applications, 2007.
2	Basant Agrawal and C.M. Agrawal – Engineering Drawing Publisher: Tata McGraw Hill Covers projections, developments, sections, and CAD tools with illustrations and practice problems, 2008.
3	K. Venugopal & V. Prabhu Raja – Engineering Graphics Publisher: New Age International, 2009.

WEB REFERENCES:

1	https://www.autodesk.com/learning
2	https://www.mycadsite.com/
3	https://drawwithrob.com (basic visualization)
4.	https://www.cadtutor.net (AutoCAD help and tutorials)

COs/POs/PSOs Mapping:

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
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3	2	3	3	1	3	-	-	-	1	2	-	1	2	3	3
4	3	3	3	2	3	1	-	1	2	2	1	1	3	3	3
5	3	3	3	2	3	1	-	1	2	2	1	1	3	3	3

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation


BoS Chairman

U25VA02P	Physical Wellness and Yoga	L	T	P	C	Total
		0	0	2	1	30

COURSE OBJECTIVES:

To introduce students to loosening exercises and Surya Namaskar for flexibility, awareness, and foundational yoga practice
To develop knowledge of various asanas, their procedures, breathing techniques, contraindications, and benefits for physical well-being
To provide understanding of pranayama techniques for enhancing respiratory efficiency, concentration, and relaxation
To familiarize students with kriyas and bandhas, their physiological effects, and role in cleansing and energy regulation
To equip learners with knowledge of mudras and relaxation techniques for holistic well-being and stress management

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1:	Explain the structure and movement of the major joints of the human body and their role in physical activities and yoga practices.
CO2:	Demonstrate the principles, techniques, and benefits of various asanas and pranayama practices.
CO3:	Analyze the purpose, benefits, precautions, and therapeutic applications of different asanas, pranayama, and relaxation techniques.
CO4:	Perform and demonstrate various yoga practices with correct posture, breathing techniques, alignment, and safety measures.
CO5:	Apply appropriate mudras and relaxation techniques to promote relaxation, concentration, and overall wellness.

UNIT I:	LOOSENING EXERCISES AND SURYA NAMASKAR	6 Hrs.
Loosening Exercise Loosening the joints, Joint freeing series, Surya Namaskar: (Bihar school of yoga 12 Steps) – Prayer, Meaning, Definition, Guidelines, Procedure, Breathing technique, Awareness, Contraindication, and Benefits.		

UNIT II:	ASANAS AND THEIR PRACTICE	6 Hrs.
Asana: Name, Meaning, Definition, Guidelines, Procedure, Breathing technique, Awareness, Contra-indication, Benefits, Type and Category of each asana. Standing: Ardha chakrasana, Padma hastasana, Trikonasana, Ekapadasana. - Sitting: Padmasana, vajrasana, Ustrasana, Pachimotrasana. - Supine: Uttanapadasana, Ardha halasana, Savasana. - Prone: Bhujangasana, Shalabhasana, Makarasana.		

UNIT III:	PRANAYAMA AND BREATHING PRACTICES	6 Hrs.
Pranayama: Name, Meaning, Definition, Guidelines, Procedure, Breathing technique, Awareness, Contra-indication, Benefits, Type and Category of each one Pranayama: Surya nadi, Chandra nadi, surya bhedhana, Chandra bhedhana, Nadisudhi.		

UNIT IV:	YOGIC KRIYAS AND BANDHAS	6 Hrs.
Kriyas and Bandha: Name, Meaning, Definition, Guidelines, Procedure, Breathing technique, Awareness, Contra-indication, Benefits, Type and Category of each one Kriya – Kapalabhati, Vamana dhauti. Bandha: Jalandhara Bandha, Moola Bandha.		

UNIT V:	MUDRAS AND RELAXATION TECHNIQUES	6 Hrs.
Mudra and Relaxation Technique: Name, Meaning, Definition, Guidelines, Procedure, Breathing technique, Awareness, Contra-indication, Benefits, Type and Category of each one Mudras: Chin mudra, chinmaya mudra, adi mudra, Brahma mudra, Bhairava mudra, Bhairavi mudra. Relaxation Technique: Instant Relaxation Technique, Quick Relaxation Technique.		

Total Hours: 30

REFERENCES BOOKS:	
1	B.K.S. Iyengar, " <i>Light on Yoga</i> ", Unwin Paperbacks, 1976.
2	Swami Sivananda Saraswati, " <i>Yoga Asanas</i> ", My Magazine of India, 1934.
3	Swami Satyananda Saraswati, " <i>Asana, Pranayama, Mudra, Bandha</i> ", Yoga Publications Trust, 2008.
4	B.K.S. Iyengar, " <i>Light on Pranayama</i> ", HarperCollins Publishers India, 2008.
5	K. Chandrasekaran, " <i>Sound Health Through Yoga</i> ", Prem Kallan Publications, 1999.

6	Swami Vishnu Devananda, " <i>The Complete Illustrated Book of Yoga</i> ", Pocket Books, 1972.
7	Yogeshwaran and Swami Saraswati, " <i>First Steps to Higher Yoga</i> ", Yoga Niketan Trust, 1975.
8	H. David Coulter, " <i>Anatomy of Hatha Yoga</i> ", Body and Breath Inc., 2001.
9	Martin Kirk, " <i>Hatha Yoga Illustrated</i> ", Human Kinetics, 2006.
10	M. L. Gharote, " <i>Applied Yoga</i> ", Kaivalyadhama, 2004.

WEB REFERENCES :

1.	https://www.ayush.gov.in
2.	https://yogaportal.nic.in
3.	https://www.svyasa.edu.in
4.	https://www.yogaalliance.org

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3	-	-	-	-	-	3	2	1	1	-	3	3	-	-	2
4	-	-	-	-	-	3	2	1	1	-	3	3	-	-	2
5	-	-	-	-	-	3	3	2	1	-	3	3	-	-	3

Correlation Level: 1-Low, 2-Medium, 3- High, '-' - no correlation


BoS Chairman