K.L.N.COLLEGEOFENGINEERING

Pottapalayam–630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University,Chennai)

Estd:1994

FIRST AND SECOND YEAR

CURRICULUM AND SYLLABUS

REGULATIONS 2024

For Under Graduate Program

B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2025-2026 onwards)

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

(An Autonomous Institution, Affiliated to Anna University, Chennai)

VISION OF THE INSTITUTION

- To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society.

MISSION OF THE INSTITUTION

- To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

- To become a centre of Excellence in producing competent and futuristic professionals in Artificial Intelligence and Data Science through quality Education and Research to the Society and Industry.

MISSION OF THE DEPARTMENT

- To produce intellectual, innovative and ethical professionals by imparting technical and industry oriented skills with ethical values in Artificial Intelligence and allied areas to pursue their career in Industry and Research.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

(An Autonomous Institution, Affiliated to Anna University, Chennai)

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Ability to apply major key algorithms, techniques and theoretical findings in the field of Artificial Intelligence, Machine Learning and Deep Learning.

PSO 2: Ability to incorporate data science theories and methodologies into new research in data management, data visualization, and statistical analysis of data.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To excel in professional career and pursue higher education in the field of artificial intelligence and data science.

PEO 2: To apply their knowledge and skills to develop innovative solutions for real world problem through lifelong learning.

PEO 3: To excel as socially committed engineers or entrepreneurs with good communication and team work skills with high regard to ethical and moral values.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

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Program Outcomes(POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis &interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Teamwork: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning:
Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

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REGULATIONS2024

For Under Graduate Program

B. TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CHOICE BASED CREDIT SYSTEM

CATEGORYOFCOURSES

i. **Humanities Social Sciences and Management (HSM) courses** include Technical English, Foreign Language, Engineering Ethics and Human Values, Communication skills, Entrepreneurship, Physical Education and Environmental Sciences and Sustainability

ii. **Basic Sciences (BS) courses** include Mathematics, Physics, Chemistry, etc.

iii. **Engineering Sciences (ES) courses** include Industrial Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering, Instrumentation etc.

iv. **Professional Core (PC) courses** include the core courses relevant to the chosen specialization/branch.

v. **Professional Elective (PE) courses** include the elective courses relevant to the chosen specialization / branch.

vi. **Open Elective (OE) courses** include the courses from other branches which a student can choose from the list specified in the curriculum of B.E. / B. Tech. Programmes.

vii. **Employability Enhancement Courses (EEC)** includes Project Work, Internship, Creative and Innovative Project, Seminar, Professional Practices, Industrial/Practical Training.

viii. **Mandatory Courses (MC)** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATIONS – 2024

CHOICE BASED CREDIT SYSTEM

SEMESTER I

(Common to all B.E / B.Tech Programmes)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	24HS101	Professional English – I	HS	2	2	0	0	2
2	24BS101	Engineering Mathematics	BS	4	3	1	0	4
3	24BS102	Engineering Physics	BS	3	3	0	0	3
4	24BS103	Engineering Chemistry	BS	3	3	0	0	3
5	24GE101	Problem solving and C Programming	ES	3	3	0	0	3
6	24GE102	Engineering Graphics	ES	3	2	1	0	3
7	24HST01	தமிழர்மரபு /Heritage of Tamils	HS	1	1	0	0	1
PRACTICAL								
8	24BS1L1	Basic Science Laboratory	BS	4	0	0	4	2
9	24GE1L1	C Programming Laboratory	ES	4	0	0	4	2
10	24HS1L1	English Laboratory	HS	2	0	0	2	1
TOTAL				**29**	**17**	**2**	**10**	**24**

SEMESTER II

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	24BS202	Discrete Mathematics	BS$	4	3	1	0	4
2.	24BS204	Physics for Information Science	BS$	3	3	0	0	3
3.	24HS202	Environmental Sciences and Sustainability	HS#	2	2	0	0	2
4.	24GE201	Python Programming	ES#	3	3	0	0	3
5.	24GE202	Basic Electrical and Electronics Engineering	ES@	3	3	0	0	3
6.	24HST02	தமிழரும்தொழில்நுட்பமும் /Tamils and Technology	HS#	1	1	0	0	1
7.		Foreign Language	HS#	2	2	0	0	-
THEORY CUM PRACTICAL								
8.	24HS201	Professional English – II	HS#	4	2	0	2	3
PRACTICAL								
9.	24GE2L1	Python Programming Laboratory	ES#	3	0	0	3	1.5
10.	24GE2L2	Industrial practices Workshop	ES#	3	0	0	3	1.5
11.	24HS2L1	Aptitude and Soft Skills – I	EEC#	2	0	0	2	1*
12.	24HS2L2	Physical Education - I	HS#	2	0	0	2	1*
TOTAL				**32**	**19**	**1**	**12**	**22**

[#] Common to all B.E. / B.Tech programmes

[$] Common to B.E. CSE, CSE(CS) , CSE (IoT) and B.Tech IT & AIDS programmes

@ Common to B.E. Mech.,CSE,CSE(CS), CSE(IoT) , B.Tech. IT & AIDS

*The grades earned by the students will be recorded in the mark sheet, however the same shall not be considered for the computation of CGPA

SEMESTER III

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24BS303	Linear Algebra and Numerical Methods (Common toB.E.CSE,B.E.CSE(CS),B.E.CSE(IoT) , B.Tech.IT and B.Tech.AIDS)	BS	4	3	1	0	4
2	24AD301	Foundations of Data Science	PC	3	3	0	0	3
3	24AD302	Principles of Digital System	PC	3	3	0	0	3
4	24IT301	Data Structures and Algorithms (Common to B.E CSE(CS),B.E.CSE(IoT),B.Tech IT and B.Tech AIDS Programme)	PC	3	3	0	0	3
5	24HS301	Human Values and Ethics (Common to all B.E / B.Tech Programmes)	HS	2	1	1	0	2
THEORY CUM PRACTICAL								
6	24CS305	Object oriented programming using java	PC	5	3	0	2	4
PRACTICAL								
7	24AD3L1	Data Science Laboratory	PC	4	0	0	4	2
8	24IT3L1	Data Structures and Algorithms Laboratory (Common to B.E CSE(CS),B.E.CSE(IoT),B.Tech IT and B.Tech.AIDS Programme)	PC	4	0	0	4	2
9	24HS3L1	Aptitude and Soft Skills – II (Common to all B.E / B.Tech Programmes)	EEC	2	0	0	2	1*
10.	24HS3L2	Physical Education – II (Common to all B.E./B.Tech. programmes)	HS	2	0	0	2	1*
TOTAL				**32**	**16**	**2**	**14**	**23**

SEMESTER IV

SL NO	COURSE CODE	COURSETITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24BS402	Probability and Statistics (Common to B.E.CSE,CSE(CS),CSE(IoT) , B.Tech. IT and AI&DS)	BS	4	3	1	0	4
2	24AD401	Artificial Intelligence (Common to B.ECSE,B.Tech IT, AI&DS)	PC	3	3	0	0	3
3	24CS403	Computer Networks (Common to B.E CSE,CSE(CS), B.Tech IT, AI&DS)	PC	3	3	0	0	3
4	24CS401	Database Management Systems (Common to B.E.CSE,CSE(CS),CSE(IoT) , B.Tech. IT and AI&DS)	PC	3	3	0	0	3
5	24CS405	Concepts of Operating System	PC	3	3	0	0	3
THEORY CUM PRACTICAL								
6	24AD402	Data Exploration and Visualization	PC	5	3	0	2	4
PRACTICAL								
7	24AD4L1	Artificial Intelligence Laboratory	PC	3	0	0	3	1.5
8	24CS4L1	Database Management System Laboratory (Common to B.E.CSE, CSE(CS), CSE(IoT), B.Tech. IT and AI&DS)	PC	3	0	0	3	1.5
9	24HS4L1	Aptitude and Soft Skills -III (Common to all B.E./B.Techprogrammes)	EEC	2	0	0	2	1*
TOTAL				**29**	**18**	**1**	**10**	**23**

***The grades earned by the students will be recorded in the mark sheet, however the same shall not be considered for the computation of CGPA**

24HS101	PROFESSIONAL ENGLISH – I	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To improve the communicative competence of learners.
- To learn to apply basic grammatical structures in appropriate contexts.
- To acquire lexical competence, use them appropriately in sentences, and comprehend their meaning in a text.
- To help learners use language effectively in professional contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

UNIT-I Introduction to Effective Communication 6

Exploring the Elements of Effective Communication through various Activities - Unveiling the Significance of Effective Communication in Academic, Research, and Professional Achievements -Dissecting the Seven Components Integral to Effective Communication - Analyzing the Characteristics of Effective Writing - Enhancing English Language and Communication Skills for Optimal Course Outcome

Introduction to Fundamentals of Communication

Reading – Reading Brochures (Technical Context) – Telephone Messages / Social Messages. **Writing –** Email to MNC's (Requesting for IV, Internship, and Requesting HR for College Function, Internal & External Business Communication) - Letter to the Principal (Requesting Bona-fide Certificate, Getting Original Certificate, etc.,) **Grammar –** Present Tense – Questions Types. **Vocabulary** – Technical Vocabulary.

UNIT-II Narration and Summation 6

Reading – Biographies. **Writing –** Guided Writing – Paragraph Writing – Travel & Technical Blogs – Report on Events. **Grammar** – Simple Past Tense – Concord. **Vocabulary** – Word Formation – Prefix, Suffix and Roots

UNIT-III Description of a Process / Product 6

Reading – Project Reviews – User Manuals. **Writing –** Definitions – Instructions – Process Description. **Grammar –** Modals. **Vocabulary** – Compound Nouns – Voices

UNIT- IV Classification and Recommendations 6

Reading – Newspaper Articles, Note Taking. **Writing –** Inference – Charts, Diagrams, Tables – Note Making – Recommendations. **Grammar –** Articles – Possessive & Relative Pronouns – Degrees of Comparison.

UNIT-V Expression 6

Reading – Opinion Blogs. **Writing –** Essay Writing – Descriptive Writing - Social Issues (Public Transportation, Drinking Water) - Narrative Writing (Cyber Crime, Experience of First Semester). **Grammar –** Future Tense – Punctuation – Cause & Effect – Discourse Markers.

CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS

TEXT BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. VeenaSelvam, Dr. SujathaPriyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles And Practices By Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English for Technical Communication (With CD) By AyshaViswamohan, Mcgraw Hill Education, ISBN: 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.
6. A Course in Technical English by Mr. D. Praveen Sam, KN Shoba, Cambridge University Press, 2020, India.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :PROFESSIONAL ENGLISH – I		**COURSE CODE :** 24HS101	
CO	**Course Outcomes**	**Unit**	**K –CO**
C101.1	Remember and use appropriate words in a professional context in precise and efficient way on technological contexts	I-V	AD
C101.2	Form situational conversations and technical writing styles for interpersonal and effective communication	I-V	AD
C101.3	Gain understanding of basic grammatical structures and use them in right context	I-V	AD
C101.4	Read and infer the denotative and connotative meanings of technical texts	I-V	AD
C101.5	Write definitions, descriptions, narrations and essays on various topics	I-V	AD

24BS101	ENGINEERING MATHEMATICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- To achieve conceptual understanding and to retain the best traditions of Calculus.
- To provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

UNIT - I MATRICES 9+3

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem(without proof) – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

UNIT - II DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable.

UNIT - III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation – Homogeneous functions and Euler's theorem(without proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT - IV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions, Improper integrals.

UNIT - V ORDINARY DIFFERENTIAL EQUATIONS 9+3

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Veerarajan. T., "Engineering Mathematics I", The Tata McGraw Hill Publication-New Delhi, First Edition, 2018.

REFERENCES:

1. James Stewart, “Calculus, Early Transcendental”, Cengage Learning, 7th Edition, New Delhi, 2015. [For units II & III].
2. Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons, 9th Edition, New Delhi, 2006.
3. Wiley, “Calculus- International Student version”, 10th Edition, Wiley India Pvt. Ltd, New Delhi 2017.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.
5. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics II”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 9th Edition, 2014.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME : ENGINEERING MATHEMATICS		**COURSE CODE : 24BS101**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C102.1	Determine the Eigen values, Eigen vectors to diagonalize a matrix and reduce quadratic form to canonical form.	I	K3
C102.2	Apply the concepts of Concavity, Convexity to determine the critical points, point of Inflection, Maxima and Minima of Single variable functions.	II	K3
C102.3	Compute the derivatives of functions of two variables and apply them to calculate the maxima and minima.	III	K3
C102.4	Determine integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	IV	K3
C102.5	Apply the various techniques to solve higher order differential equations with constant and variable coefficients.	V	K3

		L	T	P	C
24BS102	ENGINEERING PHYSICS	3	0	0	3

OBJECTIVES:

- To inculcate properties of matter and characteristics of electromagnetic waves.
- To introduce the basics of LASER, fiber optics and crystallography.
- To enhance the knowledge on importance and applications of quantum physics.

UNIT - I PROPERTIES OF MATTER 9

Elasticity – Hooke's Law – Stress-Strain diagram and its uses – three modulus of elasticity (qualitative) – Poisson's ratio – Factors affecting elastic modulus and tensile strength – Twisting couple – Torsional pendulum: theory and experiment – Bending of beams – Bending moment –Cantilever: theory and experiment – Uniform and Non-uniform bending – theory and experiment – I-shaped girders

UNIT - II ELECTROMAGNETIC WAVES 9

The Maxwell's equations - Wave equation: plane electromagnetic waves in vacuum, conditions on the wave field - Properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - Polarization producing electromagnetic waves - Reflection and Transmission of electromagnetic waves from a non-conducting medium - Vacuum interface for normal incidence.

UNIT - III LASER AND FIBER OPTICS 9

LASER: theory of laser - Characteristics - Spontaneous and Stimulated emission - Einstein's coefficients - Population inversion - Nd-YAG laser, CO_2 laser – Basic applications of lasers in industry. Fiber optics: principle, Numerical aperture and Acceptance angle - Types of optical fibers (material, refractive index, mode) – Losses associated with optical fibers - Fiber optic sensors: Pressure and Displacement

UNIT - IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory – Compton effect: theory and experimental verification – wave particle duality – Concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – Particle in a one-dimensional box – Tunneling (qualitative) - Scanning tunneling microscope (STM).

UNIT - V CRYSTALLOGRAPHY 9

Crystalline and amorphous materials – Unit cell, Crystal systems, Bravais lattices, Lattice planes - Miller indices – Interplanar spacing in cubic lattice – Atomic radius, Coordination number and Packing factor for SC, BCC, FCC, HCP structures - Growth of single crystals: Solution and melt growth techniques.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. R. K. Gaur and S. L. Gupta, “Engineering Physics”, DhanpatRai Publishers,2012.
2. B. K. Pandey and S. Chaturvedi, “Engineering Physics”, Cengage Learning India, 2018.

REFERENCES:

1. D. K. Bhattacharya and T. Poonam, “Engineering Physics”, Oxford University Press 2017.
2. R. Wolfson, “Essential University Physics”, Volume 1 & 2, Pearson Education (Indian Edition), 2009.
3. K.Thyagarajan and A.Ghatak, “Lasers: Fundamentals and Applications”, Laxmi Publications (Indian Edition), 2019.
4. D. Halliday, R. Resnick and J. Walker, “Principles of Physics”, Wiley (Indian Edition), 2015.
5. P. A. Tipler and G. Mosca W. H. Freeman, “Physics for Scientists and Engineers with Modern Physics”, 2007.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME : ENGINEERING PHYSICS		**COURSE CODE: 24BS102**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C103.1	Demonstrate the properties of elasticity and measure the different moduli of elasticity	I	K3
C103.2	Discuss the characteristics of electromagnetic waves.	II	K2
C103.3	Examine the characteristics of laser and optical fiber.	III	K2
C103.4	Explain black body radiation, properties of matter waves and Schrodinger equation.	IV	K2
C103.5	Classify Brava is lattices, different types of crystal structures and crystal growth techniques	V	K3

		L	T	P	C
24BS103	**ENGINEERING CHEMISTRY**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- To introduce the basic concepts and applications of corrosion and alloys.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.

UNIT - I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Estimation of hardness by EDTA method (Problems). Desalination of brackish water: Reverse Osmosis, Electro dialysis. Waste water treatment. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment: phosphate, colloidal, sodium aluminate and calgon conditioning and External treatment: Ion-exchange demineralization and zeolite process.

UNIT - II ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials, Wind energy. Batteries- Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles - working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell.

UNIT - III CORROSION AND ALLOYS 9

Corrosion-causes-factors-types-chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control-material selection and design aspects-electrochemical protection-sacrificial anode method and impressed current cathodic method. Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze.

UNIT - IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal proximate analysis of coal and manufacture of metallurgical coke (Otto Hoffmann method). Petrol characteristics, knocking - octane number, diesel oil characteristics, cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method.

UNIT - V NANOCHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties: optical, electrical, mechanical and magnetic; Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. P. C. Jain and Monica Jain, *"Engineering Chemistry",* 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., *"Engineering Chemistry"*, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, *"A Text book of Engineering Chemistry",* S. Chand Publishing, 12th Edition, 2018

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME : ENGINEERING CHEMISTRY		**COURSE CODE : 24BS103**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C104.1	Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	I	K2
C104.2	Describe the different forms of energy resources, apply them in suitable energy sectors and illustrate the working of various batteries.	II	K2
C104.3	Explain the principles, various type of corrosion, corrosion control methods and alloys.	III	K2
C104.4	Categorize various fuels for Engineering processes and describe about applications.	IV	K2
C104.5	Identify basic concepts of nano science and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	V	K2

24GE101 PROBLEM SOLVING AND C PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic C programming constructs
- To learn about usage of arrays and strings
- To understand the concepts of functions and pointes
- To understand structures and unions
- To expose to file handling operations in C

UNIT - I PROBLEM SOLVING USING C PROGRAMMING 9

Introduction to computer system – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs and System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code, Overview of C : Features of C, structure of C program, data types, variables, Constants, Keywords, Operators–Precedence and Associativity, Expressions, statements, Control structures- Branching and Looping , Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number

UNIT - II ARRAYS AND STRINGS 9

Arrays– Declaration and Initialization of one dimensional array , Example Programs– Insertion sort, Selection sort, Linear search, Binary search, Declaration and Initialization of two dimensional array, Example programs- Matrix Addition and Multiplication, Determinant and Transpose of a matrix Strings- Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, String-handling Functions, Example Programs- with and without using built-in string functions

UNIT - III FUNCTIONS AND POINTERS 9

Introduction to functions – need of Function, Function prototype, function definition, function call, Return Values and their Types, Category of Functions, Built- in functions (string functions, math functions), Passing Arrays to Functions, Recursion, Scope, Visibility and Lifetime of variables, Example Program – Computation of Sine series, Scientific calculator using built-in functions. Pointers- Declaration and Initialization of pointer, Pointer operators, Pointer arithmetic, Pointer Increments and Scale Factor, Array of pointers, Example Program – Sorting of names, Parameter passing – Pass by value, Pass by reference, Example Program – Swapping of two numbers using pass by reference

UNIT - IV STRUCTURES AND UNIONS 9

Structure – Defining a structure, declaring structure variables, accessing structure members, structure initialization, Nested structures, Pointer and Structures, Array of structures, Example Program – using structures and pointers, typedef, Self referential structures, Union, Dynamic memory allocation, Illustrative programs – allocating block of memory, sum of n numbers using malloc, calloc.

UNIT - V FILE PROCESSING 9

Files – File operations, Types of file processing– Sequential access and Random access,

Error Handling on Files - Example Program– Finding average of numbers stored in sequential access file, Random access file -Example Program– Transaction processing using random access files, Command line arguments.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Balagurusamy E, “Programming in ANSI C”, Eighth Edition, Tata Mcgraw-Hill, 2019.
2. YashavantKanetkar, “Let Us C”, BPB Publications, 17th Edition, 2020.
3. Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education,2015.

REFERENCES:

1. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh edition, Pearson Education India, 2015.
2. Juneja, B. L and Anita Seth, “Programming in C”, CENGAGE Learning India pvt. Ltd.,2011
3. PradipDey, ManasGhosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press,2013.
4. Byron Gottfried, "Schaum’s outlines- Programming with C", McGraw-Hill Education, Fourth edition, 2018.
5. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :PROBLEM SOLVING AND C PROGRAMMING		**COURSE CODE: 24GE101**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C105.1	Explain the basic concepts of computer system and develop simple C programs.	I	K3
C105.2	Apply one dimensional and two dimensional arrays for implementing matrix operations and string operations.	II	K3
C105.3	Make use of function concept and develop programs to implement pointer arithmetic and arrays with pointers for solving simple mathematical problems.	III	K3
C105.4	Illustrate simple programs for structures and unions.	IV	K3
C105.5	Apply various file operations and develop programs to implement file access procedures.	V	K3

24GE102	ENGINEERING GRAPHICS	L	T	P	C
		2	1	0	3

OBJECTIVES:

- To understand the importance of the drawing in engineering applications
- To develop graphic skills for communication of concepts, ideas and design of engineering products
- To expose them to existing national standards related to technical drawings.
- To improve their visualization skills so that they can apply this skill in developing new products.
- To improve their technical communication skill in the form of communicative drawings

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning

UNIT-I PROJECTION OF POINTS AND LINES 9

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method.

UNIT-II PROJECTION OF PLANE SURFACES 9

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

UNIT-III PROJECTION OF SOLIDS 9

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT- IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of simple solids in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section - Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone.

UNIT-V ISOMETRIC PROJECTION 9

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids – Frustum and truncated Prisms and Pyramids.

Introduction to Perspective projections. (Not for Examination)

DEMONSTRATION ON DRAFTING PACKAGES(For Internal Evaluation Weightage only)

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 33rd Edition, 2020.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 17th Multicolor Edition, 2021.
3. N.D. Bhatt, “Engineering Drawing” Charotar Publishing House, 54th Edition, 2023.

REFERENCES:

1. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education, 5th Edition, 2022
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2019
3. Luzadder and Duff, Fundamentals of Engineering Drawing, 11th edition, Pearson Education, 2015
4. BasantAgarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2019
5. M.S.Kumar, "Engineering Graphics", DD Publications, 2018
6. http://nptel.ac.in/courses/112103019/
7. https://archive.nptel.ac.in/courses/112/102/112102304/

BUREAU OF INDIAN STANDARDS:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001: Technical drawings - General principles of presentation.
4. IS 11669 – 1986: General principles of dimensioning on technical drawings.
5. SP 46 (2003): Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :ENGINEERING GRAPHICS		**COURSE CODE : 24GE102**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C106.1	Build the orthographic projections of points and lines.	I	K3
C106.2	Sketch the projection of polygonal and circular planes.	II	K3
C106.3	Project simple solids like prisms, pyramids, cylinder and cone.	III	K3
C106.4	Construct the section and develop lateral surfaces of solids.	IV	K3
C106.5	Apply the concept of isometric projection to sketch 3D views.	V	K3

24HST01	HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

UNIT-I LANGUAGE AND LITERATURE: 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism& Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry- Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT-II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram-Role of Temples in Social and Economic Life of Tamils.

UNIT-III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam,Valari, Tiger dance - Sports and Games of Tamils.

UNIT- IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils &Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age – Export and Import during Sangam Age – Overseas Conquest of Cholas.

UNIT-V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

CLASS HOURS: 15 PERIODS TERM HOURS: 15 PERIODS TOTAL: 30 PERIODS

24HST01	**தமிழர்மரபு**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

அலகு -I மொழிமற்றும்இலக்கியம் **3**

இந்தியமொழிக்குடும்பங்கள் - திராவிடமொழிகள் - தமிழ்ஒருசெம்மொழி - தமிழ்செவ்விலக்கியங்கள்சங்கஇலக்கியத்தின்சமயச்சார்பற்றதன்மை - சங்கஇலக்கியத்தில்பகிர்தல்அறம் - திருக்குறளில்மேலாண்மைக்கருத்துக்கள் - தமிழ்க்காப்பியங்கள், தமிழகத்தில்சமணபௌத்துவசமயங்களின்தாக்கம் - பக்திஇலக்கியம், ஆழ்வார்கள்மற்றும்நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில்நவீனஇலக்கியத்தின்வளர்ச்சி - தமிழ்இலக்கியவளர்ச்சியில்பாரதியார்மற்றும்பாரதிதாசன்ஆகியோரின்பங்களிப்பு

அலகு –II மரபு - பறைஓவியங்கள்முதல்நவீனஓவியங்கள்வரை - சிற்பக்கலை **3**

நடுகல்முதல்நவீனசிற்பங்கள்வரை - ஐம்பொன்சிலைகள் – பழங்குடியினர்மற்றும்அவர்கள்தயாரிக்கும்கைவினைப்பொருட்கள், பொம்மைகள் –தேர்செய்யும்கலை - சுடுமண்சிற்பங்கள் - நாட்டுப்புறத்தெய்வங்கள் - குமரிமுனையில்திருவள்ளுவர்சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின்சமூகபொருளாதாரவாழ்வில்கோவில்களின்பங்கு.

அலகு –III நாட்டுப்புறகலைகள்மற்றும்வீரவிளையாட்டுகள் **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கனியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்விளையாட்டுகள்

அலகு –IV தமிழர்களின்திணைக்கோட்பாடுகள் **3**

தமிழகத்தின்தாவரங்களும், விலங்குகளும் – தொல்காப்பியம்மற்றும்சங்கஇலக்கியத்தில்அகம்மற்றும்புறக்கோட்பாடுகள் – தமிழர்கள்போற்றியஅறக்கோட்பாடு –சங்ககாலத்தில்தமிழகத்தில்எழுத்தறிவும், கல்வியும் – சங்ககாலநகரங்களும்துறைமுகங்களும் –சங்ககாலத்தில்ஏற்றுமதிமற்றும்இறக்குமதி – கடல்கடந்தநாடுகளில்சோழர்களின்வெற்றி.

அலகு –V இந்தியதேசியஇயக்கம்மற்றும்இந்தியபண்பாட்டிற்க்குத்தமிழர்களின்பங்களிப்பு **3**

இந்தியவிடுதலைப்போரில்தமிழர்களின்பங்கு –இந்தியாவின்பிற்ப்பகுதிகளில்தமிழ்பண்பாட்டின்தாக்கம் – சுயமரியாதைஇயக்கம் –இந்தியமருத்துவத்தில், சித்தமருத்துவத்தின்பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் –தமிழ்புத்தகங்களின்அச்சுவரலாறு.

TEXT & REFERENCE BOOKS:

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி-வைகைநதிக்கரையில்சங்ககாலநகரநாகரீகம் (தொல்லியல்துறைவெளியீடு)
4. பொருனை - ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, TamilNadu
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book And Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

24BS1L1	BASIC SCIENCE LABORATORY	L	T	P	C
		0	0	4	2

PHYSICS LABORATORY

OBJECTIVES:

- To inculcate the proper usage of various physics laboratory equipment and interpretation of experimental data.
- To stimulate problem solving skills related to physics principles.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS: (ANY SIX)

1. Torsion Pendulum – determination of moment of inertia of a disc and rigidity modulus of wire.
2. Uniform Bending – determination of Young's modulus of a given material.
3. Determination of band gap of a semiconductor.
4. Air wedge – determination of thickness of a thin wire / sheet.
5. Newton's ring – determination of radius of curvature of plano convex lens.
6. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
7. a. Optical fiber – determination of Numerical aperture and acceptance angle.
   b. Diode laser – determination of width of groove in compact disc.
8. Spectrometer grating – determination of wavelength of mercury spectrum.
9. Spectrometer hollow prism – determination of refractive index of a given liquid.

TOTAL: 30 PERIODS

LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Quantity
1	Torsion pendulum set	6
2	Travelling microscope & accessories	6
3	Air wedge set up	6
4	Ultrasonic interferometer	6
5	Laser kit	6
6	Spectrometer &hollow prism	6
7	Spectrometer & grating	6
8	Semiconductor band gap kit	6
9	Newton's ring set up	6

CHEMISTRY LABORATORY

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters through volumetric analysis.
- To have hands on experience in using instruments like pH meter, conductivity meter, potentiometer.
- To determine the amount of metal ions in alloys& molecular weight of polymer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer

LIST OF EXPERIMENTS: (ANY SIX)

1. Determination of types and amount of alkalinity in a water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Estimation of copper content of the brass solution by EDTA.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Determination of strength of acids in a mixture of acids using conductivity meter.
7. Conductometric titration of barium chloride against sodium sulphate. (precipitation titration)
8. Estimation of iron content of the given solution using potentiometer.
9. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
10. Estimation of Nickel in steel.

TOTAL: 30 PERIODS

LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Quantity
1	Burette (50ml)	30
2	Pipette(20ml)	30
3	Beaker (100ml)	30
4	Conical Flask (250ml)	30
5	Conductivity meter	10
6	Potentiometer	10
7	pH meter	10
8	Viscometer	14
9	Electronic Balance	1

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :BASIC SCIENCE LABORATORY		COURSE CODE : 24BS1L1	
CO	**Course Outcomes**	**EXP**	**K –CO**
PHYSICS LABORATORY			
C107.1	Calculate rigidity modulus, Young's modulus of a given material and band gap of a semiconductor diode	1,2, 3	K3
C107.2	Predict the thickness of a given thin object, radius of curvature of Plano convex lens and velocity of ultrasound, compressibility of liquid	4,5,6	K3
C107.3	Determine the basic parameters of optical fiber, width of groove in CD, wavelength of the prominent spectral lines and refractive index of a given liquid	7,8,9	K3
CHEMISTRY LABORATORY			
C107.4	Estimate the chemical quality of a water sample by volumetric analysis.	1,2, 3, 4	K3
C107.5	Determine the molecular weight of polymer and amount of metal ions and impurities in solution through volumetric and electro analytical techniques.	5,6,7,8,9,10	K3

24GE1L1	C PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS:

1. Programs using I/O statements, expressions and decision-making constructs.
2. Program for finding given year is leap year or not and finding given number is Armstrong number or not.
3. Design a calculator to perform the operations namely, addition, subtraction, multiplication, division and square of a number.
4. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
   a. if it is a perfect cube.
   b. if it is a multiple of 4 and divisible by 6.
   c. if it is a prime number.
5. Sort the numbers based on the weight in the increasing order as shown below <10,its weight><36,its weight><89,its weight>
6. Matrix addition and subtraction
7. Matrix multiplication and transpose of a matrix
8. Program using string with and without using string functions: string copy and Reverse the String.
9. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
10. From a given paragraph perform the following using built-in functions:
    a. Find the total number of words.
    b. Capitalize the first word of each sentence.
    c. Replace a given word with another word.
11. Program using recursion – factorial and Fibonacci series
12. Sort the list of numbers using pass by reference.
13. Generate salary slip of employees using structures and pointers.
14. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
15. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
16. **Mini project (Any one project : Maximum 4 per Team)**
    - Railway reservation system
    - Library Management System
    - University Result Publication System
    - Hospital Management System
    - Student Automation System
    - Payroll System
    - Banking System
    - Inventory System

PLATFORM NEEDED: Turbo C++ Compiler **TOTAL: 60 PERIODS**

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Laboratory requirements for a batch of 30 students - Systems with Linux Operating System with gnu compiler.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :C PROGRAMMING LABORATORY		**COURSE CODE : 24GE1L1**	
CO	**Course Outcomes**	**EXP**	**K –CO**
C108.1	Develop simple programs using decision making and looping statements.	1-5	K3
C108.2	Utilize array concepts to perform matrix addition, subtraction and multiplication.	6-7	K3
C108.3	Develop programs using user defined functions, built-in functions and recursion and utilize string operations to show string copy and reverse	8-12	K3
C108.4	Develop applications using sequential and random access files.	14-15	K3
C108.5	Develop simple real time projects using the concepts of structures and union.	13,16	K3

24HS1L1	ENGLISH LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities which are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

UNIT-I Introduction to Fundamentals of Communication 6

Listening for General Information - Specific Details - Conversation: Introduction to Classmates - Audio / Video (Formal & Informal); Telephone Conversation; Listening to Voicemail & Messages; Listening and Filling a Form. Speaking - Making Telephone Calls - Self Introduction; Introducing a Friend; Politeness Strategies - Making Polite Requests, Making Polite Offers, Replying to Polite Requests and Offers - Understanding Basic Instructions (Filling Out a Bank Application for Example).

UNIT-II Narration and Summation 6

Listening - Listening to Podcasts, Anecdotes / Stories / Event Narration; Documentaries and Interviews with Celebrities. Speaking - Narrating Personal Experiences / Events - Talking about Current and Temporary Situations & Permanent and Regular Situations - Describing Experiences and Feelings Engaging in Small Talk - Describing Requirements and Abilities.

UNIT-III Description of a Process / Product 6

Listening - Listen to Product and Process Descriptions; a Classroom Lecture; and Advertisements about Products. Speaking – Picture Description & Video Description - Describing Locations in Workplaces - Giving Instruction to Use the Product - Explaining Uses and Purposes - Presenting a Product - Describing Shapes and Sizes and Weights - Talking about Quantities (Large & Small) - Talking about Precautions; Tips to Create YouTube Channel.

UNIT- IV Classification and Recommendations 6

Listening – Listening to TED Talks; Listening to Various Online Video Repository. Speaking – SMALL Talk; Discussing and Making Plans - Talking about Tasks - Talking about Progress - Talking about Positions and Directions of Movement - Talking about Travel Preparations - Talking about Transportation.

UNIT-V Expression 6

Listening – Listening to Debates / Discussions; Different View Points on an Issue; and Panel Discussions. Speaking – Making Predictions - Talking about a Given Topic - Giving Opinions Understanding a Website - Describing Processes.

TOTAL: 30 PERIODS

REFERENCES:

1. Learn English with Cambridge - https://www.youtube.com/channel/UC9-5oT15dxc81MI-pUui3Ww
2. https://www.oxfordonlineenglish.com/
3. Oxford Online English - https://www.youtube.com/channel/UCNbeSPp8RYKmHUliYBUDizg
4. British Council | Learn English - https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg
5. https://tcesrenglish.blogspot.com/

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :ENGLISH LABORATORY		**COURSE CODE : 24HS1L1**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C109.1	Listen to and comprehend general as well as complex academic information	I - V	AD
C109.2	Listen to and understand different points of view in a discussion	I – V	AD
C109.3	Speak fluently and accurately in formal and informal communicative contexts	I – V	AD
C109.4	Describe products and processes and explain their uses and purposes clearly and accurately	I – V	AD
C109.5	Express their opinions effectively in both formal and informal discussions	I - V	AD

24HS201	PROFESSIONAL ENGLISH - II	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To engage learners in meaningful language activities to improve their reading and writing skills.
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To demonstrate an understanding of job applications and interviews for internship and placements.

UNIT-I Making Comparisons **12**

Reading - Reading New Product Features, Invitations – Technical Seminar, Conferences, Workshops, Inter-College Functions; Writing – Safety Instructions - Compare and Contrast Essay; Grammar – Preposition – Position, Movement, Direction - Prepositional Phrases – Connectives, Common Errors in Technical Writing.

LAB COMPONENT:

Speaking – Self Introduction **-**Role Play Exercises Based on Workplace Contexts – Discussion on Goal Setting. **Listening –** about Important Events – Experts Talks

UNIT-II Expressing Causal Relations in Speaking and Writing **12**

Reading - Reading Longer Technical Texts – Technological Inventions – Flaws – Rectifications Writing - Cause and Effect Essays, and Letters to Companies - Product Enquiry – Service Information - Emails of Complaint - Writing Responses to Complaints. Grammar - Voice Transformations – Impersonal Passive Voice, Infinitive and Gerunds, Smileys & Abbreviations for Email Writing - Resume Preparation

LAB COMPONENT

Speaking – Technical Presentations (TED Talk) **-** Recent Media Updates – Travel Experiences – Devising Plans and Making Decisions. **Listening –** FAQ on Technological Contexts – Making Itineraries

UNIT-III Problem Solving **12**

Reading - Journal Abstracts, Case Studies, Excerpts from Literary Texts, News Reports etc. Writing – Letter to the Editor, Checklists, Problem Solution Essay / Argumentative Essay. Grammar – Present Perfect Tense, If conditional Sentences, Digital Vocabulary, Spell Check, Tips to Create Technical Blogs - Introduction to Word Processing Online Tools (Quillbot, Grammarly, etc.,)

LAB COMPONENT

Speaking – Group Discussions**-**Likes & Dislikes **–** Climate Conditions **–** Narrating Imaginary Situations. **Listening –** Talks on Purchase and TRADES – Merits and Demerits – Advantages & Disadvantages.

UNIT- IV Reporting of Events and Research **12**

Reading – Newspaper Archives; **Writing** – Suggestions, Transcoding - Flow Charts, Pie /

Bar Diagrams, Accident Report, Survey Report. Grammar – Reported Speech; **Vocabulary** (Social Media Platforms) – Coherence Markers - Use of Prepositions.

LAB COMPONENT

Speaking – Discussion on Environments –Socio Political Systems, Mandatory Systems. **Listening –** Technical Instructions – Positions and Challenges of Higher Officials

UNIT-V The Ability to Put Ideas or Information Cogently 12

Reading – Technical Articles / Papers, Company Profiles, Statement of Purpose (SOP), an Excerpt of Interview with Professionals; Writing – Job / Internship Application – Cover Letter & Resume - Letter of Recommendation (To the Principal from NRI); Grammar – Numerical Adjectives - Relative Clauses – .PPT Preparation Tips

LAB COMPONENT

Speaking – Job Interview Practice **-** Describing Personal Outlook, Grooming, Safety Issues. **Listening –** Instructions about Electrical Devices, Timely Remedial Measures, Precautionary Measures

CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
3. Authored by Dr. VeenaSelvam, Dr. SujathaPriyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, MeeraBannerji- Macmillan India Ltd. 1990, Delhi.
6. A Course in Technical English by Mr. D. Praveen Sam, KN Shoba, Cambridge University Press, 2020, India.

Lab Component References:

Free, Authentic Online Repositories for English Proficiency and General Aptitude Practice for Higher Studies and Placement.

- https://www.examenglish.com
- https://www.aptitude-test.com/verbal-aptitude.html
- https://www.edudose.com
- https://www.freshershlive.com/online-test/aptitude-test/questions-and-answers
- https://www.indiabix.com/

- https://www.oxfordonlineenglish.com/english-level-test
- https://learnenglish.britishcouncil.org/english-levels/online-english-level-test
- https://www.ted.com
- https://tcesrenglish.blogspot.com/

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : PROFESSIONAL ENGLISH II		**Course Code : 24HS201**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C111.1	Compare and contrast ideas in technical texts, identify and report cause and effects in events, industrial processes	I - V	AD
C111.2	Analyze problems, feasible solutions and communicate them in the written format.	I – V	AD
C111.3	Present their ideas, opinions, discuss, analyze concepts and problems by effective speaking in group discussions.	I – V	AD
C111.4	Draft effective emails, official letters and job applications, effective resumes in a planned and logical manner.	I – V	AD
C111.5	Write critical reports from inferred data and information with clarity and precision	I - V	AD

24BS202	DISCRETE MATHEMATICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To understand the basic concepts of Logic and Combinatorics.
- To make the student familiarize the Applications of Graph Theory.
- To understand the concepts and significance of Lattices and Boolean Algebra which are widely used in Computer Science and Engineering.

UNIT - I PROPOSITIONAL LOGIC 9+3

Mathematical logic- Statement and Notation- Connectives- Statement Formulas and Truth tables- Tautologies- Equivalence of Formulas- Duality law. Tautological implications-Theory of inference- validity using truth tables –Rules of inference.

UNIT - II PREDICATE LOGIC 9+3

Quantifiers- Universal quantifier – Existential Quantifier- Negation of a quantified expression- Nested quantifier- Free and Bound variables- Valid formulas and equivalences- Inference Theory of predicate calculus.

UNIT - III COMBINATORICS 9+3

Mathematical Induction –The Pigeonhole Principle – Recurrence Relations – Solving Linear Recurrence Relations – Inclusion and Exclusion Principle and its Applications.

UNIT - IV REPRESENTATION OF STANDARD GRAPHS 9+3

Basic Definitions- Degree of a vertex –Special types of Graphs: Complete graph- Regular graph- Bipartite graph- Matrix Representation of graph: Adjacency Matrix and Incidence matrix (Definition and Examples only).- Graphs and Graph Isomorphism – Connectivity – Euler and Hamilton Paths (Definition and Examples only).

UNIT - V LATTICES AND BOOLEAN ALGEBRA 9+3

Partial Ordering – Hasse diagram– Lattices – Properties of Lattices (Statement only) - Lattices as an Algebraic Systems – Sub Lattices –– Some special type of Lattices– Boolean Algebra- Properties of Boolean algebra-Sub Boolean algebra.

CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS

TEXT BOOKS:

1. Tremblay.J.P. and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publishing company Limited, New Delhi, 30th Reprint, 2008.
2. Veerarajan .T, "Discrete Mathematics with graph theory and combinatorics", Tata McGraw –Hill companies, New Delhi, 4th Reprint, 2008.

REFERENCES:

1. Grimaldi. R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", Pearson Education Asia, Delhi, 5th Edition, 2007.
2. Rosen.K.H., "Discrete Mathematics and its Applications", Tata McGraw Hill Publishing company Limited, New Delhi, 7th Edition, 2011.
3. Koshy.T. "Discrete Mathematics with Applications", Elsevier Publications, 2011.
4. Venkatraman.M.K., Sridharan.V.,Chandrasekaran.C., "Discrete Mathematics", National Publishing company, 1st Edition,2001.
5. Tamilarasi.A&Natarajan A.M., "Discrete Mathematics And Its Application", Khanna Publishers, 3rd Edition, 2006.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : DISCRETE MATHEMATICS		**Course Code : 24BS202**	
CO	**Course Outcomes**	**Unit**	**K – CO**
C112.1	Apply the basic formula to formulate the Propositional	I	K3
C112.2	Apply the basic formula to formulate the Predicate Logic.	II	K3
C112.3	Solve combinatorial problems using the basic counting techniques.	III	K3
C112.4	Apply the concepts of graph theory in the Computer Science and Technologies field.	IV	K3
C112.5	Determine the Partial Ordering, Lattices as Posets and Boolean algebra using Logical Relation.	V	K3

24BS204	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the essential principles of semiconductor device and electron transport properties.
- To inculcate proficiency in magnetic & optical properties of materials and their fruitful applications.
- To develop knowledge on nanodevices and quantum computing

UNIT - I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory: Derivation of Electrical conductivity and Thermal conductivity - Wiedemann-Franz law – Success and failures – Quantum free electron theory: Fermi - Dirac statistics – Density of energy states – Band theory: electron in periodic potential – Energy bands in solids - Electron effective mass (qualitative) – Concept of hole.

UNIT - II SEMICONDUCTOR PHYSICS 9

Intrinsic semiconductors: energy band diagram – Direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – Variation of fermi level with temperature - Extrinsic semiconductors: carrier concentration in n-type & p-type semiconductors (qualitative) – Variation of carrier concentration with temperature – Variation of Fermi level with temperature and impurity concentration – Hall effect and devices.

UNIT - III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment – atomic magnetic moments – magnetic permeability and susceptibility – Magnetic material classification: Diamagnetism – Paramagnetism – Ferromagnetism – Antiferro magnetism – Ferrimagnetism – Domain theory – M versus H behaviour – Hard and soft magnetic materials – Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT - IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Carrier generation and recombination processes – Absorption, emission and scattering of light in metals, insulators and semiconductors (concepts only) - Photo current in a p-n diode – Solar cell – LASER diode - LED – organic LED – Optical data storage techniques.

UNIT - V NANODEVICES AND QUANTUM COMPUTING 9

Quantum confinement – Quantum structures: quantum wells, wires and dots - band gap of nanomaterials - Tunneling: single electron phenomena, single electron transistor – Quantum cellular automaton - Quantum system for information processing - Quantum states – Classical bits – Quantum bits or qubits – CNOT gate - multiple qubits – Bloch sphere – Quantum gates – advantage of quantum computing over classical computing.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
2. S.O. Kasap, “Principles of Electronic Materials and Devices”, McGraw-Hill Education (Indian Edition), 2020.
3. Parag K. Lala, “Quantum Computing: A Beginner's Introduction”, McGraw-Hill Education (Indian Edition), 2020

REFERENCES:

1. Charles Kittel, “Introduction to Solid State Physics”, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, “Quantum Mechanics with Applications to Nanotechnology and Information Science”, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, “Introduction to Nanoelectronics”, Cambridge Univ. Press, 2008.
4. G.W. Hanson, “Fundamentals of Nanoelectronics”, Pearson Education (Indian Edition), 2009.
5. B.Rogers, J.Adams and S.Pennathur, “Nanotechnology: Understanding Small Systems”, CRC Press, 2014.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :Physics for Information science		**Course Code : 24BS204**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C113.1	Differentiate classical and quantum electron theory.	I	K2
C113.2	Discuss the various types of semiconductors and Hall effect.	II	K2
C113.3	Explain magnetic properties of materials.	III	K2
C113.4	Classify optical materials for opto – electronic applications like solar cell, LED etc.	IV	K3
C113.5	Discuss different quantum structures and their application on quantum computing.	V	K2

24HS202	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To study the scope and significance of environment, understand the interrelationship between living organism and environment.
- To get a concept knowledge on various types of pollution and its effects.
- To gain knowledge on various renewable energy sources and its applications.
- To provide knowledge on solid waste disposal methods and natural disasters and its management.
- To development goals and protocol- sustainability and gain knowledge on carbon credit and carbon footprint.

UNIT – I ENVIRONMENT AND BIODIVERSITY 6

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

UNIT - II ENVIRONMENTAL POLLUTION 6

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Climate change, Global warming, Acid rain, Ozone layer depletion. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection.

UNIT - III RENEWABLE SOURCES OF ENERGY 6

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Solar, Wind, Tidal, Geothermal, H_2 energy & Ocean energy. Applications of Hydrogen energy, Ocean energy resources.

UNIT - IV SOLID WASTE AND DISASTER MANAGEMENT 6

Solid waste management - Introduction, types, e-waste, effects on human beings and disposal management. Disaster management - Introduction, causes, effects and management of flood, cyclone, earthquake, landslide disasters, case studies – roles and responsibilities of Government and community.

UNIT - V SUSTAINABILITY AND MANAGEMENT 6

Development, GDP, sustainability – concept, needs and challenges- economic, social and aspects of sustainability –from unsustainability to sustainability – millennium development goals, and protocols – Sustainable Development Goals-targets, indicators and intervention areas. Climate change – Global Regional and local environmental issues and possible solutions – case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry – A case study.

CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS

TEXT BOOKS:

1. AnubhaKaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition,New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.

REFERENCES:

1. Dr.A.Ravikrishnan, 'Environmental Science & Engineering', Sri Krishna Hitech Publishing Company Pvt. Ltd. Revised Edition 2023-2024.
2. Dr.V.VeeraiyanandDr.L.DevarajSteohen, 'Environmental Science & Engineering', VRB Publishers Pvt.Ltd. Reised& Updated Edition 2018-19.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : ENVIRONMENTAL SCIENCES AND SUSTAINABILITY		**Course Code : 24HS202**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C114.1	Describe the environment, ecosystem and their significances and explain the threats to biodiversity.	I	K2
C114.2	Describe the sources, effects, and control methods of environmental pollution.	II	K2
C114.3	Explain the knowledge on various renewable sources and its applications.	III	K2
C114.4	Describe the disposal techniques of solid waste and record the consequences of natural disasters.	IV	K2
C114.5	Outline the different goals of sustainable development and apply them for suitable technology and societal development.	V	K2

24GE201	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand Python basics and programs with conditional and looping constructs.
- To understand Python functions and strings.
- To understand various operations using Python data structures– lists, tuples, sets and dictionaries.
- To understand exception handling and modules, packages in Python
- To understand usage of data base in python

UNIT - I PYTHON BASICS AND PROGRAM FLOW 9

Introduction to python - Features of python, python syntax compared to other programming languages, python installation, python interpreter and interactive mode, values and types – int, float, boolean, string and list, variables, expressions, statements, comments, operators and precedence of operators, control flow statements – conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), iteration – state, while, for, break, continue, pass ,illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points.

UNIT - II FUNCTIONS, STRINGS 9

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion , Illustrative programs- Decimal binary conversion, Tower of Hanoi , Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search

UNIT - III LISTS, TUPLES, SETS AND DICTIONARIES 9

Lists – list operations, list slices, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, list methods, List comprehension, **Tuples** –Tuple operations (create, access, modify, delate, append, membership test, concatenation and repeat), tuple assignment, tuple as return value, Iterating a tuple, Built-in functions with tuple, **Sets** – Creating, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Built-in functions and methods with set, **Dictionaries** – creation, accessing elements, operations and methods, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers

UNIT - IV FILES HANDLING, MODULES, PACKAGES 9

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and Rand, Illustrative programs – word count, copy file, merge two files

UNIT - V DATA BASES INPYTHON 9

Python SQL database: Installation, DB connection, create table, Data Manipulation operations (Insert, read, update, delete, commit and rollback), **Additional topics:** Lambda function, filter, map, reduce, decorators, Frozen set – creation, accessing elements, operations, collections (Counters, OrderedDict, DefaultDict ,Chain Map ,Named Tuple, DeQue, UserDict, UserList, UserString)

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

REFERENCES:

1. YashavantKanetkar, AdityaKanetkar, “Let Us Python”, 2nd Edition, BPB Publications, 2020.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Application to Understanding Data”, 2nd Edition, PHI Publisher, 2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3.6”, 3rd edition, Shroff/O’ Reilly Publishers,2018.
6. Dr.A.Kannan,Dr.L.SaiRamesh, “Problem Solving and Python Programming”, Updated Edition, United Global Publishers Pvt. Ltd., April 2018.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :PYTHON PROGRAMMING		**Course Code : 24GE201**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C115.1	Explain the basic concepts of python programming like python installation, data types, expression and control statements.	I	K2
C115.2	Apply Python functions, recursive functions and string functions to solve simple problems and perform linear and binary search.	II	K3
C115.3	Illustrate the various operations of lists, tuples, sets, dictionaries and arrays and develop programs to solve various sorting and matrix operations.	III	K3
C115.4	Explain file handling operations, exception handling, modules and packages and develop programs for word count, file copy, merge operations and exception handling.	IV	K3
C115.5	Apply python SQL database and additional functions like Lambda function and Frozen set to solve real world applications.	V	K3

24GE202	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them.
- To study the basic principles of electrical machines and their performances.
- To study the different energy sources and their utilizations.
- To study the fundamentals of electronic circuits.
- To understand the principles and operations of operational amplifiers.

UNIT - I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchhoff's Law - Instantaneous power - series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis - network theorems – DC circuit theorems – The venin's theorem, Norton theorem. Star-Delta conversion

UNIT - II ELECTRICAL MACHINES 9

DC and AC Rotating Machines: DC Generator, DC Motor, Alternator, single phase and three phase induction motor, Construction, principle, emf and torque equation, Basics of Stepper Motor- Transformers-Introduction- types and construction.

UNIT - III UTILIZATION OF ELECTRICAL POWER 9

Renewable energy sources - wind energy and solar panels. Fluorescent tube. Domestic refrigerator - Electric circuit, construction and working principle. Protection-need for ear thing. Energy Tariff calculation for domestic loads.

UNIT - IV ELECTRONIC CIRCUITS 9

Semiconductors, Types - PN Junction - VI Characteristics of Diode, zenerdiode, Rectifiers- BJT-operations of PNP and NPN transistors - Transistors configurations – Common Base, Common Emitter & Common Collector configurations – Common Emitter Amplifier.

UNIT - V OPERATIONAL AMPLIFIERS AND DIGITAL ELECTRONICS 9

Op amp: inverting and non-inverting Amplifier-summer-differential amplifier-differentiator, integrator, Successive Approximation ADC, R-2R Ladder DAC, Number Systems, Basic Digital Logic gates, Universal gates - NAND and NOR Implementation.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. D.P.Kothariand, I.JNagarath, "Basic Electrical and Electronics Engineering", McGrawHill, 2019, Fourth Edition.
2. M.S.Sukhijaand, T.K.Nagsarkar, "Basic Electrical and Electronic Engineering", Oxford, 2019

REFERENCES:

1. S.B.LalSeksena and KaustuvDasgupta, "Fundamentals of Electrical Engineering", Cambridge, 2017
2. B.LTheraja, "Fundamentals of Electrical Engineering and Electronics", Chand &Co, 2018
3. S.K.Sahdev, "Basic of Electrical Engineering", Pearson, 2019.
4. John Bird, "Electrical and Electronic Principles and Technology", Sixth Edition, Elsevier, 2017.

5. Mittle, Mittal, “Basic Electrical Engineering”, 2nd Edition, Tata McGraw-Hill Edition 2017
6. C.L.Wadhwa, “Generation, Distribution and Utilisation of Electrical Energy”, New Age international pvt. ltd., Revised 4th Edition 2018.

OUTCOMES:

ATTHEENDOFTHECOURSE, LEARNER SWILL BEABLETO:

COURSE NAME: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING		**Course Code : 24GE202**	
CO	**Course Outcomes**	**Unit**	**K–CO**
C116.1	Solve the electrical circuits by using nodal analysis, mesh analysis and Network theorems.	I	K3
C116.2	Explain the Construction, working principle of Transformers, DC and AC Rotating Machines.	II	K2
C116.3	Describe the working principle of wind energy and solar panels. Compile the need for ear thing. Explain the Energy Tariff for domestic loads.	III	K2
C116.4	Summarize the operation and characteristics of PN Junction Diode, Zener diode and BJT configurations. Explain the operation of Rectifiers and Common Emitter Amplifier circuits with its response.	IV	K2
C116.5	Explain the operation fop-amp applications. Review of number systems and verify he truth table of Basic Digital Logic gates.	V	K2

24HST02	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

UNIT-I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT-II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period -Type study (Madurai Meenakshi Temple)- ThirumalaiNayakarMahal - Chetti Nadu Houses, Indo – Saracenic architecture at Madras during British Period.

UNIT-III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram

UNIT- IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conchediving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT-V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

CLASS HOURS: 15 PERIODS TERM HOURS: 15 PERIODS TOTAL: 30 PERIODS

		L	T	P	C
24HST02	தமிழரும்தொழில்நுட்பமும்	1	0	0	1

அலகு -I நெசவுமற்றும்பானைதொழில்நுட்பம்: **3**

சங்ககாலத்தில்நெசவுத்தொழில் - பனைத்தொழில்நுட்பம் -கருப்புசிவப்புபாண்டங்கள் - பண்டங்களில்கீறல்குறியீடுகள்.

அலகு-II வடிவமைப்புமற்றும்கட்டிடத்தொழில்நுட்பம் **3**

சங்ககாலத்தில்வடிவமைப்புமற்றும்கட்டுமானங்கள்&சங்ககாலத்தில்வீட்டுப்பொருட்களில்வடிவமைப்பு - சங்ககாலத்தில்கட்டுமானபொருட்களும்நடுகல்லும் - சிலப்பதிகாரத்தில்மேடைஅமைப்புபற்றியவிவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப்பெருங்கோயில்கள்மற்றும்பிறவழிப்பாட்டுதலங்கள் - நாயக்கர்காலகோயில்கள் - மாதிரிகட்டமைப்புகள்பற்றிஅறிதல், மதுரைமீனாட்சிஅம்மன்ஆலயம்மற்றும்திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ்காலத்தில்சென்னையில்இந்தோ - சாரோசெனிக்கட்டிடக்கலை

அலகு-III உற்பத்திதொழில்நுட்பம் **3**

கப்பல்கட்டும்கலை - உலோகவியல் - இரும்புதொழிற்சாலை - இரும்பைஉருக்குதல், எஃகு - வரலாற்றுச்சான்றுகளாகசெம்புமற்றும்தங்கநாணயங்கள் - நாணயங்கள்அச்சடித்தல் - மணிஉருவாக்கும்தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புத்துண்டுகள் - தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில்மணிகளின்வகைகள்

அலகு- IV வேளாண்மைமற்றும்நீர்பாசனதொழில்நுட்பம் **3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்குமிழித்தூம்பின்முக்கியத்துவம்- கால்நடைபராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மைமற்றும்வேளாண்மைசார்ந்தசெயல்பாடுகள் - கடல்சார்அறிவு - மீன்வளம் - முத்துமற்றும்முத்துக்குளித்தல் - பெருங்கடல்குறித்தபண்டையஅறிவுஅறிவுசார்சமூகம்.

அலகு-V அறிவியல்தமிழ்மற்றும்கணினித்தமிழ்: **3**

அறிவியல்தமிழின்வளர்ச்சி - கணித்தமிழ்வளர்ச்சி - தமிழ்நூல்களைமின்பதிப்புசெய்தல் - தமிழ்மென்பொருட்கள்உருவாக்கம் - தமிழ்இணையக்கல்விக்கழகம் - தமிழ்மின்நூலகம் - இணையத்தில்தமிழ்அகராதிகள் - சொற்குவைத்திட்டம்

TOTAL: 15 PERIODS

TEXT & REFERENCE BOOKS:

1.தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு:
தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)
2.கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்)
3.கீழடி - வைகைநதிக்கரையில்சங்ககாலநகரநாகரீகம் (தொல்லியல்துறைவெளியீடு)
4.பொருனை - ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு)

5**.** Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies

7 . Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Publishedby: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: InternationalInstitute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, TamilNadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text BookAnd Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

24HS203	JAPANESE - I	L	T	P	C
		2	0	0	-

OBJECTIVE:

1. To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation.
2. Develop basic communicative competence in everyday Japanese
3. Enable learners to understand and use fundamental grammar pattern

Module- I Japanese Writing System & Basic Sentence Structure 6

Introduction to Japanese writing systems: Hiragana, Katakana, basic Kanji (introduction), Pronunciation and sound patterns, Greetings and self-introduction.

Module- Ⅱ Basic Sentence Structure & Vocabulary 4

Sentence pattern: **A は B です**, Question formation using **か**, Particles: **は, の**, Basic vocabulary: nationality, occupations, majors, Subject pronouns, Family.

Module -Ⅲ Demonstratives, Numbers & Daily Objects 6

Demonstratives: **これ, それ, あれ, どれ**, Demonstratives with noun**: この, その, あの, どの,** Location words: **ここ, そこ, あそこ,** Numbers, time, prices, counters, Particles: **も、ね、よ**, Classroom and daily-use vocabulary.

Module- IV Verbs, Actions , Time Expressions & Present Tense 8

Verb classification: Group I, II, III, Verb ます form (present & negative), Time expressions and frequency adverbs, Particles: **を、で**, Making invitations: **～ませんか,** Word order, Days, Weeks, Months, and Years.

Module-V Past Tense & Movement Expressions 6

Past tense forms: **ました／ませんでした** form (past & negative)**,** Location and direction particles: **に、へ、で,** Means of transport, Talking about past events, Basic movement-related expressions**.**

TOTAL:30PERIODS

Text Books

1. GENKI I – An Integrated Course in Elementary Japanese (3rd Edition)
2. Minna no Nihongo Shokyuu I – Main Text
3. Minna no Nihongo I – Translation & Grammatical Notes (English)

Reference Books

1. GENKI I Workbook (3rd Edition)
2. Minna no Nihongo I Workbook
3. JLPT N5 Official Practice Workbook

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name: JAPANESE-I	
CO	**Course Outcomes**
CO1	Understand simple spoken Japanese in everyday contexts.
CO2	Communicate with widely used Japanese words effectively.
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Japanese language.

24HS204	DEUTSCH-I	L	T	P	C
		2	0	0	-

OBJECTIVE:

- To impart fundamentals of the German language, including reading, writing systems, pronunciation, and speaking.

Module- I **Basic Communication - Sprechen** **10**

Basics & Introduction: German alphabet and pronunciation, Vowels (long & short), consonants, Umlauts (ä, ö, ü) and ß. Greetings and farewells (formal & informal), Polite expressions (Bitte, Danke, Entschuldigung). Numbers 1–100 and days of the week, Months, Seasons, Personal pronouns (ich, du, er, sie…), Telling time (Wie spät ist es?) – Official timings and Unofficial timings.Grammar Essentials & Everyday Vocabulary: Present tense of regular verbs (spielen, arbeiten, machen…)

Activities: Self- Introduction and Talking about hobbies

Module -II **Basic German grammar** **10**

Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Artikel and gender (der, die, das; ein, eine), Modal verbs, and its conjugations. Nouns- Rules for Artikel (Masculine gender, Feminine gender and Neutram gender) Artikel - Nominativ Case. (Was oder Wer, kein oder nicht)
Activities: Conversation in the office, Hotel Reception, composition of simple texts giving information about person, daily routine, family members etc.,

Module- III **German grammar-II** **10**

Artikel-Akkusativ case (e.g., einen, keinen, doch), Akkusativ case- Pronomen, Possessivartikel, Präpositionen, Es gibt. Describing people and things: adjectives and colors, Family, food, furniture, and common vocabulary with gender.
Activities: Food culture in Germany, Ordering food and drinks at a café or Listening to short conversations and responding appropriately.History, geography and aspects of German culture as group task / project work.

TOTAL:30 PERIODS

REFERENCES:

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag
2. *Studio d A1: Deutschals Fremdsprache,* Hermann Funk and Christina Kuhn Cornelsen Verlag publication **(**2005).
3. Evans, S., &Pude, A. (2012).*Menschen A1.* HueberVerlag.
4. Niebisch, D., Penning-Hiemstra, S., et al. (2016). *Schritte International Neu A1.1.* HueberVerlag.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name: DEUTSCH - I	
CO	**Course Outcomes**
CO1	Communicate with widely used German words effectively
CO2	Understand German grammar and German culture
CO3	Understand German civilization and Translation

24HS2L1	APTITUDE AND SOFT SKILLS – I	L	T	P	C
		0	0	2	1

Module I Aptitude Skills I **15**

Quantitative Aptitude Modules : Number System, square root and cube root, average, problems on numbers, Ages, Percentages, Profit and Loss, Ratio and Proportion, Partnership, Chain rule, time and work, time and distance.

Module II Soft Skills I **15**

Self-Introduction - Self analysis, Attitude, perceptions, Positive approach to challenges, Change management –ideas and approach, Goal setting vision, Time management, Planning, Entrepreneurial skills - Leadership skills, presentation and performance giving and receiving feedback, setting expectations and exhibiting professional behavior – Group Discussion.

TOTAL: 30 PERIODS

REFERENCES:

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010

24GE2L1	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations and data manipulation on data base.

LIST OF EXPERIMENTS:

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files
13. Data Manipulation operations using python SQL database access

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Systems with Linux or Windows 7 or later Operating System with Python versions: 2.7.X, 3.6.X.,3.8.X, MySQL software.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSENAME:PYTHON PROGRAMMING LABORATORY		**Course Code :24GE2L1**	
CO	**Course Outcomes**	**EXP**	**K–CO**
C117.1	Develop simple Python programs using conditional and iterative constructs	1,2,7	K3
C117.2	Construct simple Python programs using built-in functions, user-defined functions and recursion functions.	3,4	K3
C117.3	Make use of array concepts to develop programs for solving various sorting and matrix operations.	5,6,8,9	K3
C117.4	Apply command line arguments and file handling methods to implement programs to read word from text file and merging files.	10, 11,12	K3
C117.5	Make use of python SQL database to implement and solve data Manipulation operations.	13	K3

24GE2L2	INDUSTRIAL PRACTICES WORKSHOP	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To understand various pipe fittings used in common household plumbing work and wood work.
- To know about arc welding and machining processes.
- To gain knowledge on sheet metal work.
- Wiring various electrical joints in common household electrical wire work.
- Soldering and testing simple electronic circuits Assembling and testing simple electronic components on PCB.

GROUP A (CIVIL AND MECHANICAL)

PART I CIVIL ENGINEERING PRACTICE

CARPENTRY PRACTICE:

1. Sawing, Planning and making T-Joint / Cross lap joint / Dovetail joint

PLUMBING PRACTICE:

2. Providing basic water line connection for a residential house using plumbing components and household utilities like water heater, wash basin etc.,

PART II MECHANICAL ENGINEERING PRACTICE

SHEET METAL PRACTICE:

3. Preparation of a Model of Rectangular Tray/ Conical Funnel.

WELDING PRACTICE:

4. Joining two metal plates by single butt joint / T fillet joint / lap joint using arc welding.
5. Demonstration on Gas welding

BASIC MACHINING PRACTICE:

6. Exercise on Simple turning, Facing / Taper turning / Drilling and Tapping.

Simple model development using above practices

GROUP–B(ELECTRICALANDELECTRONICS)

PART- III ELECTRICAL ENGINEERING PRACTICES

7. Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter
8. Staircase wiring
9. Fluorescent Lamp wiring.
10. Energy meter wiring and related calculations
11. Study of Iron Box wiring and assembly
12. Study of Fan Regulator/ emergency lamp wiring

PARTIV ELECTRONIC ENGINEERING PRACTICES

13. Resistor Colour coding and verification of series parallel connections.
14. Measurement of AC signals parameters. (Amplitude and Frequency)
15. Verification of logic gates.
16. Soldering simple electronic circuits and checking continuity.
17. PN Diode as a switch.
18. Study of Lap Top

TOTAL: 45 PERIODS

EQUIPMENT FOR A BATCH OF 30 STUDENTS:		
	CIVIL	
1.	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings	15 sets
2.	Carpentry Vice (fitted to work bench)	15 nos
3.	Standard wood working tools	15 sets
4.	Models of industrial trusses, door joints, furniture joints	5 each
5.	Power Tools a. Rotary Hammer b. Demolition Hammer c. Circular Saw d. Planer e. Hand Drilling Machine f. Jigsaw	2 nos 2 nos 2 nos 2 nos 2 nos 2 nos
	MECHANICAL	
6.	Arc welding transformer with cables and holders	5 nos
7.	Welding booth with exhaust facility	5 nos
8.	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 sets
9.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 nos
10.	Centre Lathe	2 nos
11.	Power Tool: Angle Grinder	2 nos
12.	Standard Sheet metal working tools	15 sets
	ELECTRICAL	
1	Assorted electrical components for house wiring	5 sets
2	Electrical measuring instruments (Energy meter, ammeter, voltmeter)	2 nos each
3	Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
	ELECTRONICS	
1	Assorted electronic components for making circuits. (Resistor, Capacitor, Diode)	20 nos each
2	Small PCBs	10 nos
3	Multimeters	5 nos
4	CRO, AFO, Transformer	3 nos each
5	Soldering guns	5 nos
6	IC Trainer kit	5 nos
7	AND, OR, NAND, NOR, NOT, XOR Gate ICs	5 nos each
8	Used Laptop (for demo purpose)	1 no

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name: INDUSTRIAL PRACTICES WORKSHOP		Course Code:24GE2L2	
GROUPA(Civil & Mechanical) GROUP B (Electrical & Electronics)			
CO	**Course Outcomes**	**EXP**	**K–CO**
C120.1	Apply the knowledge of engineering fundamentals to the professional engineering practice.	1-18	K3
C120.2	Identify, formulate and analyze engineering problems reaching conclusions using engineering sciences	1-18	K3
C120.3	Design solutions for societal and environmental considerations.	1-18	K3
C120.4	Apply reasoning informed by the contextual knowledge relevant to the professional engineering practice.	1-18	K3
C120.5	Function effectively as an individual, as a leader and write effective reports and documentation.	1-18	K3

24HS2L2	PHYSICAL EDUCATION - I	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

Introduction to physical education: Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid practices. **Participation of athletic events**: Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles. **Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis. **Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

TOTAL: 30 PERIODS

REFERENCES:

1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.

2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.

3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication.

E-resources: 1. https://www.who.int/health-topics/physical-activity

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : PHYSICAL EDUCATION - I	
CO	**Course Outcomes**
CO1	Understand and explain the importance of physical activity for mental and physical health.
CO2	Apply basic principles of exercise science in the routine life
CO3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively
CO4	Demonstrate independent learning in health, nutrition, and fitness-related topics.

24BS303	LINEAR ALGEBRA AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To understand the concepts of Vector space, linear transformations, inner product spaces and orthogonalization.
- To introduce the Numerical methods for solving algebraic and transcendental equations and interpolation in various intervals.
- ToacquainttheknowledgeofvariousNumericalmethodsofsolvingordinarydifferential equations.

UNIT - I VECTOR SPACES 9+3

Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

UNIT - II LINEAR TRANSFORMATION AND INNER PRODUCT SPACES 9+3

Linear transformation - Null spaces and ranges - Dimension theorem (without Proof) - Matrix representation of a linear transformations - Inner product - Norms - Gram Schmidt orthogonalization process (without Proof) - Least square approximation.

UNIT - III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method -Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel-Eigenvalues of a matrix by Power method.

UNIT - IV INTERPOLATION,NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation–Approximation of derivatives using interpolation polynomials– Numerical single and double integrations using Trapezoidal and Simpson's1/3rules.

UNIT - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method-Euler's method –Modified Euler's method-Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations

CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS

TEXT BOOKS:

1. Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004
2. Grewal.B.S.," Numerical Methods in Engineering and Science", KhannaPublishers,NewDelhi,10th Edition,2015

REFERENCES:

1. Lay.D.C.," Linear Algebraandit'sa Applications", Pearson Education,5th Edition,2018.
2. Kumaresan. S.," Linear Algebra–AGeo metric Approach", Prentice Hall of India, New Delhi, Reprint, 2018.

3. Sastry.S.S," Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2018.

4. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 5th Edition, New Delhi, 2007.

5. Veerarajan.T,Ramachandran.T," Numerical Methods With Programs In C", Tata Mcgraw Hill Publishing Company Limited,8thEdition,Reprint 2011.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :LINEAR ALGEBRA AND NUMERICAL METHODS		**Course Code : 24BS303**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C201.1	Apply the concepts of Vector space to determine bases and dimensions.	I	K3
C201.2	Construct the least square fit and orthonormal basis for an inner product space by using Gram-Schmidt process	II	K3
C201.3	Solve algebraic, transcendental equations and simultaneous linear equations.	III	K3
C201.4	Solve numerical differentiation and integration using numerical techniques.	IV	K3
C201.5	Apply numerical techniques to solve the ordinary differential equations with initial and boundary conditions with engineering applications.	V	K3

24AD301	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Learn the data analysis basics with Python
- Study Data Analysis and interpretation with Numpy on statistical parameters
- Understand various methods of Data Preparation and Manipulation with Pandas
- Learn about the relationship between data.
- Learn Data Visualization using matplotlib and seaborn

UNIT-I INTRODUCTION TO DATA ANALYSIS 9

Data Analysis - Mathematics and Statistics Basic Concepts - The Data Analysis Process - Data Extraction -Data Preparation– Data Exploration/Visualization -Predictive Modeling- Model Validation- Quantitative and Qualitative Analysis.

UNIT-II INTRODUCTION TO NUMPY 9

Python data types - NumPy Arrays with Computations - Aggregations: Min, Max, and Everything In Between-Broadcasting - Comparisons, Masks, and Boolean Logic – Sorting Arrays - Structured Data with NumPy's Arrays

UNIT-III DATA MANIPULATION WITH PANDAS 9

Introducing Pandas Objects - Data Indexing and Selection - Operating on Data in Pandas - Handling Missing Data - Hierarchical Indexing - Combining Datasets - Vectorized String Operations - Working with Time Series - High-Performance.

UNIT- IV DESCRIBING RELATIONSHIPS 9

Correlation –correlation coefficient for quantitative data –computational formula, correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r^2 –multiple regression equations –regression towards the mean

UNIT-V VISUALIZATION WITH MATPLOTLIB 9

Various Plots - Simple Line - Scatter Plots - Error Visualization - Density and Contour Plots - Histograms, Binnings, and Density - Customizing Plots-Multiple Subplots – Three Dimensional Plotting in Matplotlib - Geographic Data with Basemap - Visualization with Seaborn

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Fabio Nelli 2015, Python Data Analytics, Apress, USA.
2. Jake Vander Plas, 2016, Python Data Science Handbook: Essential Tools for Working with Data, O'Reilly Media, Inc
3. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.

REFERENCES:

1. McKinney, W 2017, Python for Data Analysis, 2nd ed, O'Reilly Media, Inc.
2. John V Guttag 2013, Introduction to Computation and Programming Using Python, Revised and Expanded Edition, MIT Press.
3. Timothy A. Budd 2015, Exploring Python, Mc-Graw Hill Education Private Ltd. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME : FOUNDATIONS OF DATA SCIENCE		**COURSE CODE : 24AD301**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C202.1	Determine the various data analysis process in data science	I	K2
C202.2	Apply data analysis and interpretation with Numpy on statistical parameters	II	K3
C202.3	Demonstrate various methods of Data Preparation and Manipulation with Pandas	III	K3
C202.4	Determine the knowledge on relationships between data.	IV	K2
C202.5	Apply visualization Libraries in Python to interpret and explore data	V	K3

24AD302 PRINCIPLES OF DIGITAL SYSTEM L T P C
3 0 0 3

OBJECTIVES:

- To design digital circuits using simplified Boolean function
- To design and analyze combinational circuits
- To design and analyze synchronous and asynchronous sequential circuits
- To understand Memory and Programmable Logic Devices

UNIT– I BOOLEAN ALGEBRA AND LOGIC GATES 9

Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.

UNIT– II COMBINATIONAL LOGIC 9

Combinational Circuits – Analysis and Design Procedures – Half and Full Adder/ Subtractor - Binary Adder-Subtractor –2 bit Magnitude Comparator - Decoders – Encoders – Multiplexers –De Mux -Code converters (Binary to Gray and Gray to Binary).

UNIT–III SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential Circuits - Storage Elements: Latches, Flip-Flops-Characteristic table-Excitation table-Characteristic equation-Conversion of one flip-flop into another - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters.

UNIT– IV ASYNCHRONOUS SEQUENTIAL LOGIC 9

Analysis of Asynchronous Sequential Circuits–Reduction of State and Flow Tables –Race-Free State Assignment–Hazards.

UNIT– V MEMORY AND PROGRAMMABLE LOGIC 9

Error Detection and Correction-RAM- ROM-Programmable Logic Array–Programmable Array Logic

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXTBOOKS:

1. M.MorrisR.Mano, MichaelD.Ciletti,—"Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog",6th Edition,Pearson Education,2018.
2. Dr.P. Leach and A.P.Malvino, "Digital Principles and Applications", Tata McGraw Hill, 2011.

REFERENCES:

1. G.K.Kharate, Digital Electronics, Oxford University Press, 2012.
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2018.
3. Charles H.RothJr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013.
4. DonaldD.Givone, Digital Principles and Design, Tata McGraw Hill, 2017.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : PRINCIPLES OF DIGITAL SYSTEM		**Course Code : 24AD302**	
CO	**Course Outcomes**	**Unit**	**K-CO**
C203.1	Apply Arithmetic operations in any number system and various techniques to simplify the Boolean function.	I	K3
C203.2	Build combinational circuits that perform arithmetic operations.	II	K3
C203.3	Design and Analyze Synchronous sequential circuits such as counters and registers.	III	K3
C203.4	Analyze asynchronous sequential circuits.	IV	K3
C203.5	Model memory arrays for any Boolean function with the help of PLD's	V	K3

24IT301 DATA STRUCTURES AND ALGORITHMS L T P C

3 0 0 3

OBJECTIVES:

- To understand the concepts of ADTs.
- To understand the basics of algorithm analysis
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms.

UNIT I INTRODUCTION TO DATA STRUCTURES AND ALGORITHM ANALYSIS 10

Introduction: Data Structures, Linear Data Structures: Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation–Polynomial Manipulation –Introduction to algorithms - Algorithm Analysis framework - Space and Time Complexity - Asymptotic Notations-Mathematical analysis of Non-Recursive Algorithms- Linear Search and Recursive Algorithms- Binary Search.

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 8

Stack ADT – Operations – Applications – Evaluating arithmetic expressions- Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – De Queue – applications of Queues.

UNIT IIITREES AND APPLICATIONS 9

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – B+ Tree – Heap – Applications of heap.

UNIT IV GRAPHS AND APPLICATIONS 9

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort –Dijkstra algorithm- Floyd War shall Algorithm- Prims Algorithm- Kruskal Algorithm- Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SORTING AND HASHING TECHNIQUES 9

Sorting –Bubble sort, Selection sort, Insertion sort, Merge Sort, Quick Sort, Shell sort, Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXTBOOKS

1. Reema Thareja, — Data Structures Using C, Third Edition, Oxford University Press, 2023.
2. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, 2013
3. Mark Allen Weiss, — Data Structures and Algorithm Analysis in C, 2nd Edition Reprint, Pearson Education, 2002.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein – Introduction to Algorithms, MIT Press, 3rd edition, 2009.

REFERENCES:

1. StephenG.Kochan, —Programming in C, 3rd edition, Pearson Education, 2005.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, —Fundamentals of Data Structures inC,2ndEdition,UniversityPress,2008

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME : DATASTRUCTURES AND ALGORITHMS		**COURSE CODE : 24IT301**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C204.1	Describe Linear Data Structure and perform analysis framework	I	K3
C204.2	Implement the applications of stack and queue	II	K3
C204.3	Develop different types of trees and implement its applications	III	K3
C204.4	Implement various operations on graph and its applications	IV	K3
C204.5	Sort the data by using different types of soring algorithms and implement hashing mechanism for data access.	V	K3

24HS301	HUMAN VALUES AND ETHICS	L	T	P	C
		1	1	0	2

OBJECTIVES:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT - I INTRODUCTION TO VALUE EDUCATION **3+3**

Value Education – Definition - Concept and Need for Value Education - Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education- fulfilling human aspirations.

Practice Session: Sharing about Oneself, Exploring Human Consciousness – self exploration, Exploring Natural Acceptance.

UNIT - II HARMONY IN THE HUMAN BEING **3+3**

Understanding Myself as Co-existence of the Self and the Body - I' and Body synchronization - Realization of Self, Body needs - Self-regulation and Health.

Practice Session: Exploring the difference of Needs of Self and Body, Exploring Sources of Imagination in the Self, Harmony of Self with the Body - program for ensuring health vs dealing with disease.

UNIT - III HARMONY IN THE FAMILY, SOCIETY AND NATURE **3+3**

Family as a basic unit of Human Interaction-Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love – Harmony in society: Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal- Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

Practice Session: Exploring the Feelings of Trust, Respect and Gratitude, Exploring Systems to fulfil Human Goals considering society and nature - Co-existence in Existence.

UNIT - IV SOCIAL ETHICS **3+3**

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

Practice Session: Exploring Ethical Human Conduct, Humanistic Models in Education, Exploring Steps of Transition towards Universal Human Order.

UNIT - V PROFESSIONAL ETHICS **3+3**

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies.

Practice Session: Holistic Technologies - Production Systems and Management Models, Holistic vision of life - Socially responsible behaviour and environmentally responsible work.

CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS

TEXT BOOKS:

1. R.R. Gaur, R. Asthana, G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd revised edition, Excel Books, New Delhi, Reprint 2019.
2. A N Tripathy, Human Values, New Age International Publishers, New Delhi, 2003.

REFERENCES:

1. E G Seebauer& Robert L.Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd, Reprint 2011.
3. Mike Martin and Roland Schinzinger "Ethics in Engineering" McGraw Hill, New York, 4th edition, Reprint 2017.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, "Engineering Ethics-concepts and Cases", Thomson Learning, 2000.
5. S.K. Chakraborty and Dabangshu Chakraborty, "Human Values and Ethics: Achieving Holistic Excellence", ICFAI University Press, 2006.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : HUMAN VALUES AND ETHICS		**Course Code : 24HS301**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C205.1	Explain the significance of value inputs and start applying them in their life and profession to ensure happiness and prosperity.	I	AD
C205.2	Differentiate between Thyself & the Body to ensure competency of an individual.	II	AD
C205.3	Explain the role of a human being in ensuring harmony in family, society, and nature.	III	AD
C205.4	Develop an awareness of human values to appreciate the rights of others and to enable social balance.	IV	AD
C205.5	Differentiate between ethical and unethical professional practices, and apply suitable strategy to actualize a harmonious working environment.	V	AD

24CS05	OBJECT ORIENTED PROGRAMMING USING JAVA	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To know Object Oriented Programming concepts
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes
- To define exceptions and use I/O streams
- To design and build Graphical User Interface Application using JAVAFX

UNIT-I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Object oriented programming– Abstraction–objects and classes–Encapsulation–Polymorphism–OOP in Java–Programming Structures in java – Defining classes in Java– Data Types, Variables and Arrays – Operators – Control Statements –Constructors-Methods -Access specifiers - Static members.

UNIT-II INHERITANCE, PACKAGES AND INTERFACES 9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages –Packages and Member Access –Importing Packages – Interfaces.

UNIT-III EXCEPTION HANDLING AND MULTITHREADING 9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model– Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication Suspending –Resuming, and Stopping Threads.

UNIT- IV I/O, GENERICS AND STRING HANDLING 9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

UNIT-V EVENT DRIVEN PROGRAMMING 9

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls –Scroll Pane. Layouts – Flow Pane – H Box and V Box – Border Pane – Stack Pane – Grid Pane. Menus – Basics – Menu – Menu bars – Menu Item.

PRACTICAL EXERCISES:

1. Write a program to implement the usage of constructors, static members with different data types.
2. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_noas members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pays lips for the employees with their gross and net salary.
3. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class

Shape. Each one of the classes contains only the method print Area ( ) that prints the area of the given shape.

4. Solve the above problem using an interface.
5. Implement exception handling and creation of user defined exceptions.
6. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
7. Write a program to perform file operations.
8. Develop applications to demonstrate the features of generics classes.
9. Develop applications using Java FX controls, layouts and menus.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 120 PERIODS

TEXT BOOKS:

1. Herbert Schildt, “Java: The Complete Reference”, 11 th Edition, McGraw Hill Education, New Delhi, 2019
2. Herbert Schildt, “Introducing Java FX 8 Programming”, 1 st Edition, McGraw Hill Education, New Delhi, 2015.

REFERENCES:

1. Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11 th Edition, Prentice Hall, 2018.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :OBJECT ORIENTED PROGRAMMING USING JAVA		**COURSE CODE : 24CS305**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C206.1	Apply the principles of Object-Oriented Programming	I	K3
C206.2	Apply the concepts of inheritance and interfaces.	II	K3
C206.3	Apply use defined java exceptions and multithread.	III	K3
C206.4	Construct concepts of string handling, I/O packages and generics in java	IV	K3
C206.5	Develop event handling GUI based applications using Java FX	V	K3

24AD3L1	DATA SCIENCE LABORATORY	L	T	P	C
		0	0	4	2

- Learn the data analysis basics with Python
- Study Data Analysis and interpretation with Numpy on statistical parameters
- Understand various methods of Data Preparation and Manipulation with Pandas
- Learn Data Visualization using matplotlib and sea born

LIST OF EXPERIMENTS:

1. NumPy Arrays Computations - Aggregations-Sorting -Arrays-Structured Data
2. Pandas Data frame- Manipulations from CSV
3. Data Acquisition using python web Scraping
4. Classification and tabulation of data and Graphical and diagrammatic presentation of data.
5. Perform calculations that measure the central tendency and dispersion of data and Implementation of measures of Skew ness, moments and kurtosis.
6. Determination of point and interval estimates.
7. Solving linear regression, polynomial regression and non-linear regression based problems and solving multiple regression and correlation analysis based problems**.**
8. Solving the problems based on Time series analysis and forecasting and implementing statistical quality control charts.
9. Visualizing Geographic Data with Base map.
10. Mini Project.

TOTAL: 60 PERIODS

Software Requirement: Jupyter Notebook/Python

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :DATA SCIENCE LABORATORY		**COURSE CODE : 24AD3L1**	
CO	**Course Outcomes**	**Exp**	**K –CO**
C207.1	Apply various analysis methods, data acquisition in NumPy and Pandas	1,2,3,10	K3
C207.2	Apply the concept of Classification and tabulation of data	4,10	K3
C207.3	Calculate the central tendency and dispersion of data and Implementation of measures of Skew ness, moments and kurtosis	5,6,10	K3
C207.4	Apply the concepts regression and correlation analysis to solve problems	7,10	K3
C207.5	Solve the problems based on Time series analysis, forecasting and visualization	8,9,10	K3

24IT3L1 DATA STRUCTURES AND ALGORITHMS LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- Write functions to implement linear and non-linear data structure operations
- Suggest appropriate linear / non-linear data structure operations for solving a given problem
- Appropriately use the linear / non-linear data structure operations for a given problem
- Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

LIST OF EXPERIMENTS

1. Implementation of List Using Array
2. Implementation of List Using Linked list
3. Implementation of Linear Search and Binary Search
4. Perform polynomial addition using Linked list
5. Perform Infix to postfix conversion using stack
6. Implementation of Binary Search tree
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Implementation of Graph Traversal Using Breadth First Search and Depth First Search
10. Implementation of Dijkstra algorithm and Floyd Warshall Algorithm
11. Implementation of Prims Algorithm and Kruskal Algorithm
12. Implementation of bubble sort, selection sort and insertion sort
13. Implementation of Quick sort and Merge sort
14. Implementation of Linear probing, Quadratic probing and Double hashing.
15. Case study problem using linked list

TOTAL: 60 PERIODS

Software Requirement : Sublime editor / Turbo C

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

COURSE NAME :DATA STRUCTURES AND ALGORITHMS LABORATORY		**COURSE CODE : 24IT3L1**	
CO	**Course Outcomes**	**Exp**	**K –CO**
C208.1	Compute various operations on list by using Array and Linked list	1,2,4,5,8,15	K3
C208.2	Manipulate Linear Search and Binary search	3	K3
C208.3	Compute graph representation and Travers alalgorithms	6,7,9	K3
C208.4	Implement Graph algorithms: Dijkstra algorithm- Floyd Warshall Algorithm- Prims and Kruskal algorithm	10,11	K3
C208.5	Examine various sorting and hashing algorithms.	12,13, 14	K3

24HS3L1 APTITUDE AND SOFT SKILLS – II	L	T	P	C
	0	0	2	1

Module I Aptitude Skills II **15**

Pipes and cisterns, boats and streams, Problems on trains, Alpha Numeric Puzzles, Simple Interest, Compound Interest, Mixtures and Allegations, calendar, clock, permutation and combination, probability, height and distance.

Module II Soft Skills II **15**

Introduction to Soft skills – Non-Verbal Communication - Role play - Learning styles – Writing Bio-data and Process description - Peak Life Moment / Challenging moment - People management – team work, leadership, Decision making – problem identification - Email and Essay writing - Just a minute (JAM).

TOTAL: 30 PERIODS

REFERENCES:

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010

24HS3L2 **PHYSICAL EDUCATION – II**

L	T	P	C
0	0	2	1

Objective:
To impart knowledge on gymnastic exercises and pressing needs for up skilling in a particular game.

Basic gymnastics exercises: Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, horizontal bar exercise, flic-flac-walk

Up skilling in any one of the athletics: Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the previous semester.

TOTAL: 30 PERIODS

References:
1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication.
4. Kandappan, K. (2004). Foundations of physical education. Friends Publications.
E-resources: 1. https://www.who.int/health-topics/physical-activity

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :PHYSICAL EDUCATION – II	
CO	**Course Outcomes**
CO1	Understand and explain the importance of physical activity for mental and physical health.
CO2	Apply safety principles and methods during sports activities.
CO3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively.
CO4	Demonstrate the advanced technical skills and strategic understanding in the game of their interest.

24BS402	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables of one and two dimensions.
- To acquaint the knowledge of testing of hypothesis for small and large samples and to introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT – I PROBABILITY AND RANDOM VARIABLES 9+3

Probability–Discrete and continuous random variables –Moments–Moment generating functions– Binomial, Poisson, Uniform, Exponential and Normal distributions(Except derivations).

UNIT – II TWO-DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression –Transformation of random variables–Central limit theorem (for independent and identically distributed random variables).

UNIT - III TESTING OF HYPOTHESIS 9+3

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means-Tests based on t, Chi-square and F distributions for mean, variance and proportion-Contingency table (test for independence)-Goodness off it.

UNIT - IV DESIGN OF EXPERIMENTS 9+3

One way and Two way classifications – Completely randomized design–Randomized block design–Latin square design-2^2factorialdesign.

UNIT - V STATISTICAL QUALITYCONTROL 9+3

Control charts for measurements(X and R charts)– Control charts for attributes(p,candnp charts)–Tolerance limits-Acceptance sampling.

CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS

TEXT BOOKS:

1. Johnson.R.A.,Miller,IandFreundJ.,"Millerand Freund‘s Probability and Statistics for Engineers", Pearson Education,Asia,8th Edition,2015.
2. Veerarajan.T.," Probability, Statistics and Random Processes", Tata Mc Graw Hill, New Delhi, 2006.

REFERENCES:

1. Papoulis.A.andUnnikrishnapillai.S.," Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, New Delhi, 4th Edition, 2002.
2. Spiegel.M.R.,Schiller.JandSrinivasan.R.A.,"Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGrawHill,3rd Edition,2004.
3. Walpole.R.E.,Myers.R.H.,Myers.S.L.andYe.K.," Probability and Statistics for Engineers and Scientists",PearsonEducation,Asia,8th Edition,2011.
4. Gupta.S.C., Kapoor.V.K,, "Fundamental of Mathematical Statistics", Sultanchand &Sons Educational Publishers, New Delhi, Reprint 2013.
5. Kandasamy.P.,Thilagvathi. K.,Gunavathi.K., "Probability R and om Variables& Random Processes",S.Chand&Co.Ltd.,Reprint2008.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :PROBABILITY AND STATISTICS		**Course Code : 24BS402**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C209.1	Build the parameters of statistical distributions using basic probability theory concepts.	I	K3
C209.2	Calculate the statistical measures for two dimensional random variables.	II	K3
C209.3	Apply the concepts of testing of hypothesis for large and small samples.	III	K3
C209.4	Apply the basic concepts of design of experiments in the field of agriculture.	IV	K3
C209.5	Use control charts for quality control problems.	V	K3

24AD401	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To know about the various applications of AI

UNIT - I INTRODUCTION 9

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems

UNIT - II PROBLEM SOLVING METHODS 9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search

UNIT - III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic –Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

UNIT - IV PROBABILISTIC REASONING 9

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

UNIT - V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Fourth Edition, 2021.

REFERENCES:

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence‖, Cambridge University Press,2009.
3. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :ARTIFICIAL INTELLIGENCE		**Course Code : 24AD401**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C210.1	Explain the apt agent strategy for solving Typical AI problems	I	K2
C210.2	Apply appropriate search algorithms for any AI problem	II	K3
C210.3	Apply knowledge representation and logic for problem solving	III	K3
C210.4	Understand the probabilistic reasoning under uncertainty	IV	K2
C210.5	Categorize various applications of Artificial Intelligence.	V	K2

24CS403	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the concept of layering and functions of each layers of the protocol suits
- To be familiar with the components required to build different types of networks
- To learn concepts related to network addressing and routing
- To familiarize the functions and protocols of the layer of Transport layer
- To understand the working of various application layer protocols

UNIT – IINTRODUCTION TO NETWORKS 8

Network Introduction: Evolution of Computer Networks, Classification of computer Networks LAN, WAN, MAN, Software Defined Networks (SDN), Network Topology: BUS, STAR, RING, MESH, OSI Layered Architecture, TCP/IP Protocol Suite.

UNIT – II MEDIA ACCESS & INTER NETWORKING 12

Medium Access Control Techniques: Random, Round Robin, Reservation: ALOHA Pure and Slotted, CSMA/CD-CSMA/CA- Ethernet-Token Ring-Token Bus-ARQ 3 Types, Data Link Layer design issues: Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, IEEE Standards: Bluetooth (802.15), Basic Internetworking: IP - CIDR - ARP -DHCP - ICMP.

UNIT – III NETWORK DEVICES AND NETWORK LAYER 8

Network Devices: Router, Switch, HUB, Bridge, Routing: Static Routing, Dynamic Routing, Categories of Routing – RIP v1 and RIP v2- IPV4 Addressing - IPV6 Addressing

UNIT – IV TRANSPORT LAYER 9

Overview of Transport layer: UDP - Reliable byte stream (TCP), Connection Management: Flow control – Retransmission – TCP Congestion control, Congestion avoidance:

UNIT – V APPLICATION LAYER 8

Traditional applications: SSH – HTTP – FTP –DNS – SNMP – Telnet

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :COMPUTER NETWORKS		**Course Code : 24CS403**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C211.1	Identify the different types of computer networks and their layered architectures to determine suitable networking solutions.	I	K3
C211.2	Analyze various MAC techniques and apply link-layer error-handling methods in communication scenarios.	II	K4
C211.3	Apply routing concepts to evaluate the functioning of network devices and analyze IPv4/IPv6 addressing schemes	III	K4
C211.4	Generalize the transport-layer mechanisms by applying TCP/UDP concepts to real-time data transmission problems	IV	K4
C211.5	Illustrate application-layer protocols to analyze how common network services enable end-to-end communication.	V	K4

24CS401	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models and to depict a database system using ER Diagrams
- To study relational database model and to write SQL queries for store/retrieve database
- To understand Normalization technique to improve the performance data base design
- To understand the concepts of Transaction processing, concurrency control techniques and recovery procedures for real time applications.
- To understand working procedures of query processing and internal storage structures using different file and indexing techniques which will help in physical DB design

UNIT – I DATABASE FUNDAMENTALS 9

Purpose of Database System – Views of data – Data abstraction and data independence- Instances and schemas- Database System Architecture – Difference between File system and DBMS, Compare Centralized vs Distributed database, Data Models –Constraints- Keys with its types, Entity Relationship Model: Entity Sets – Relationship sets-Types of mapping constraints- Attributes–Relationships in ER diagram- E-R design issues– Extended ER features: Generalization, Specialization and Aggregation in ER model

UNIT – II RELATIONAL DATABASE 9

Relational Algebra: Relational operators- Joins - Relational Calculus: Tuple relational calculus and Domain relational calculus, SQL: Types of commands- set operations, Constraints- Aggregate Functions- Clauses- operators, Sub queries: Correlated and Nested Sub queries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL

UNIT – III RELATIONAL DATABASE DESIGN 9

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Canonical Cover – Armstrong Axioms - Problem of Redundancy in database-Lossless join and Dependency Preserving decomposition, Normalization: First Normal Form– Second Normal Form – Third Normal Form –Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form

UNIT – IV TRANSACTIONS AND CONCURRENCY CONTROL 9

Transaction: ACID properties and their necessity – Transaction States – Schedule and conflict: Types of schedules–Conflict Serializable schedule–View Serializable schedule-Conflict equivalent schedule-Recoverability in DBMS: Recoverable and Irrecoverable Schedule- Cascading rollback, Cascade less and strict schedule, Equivalence of schedule, Concurrency Control: Lock Based Protocols–Time stamp based Protocols –Validation Based Protocols - Deadlock handling

UNIT – V STORAGE AND QUERY PROCESSING 9

File Organization – RAID- Indexing and Hashing: Ordered Indices – Static Hashing – Dynamic Hashing, Comparison of Ordered indexing and Hashing, B+ tree Index Files, Query Processing – Measures of Query cost, Algorithms for SELECT and JOIN operations – Evaluation of expressions.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan — Database System Concepts, Seventh Edition, Tata McGraw Hill, 2019.
2. Ramez Elmasri, Shamkant B. Navathe —Fundamentals of Database Systems, Seventh Edition, Pearson Education, 2016.

REFERENCES:

1. Raghu Ramakrishnan —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
2. C.J.Date, A.Kannan, S.Swamynathan -An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATABASE MANAGEMENT SYSTEMS		**Course Code : 24CS401**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C212.1	Illustrate the fundamental elements of relational database management systems and also ability to design the database using ER modeling.	I	K3
C212.2	Apply SQL queries to interact with database.	II	K3
C212.3	Apply normalization to design the database efficiently through elimination of anomalies	III	K3
C212.4	Analyze database transactions and can control them by applying ACID properties and also Summarize concurrency control protocols.	IV	K4
C212.5	Illustrate database storage structures and access techniques: file organization, indexing methods including B+ tree and hashing.	V	K3

24CS405	CONCEPTS OF OPERATING SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads.
- To apply various Scheduling algorithms.
- To understand the concept of Deadlocks and memory management schemes.
- To understand I/O management and File systems.
- To study various operating systems like Distributed OS, Real-Time OS, Virtual machine and basic concepts of virtualization.

UNIT-I OPERATING SYSTEM OVERVIEW 9

Operating System Overview - Objectives and Functions, Evolution of Operating Systems, Operating System Structure and Operations- System Calls, System Programs, Operating Systems Generation and System Boot.

UNIT-II PROCESS MANAGEMENT AND CONCURRENCY CONTROL 9

Processes - Process Concept and Scheduling, Operations on Processes, Inter Process Communication - CPU Scheduling - Scheduling criteria, Scheduling algorithms; Threads- Overview, Multithreading models, Threading issues - Process Synchronization - The critical-section problem, Mutex locks, Semaphores, Classic problems of synchronization, critical region, Monitors.

UNIT - III DEADLOCK AND STORAGE MANAGEMENT 9

Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock;Main Memory - Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation; Virtual Memory - Background, Demand Paging, Page Replacement, Allocation, Thrashing - Allocating Kernel Memory.

UNIT - IV MASS STORAGE AND FILE SYSTEMS 9

Overview of Mass Storage System and Structure- Disk Structure, Disk Scheduling and Management Swap space management; File-System-Interface- File concept, Access methods, File Sharing and Protection, Allocation Methods, Free Space Management; Directory- Structure, organization, implementation.

UNIT - V ADVANCED OPERATING SYSTEMS AND VIRTUALIZATION 9

Basics of Network Operating System, Server Operating System, Real Time Operating System and Distributed Operating Systems - Virtual Machines - Types and Structure - virtualization - Types, Techniques and Application - supporting multiple operating systems simultaneously on a single hardware platform; Running one operating system on top of another.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, - Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, “Operating Systems - Internals and Design Principles”, 9th Edition, Prentice Hall, 2018.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Fifth Edition, Pearson Publications, 2022.
2. AchyutS.Godbole, AtulKahate, - Operating Systemsǁ, McGraw Hill Education, 2016.
3. RamazElmasri, A. Gil Carrick, David Levine, - Operating Systems - A Spiral Approach, Tata McGraw Hill Edition, 2010.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :CONCEPTS OF OPERATING SYSTEM		**Course Code : 24CS405**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C213.1	Understand basics and functions of operating systems.	I	K2
C213.2	Apply various scheduling algorithms and threads.	II	K3
C213.3	Apply process synchronization and deadlock, prevention, avoidance algorithms.	III	K3
C213.4	Construct various memory management schemes	IV	K3
C213.5	Apply the functionality of advanced operating systems and virtualization	V	K3

24AD402	DATA EXPLORATION AND VISUALIZATION	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To outline an overview of exploratory data analysis
- To perform univariate data exploration and analysis.
- To apply bivariate data exploration and analysis.
- To use Data exploration and visualization techniques for multivariate and time series data

UNIT-I EXPLORATORY DATA ANALYSIS 9

EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data –Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA- Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques - Grouping Datasets - data aggregation

UNIT-II UNIVARIATE ANALYSIS 9

Introduction to Single variable: Distributions and Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality - Smoothing Time Series.

UNIT-III BIVARIATE ANALYSIS 9

Relationships between Two Variables - Percentage Tables - Analyzing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines – Transformations.

UNIT- IV MULTIVARIATE AND TIME SERIES ANALYSIS 9

Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond - Longitudinal Data – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling.

UNIT-V DATA VISUALIZATION 9

Loading Data into R -Transforming Data - Creating Tidy Data - Basic Data Exploration Techniques -Data Visualization Techniques – Visualizing Geographic Data with ggmap - R Markdown.

CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 120 PERIODS

LAB COMPONENT:

1.Execute various commands in R for descriptive data analytics using bench mark datasets

2.Use R tool to explore various variable and row filters for cleaning data.

3. Use R commands for probability distributions and probability statistics.

4.Show various plot features in R on sample data sets and visualize

5.Install the data Analysis and Visualization tool :Python/Tableau Public/ Power BI Desktop.

6.Prepare & Load data

7.Develop the data model

8.Perform DAX calculations

9.Design a report

10.Create a dashboard and perform data analysis

SOFTWARE:R studio**/** R Tool / Tableau Public/ Power BI Desktop.

TEXT BOOKS:

1. Suresh Kumar Mukhiya, Usman Ahmed, “Hands-On Exploratory Data Analysis with Python”, Packt Publishing, 2020.
2. Catherine Marsh, Jane Elliott, “Exploring Data: An Introduction to Data Analysis for Social Scientists”, Wiley Publications, 2nd Edition, 2008.

REFERENCES:

1. Eric Pimpler, “Data Visualization and Exploration with R”, Geo Spatial Training service, 2017
2. Claus.O.Wlike, Fundamentals of Data Visualization, A primer on making informative and compelling Figures, O’Reily Publications, 2019.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATA EXPLORATION AND VISUALIZATION		**Course Code :24AD402**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C214.1	Demonstrate various data transformation techniques in data analysis	I	K3
C214.2	Apply univariate data exploration and analysis for dataset.	II	K3
C214.3	Apply bivariate data exploration and analysis for given data.	III	K3
C214.4	Apply multivariate and time series analysis.	IV	K3
C214.5	Apply data analysis and visualization techniques.	V	K3

24AD4L1	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To design and implement search strategies
- To implement CSP techniques
- To develop systems with logical reasoning
- To develop systems with probabilistic reasoning

LIST OF EXPERIMENTS:

1. Implement basic search strategies – 8-Puzzle, 8 - Queens problem, Crypt arithmetic.

2. Implement A* and memory bounded A* algorithms

3.Travelling Salesperson Problem using Heuristic approach

4. Solve constraint satisfaction problems

5. Implement propositional model checking algorithms

6. Implement forward chaining and backward chaining

7. Implement resolution strategies

8. Build naïve Bayes models

9. Implement Bayesian networks and perform inferences

10.Create a chat bot application using AI.

TOTAL: 45 PERIODS

SOFTWARE: Python 3.0 above

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :ARTIFICIAL INTELLIGENCE LABORATORY		**Course Code : 24AD4L1**	
CO	**Course Outcomes**	**Exp**	**K –CO**
C215.1	Apply and implement search strategies	1,2,3	K3
C215.2	Implement various CSP techniques	4	K3
C215.3	Develop logical reasoning systems	5,6	K3
C215.4	Develop probabilistic reasoning systems	7,8,9	K3
C215.5	Develop a chat bot application using AI	10	K3

24CS4L1	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To write and debug Database commands.
- To implement advanced query in Database tool.
- To use functions and procedures for implementing simple logic in Database.
- To design real time applications using front end tool and Database.
- To implement Database connectivity for real time applications.

LIST OF EXPERIMENTS

1. Implementation of Data Definition and Data Manipulation Language Commands of SQL with suitable examples.
2. Implementation of Data Control and Transaction Control Language Commands of SQL with suitable examples.
3. Implementation of Aggregate Functions and Set Operations with suitable examples.
4. Implementation of different types of constraints and Group by, Order by, Having clause with suitable examples
5. Implementation of different types of Joins with suitable examples.
6. Implementation of Nested Sub queries and Views.
7. Study of PL/SQL programs
8. PL/SQL - procedures
9. PL/SQL - Functions
10. PL/SQL – Triggers and Cursor
11. Front end application development – Create Forms, Menu and Reports.
12. Implementation of Database Connectivity

TOTAL: 45 PERIODS

PLATFORM NEEDED: Oracle/Mysql/Visual Basics/Net beans IDE

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATABASE MANAGEMENT SYSTEMS LABORATORY		**Course Code :24CS4L1**	
CO	**Course Outcomes**	**Exp**	**K –CO**
C216.1	Develop simple Database using DDL, DML and TCL commands.	1-3	K3
C216.2	Create Relational Database for real time application through Database constraints.	4	K3
C216.3	Write and execute nested sub queries and join queries with privileges.	5-6	K3
C216.4	Develop PL/SQL programs using Procedure, Functions, Triggers and Cursor.	7-10	K3
C216.5	Design real time applications with Database Connectivity.	11-12	K3

24HS4L1	APTITUDE AND SOFT SKILLS -III	L	T	P	C
		0	0	2	1

Module I LOGICAL REASONING SKILLS 10

Logical Reasoning, Letter and Symbol series, Number series, Analyzing arguments, Making judgments, Logical Reasoning, Direction Sense test, Venn diagrams, Seating arrangements, Cause and effect, Blood relation test, Dice Logical, verbal puzzles, Analytical puzzles and sudoku.

Module II BEHAVIOURAL SKILLS 5

Interview Etiquettes - Body language, Dress code, Eye contacts, Handshakes for Interview - Interview handling – Mock Interview Videos - High Frequency words in resume and interviews - Visual Interpretation – HR Interview question – Sell yourself -Interpersonal and intrapersonal communication

Module III VERBAL SKILLS 15

Vocabulary basics, Grammar basics, Critical Reasoning, Reading comprehension, Synonyms, Antonyms, Idioms and phrases - sentence completion, Spotting errors, Error correction, Sentence correction, Writing Resume, Letter writing, Official mail correspondence -Ways to communicate in different scenarios-job interview, business meeting, project proposal submission, informal gathering, speech for a large audience and debate.

TOTAL: 30 PERIODS

REFERENCES:

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010