KIT - Kalaignarkarunanidhi Institute of Technology

An Autonomous Institution

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' GRADE & NBA (AERO, CSE, ECE, EEE, MECH & MBA)

An ISO 9001 : 2015 Certified Institution, Coimbatore - 641 402.

Regulations, Curriculum & Syllabus - 2023

(For Students admitted from the Academic Year 2023-24 and onwards)

BACHELOR OF ENGINEERING DEGREE

IN

COMPUTER SCIENCE AND ENGINEERING
(Artificial Intelligence and Machine Learning)

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Department of Computer Science and Engineering (Artificial Intelligence and Machine learning)

Conceptual Frame work

(For Students admitted from the Academic Year 2023-24 and onwards)

Semester	Level of Course	Hours / Week	No of Courses	Range of Credits / Courses	Total Credits
PART - I					
A - Foundation Courses					
I to VII	Humanities and Social Sciences (HS)	1- 5	5	1 - 4	10
I to IV	Basic Sciences (BS)	4 – 5	6	4	24
I to II	Engineering Sciences (ES)	3 - 5	5	2 - 4	17
B - Professional Core Courses					
III to VII	Professional Core (PC)	3 - 5	26	2 - 4	74
C - Elective Courses					
V to VIII	Professional Elective (PE)	3 - 5	6	3	18
V to VIII	Open Elective (OE)	3 - 5	4	3	12
D - Project Work					
VI, VII & VIII	Project Work (PW)	4 -16	3	2 - 8	12
E - Mandatory Courses Prescribed by AICTE/UGC (Not to be Included for CGPA)					
V & VI	**Mandatory Course (MC)**	3	2	NC	NC
Total Credit					**167**
PART - II					
F- Career Enhancement Courses (CEC)					
II	Soft Skills	2	1	-	NC
IV	Professional Certificate course	-	1	1	1
V	Summer Internship	-	1	1	1
Total Credit					**02**
Total Credit to be Earned					**169**

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Curriculum and Scheme of Assessment	
(For Students admitted from the Academic Year 2023-24 and onwards)	

Semester - I

Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
B23IPT101	Induction Programme	HS	-	-	-	-	0	-	-	-
Theory / Theory with Practical										
B23ENT101	Professional English	HS	2	2	0	0	**2**	40	60	100
B23MAT101	Matrices and Differential Calculus	BS	4	3	1	0	**4**	40	60	100
B23HST101	தமிழர் மரபு / Heritage of Tamils	HS	1	1	0	0	**1**	40	60	100
B23MET101	Engineering Graphics	ES	4	2	2	0	**4**	40	60	100
B23PHI101	Engineering Physics	BS	5	3	0	2	**4**	50	50	100
B23CSI101	C Programming	ES	5	2	0	4	**4**	50	50	100
Total credits to be earned							**19**			

Semester – II

Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT201	Integral Calculus and Complex Analysis	BS	4	3	1	0	**4**	40	60	100
B23EET202	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	**3**	40	60	100
B23HST201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HS	1	1	0	0	**1**	40	60	100
B23ENI101	Professional Communication	HS	5	3	0	2	**4**	50	50	100
B23CHI101	Engineering Chemistry	BS	5	3	0	2	**4**	50	50	100
B23ADI201	Python Programming	ES	5	2	0	4	**4**	50	50	100
B23CEP201	Soft Skills	CEC	2	2	0	0	**NC**	100	-	100
Practical										
B23MEP101	Engineering Practices Laboratory	ES	4	0	0	4	**2**	60	40	100
B23CEP201	Application Design and Development	MC	**2**	0	0	2	**1**	**100**	-	**100**
Total credits to be earned							**22**			

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Semester – III										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT302	Discrete Mathematics	BS	4	3	1	0	**4**	40	60	100
B23AMT301	Computer Organization and Architecture	PC	3	3	0	0	**3**	40	60	100
B23AMT302	Data Structures and Algorithms	PC	3	3	0	0	**3**	40	60	100
B23CST303	Computer Networks	PC	3	3	0	0	**3**	40	60	100
B23AMT303	Artificial Intelligence Foundations	PC	3	3	0	0	**3**	40	60	100
B23AMI301	Object Oriented Programming using Java	PC	5	3	0	2	**4**	50	50	100
Practical										
B23AMP301	Data Structures and algorithms Laboratory	PC	4	0	0	4	**2**	60	40	100
B23AMP302	Fundamentals of Artificial Intelligence Laboratory	PC	4	0	0	4	**2**	60	40	100
Total credits to be earned							**24**			

Semester - IV										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT404	Probability and Statistics	BS	4	3	1	0	**4**	40	60	100
B23CST401	Database Management Systems	PC	3	3	0	0	**3**	40	60	100
B23ADT401	Operating System Foundations	PC	4	3	1	0	**3**	40	60	100
B23AMT401	Software Engineering with Agile Methodology	PC	3	3	0	0	**3**	40	60	100
B23ADT302	Foundations of Data Science	PC	3	3	0	0	**3**	40	60	100
B23ADI401	Machine Learning	PC	5	3	0	2	**4**	50	50	100
Practical										
B23CSP401	Database Management and Systems Laboratory	PC	4	0	0	4	**2**	60	40	100
B23ADP301	Data Science Laboratory	PC	4	0	0	4	**2**	60	40	100
B23CEP301	Professional Certificate Course	CEC	-	-	-	-	**1**	100	-	100
Total credits to be earned							**25**			

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B.E/B.Tech (Except CSBS)	B23ENT101–PROFESSIONAL ENGLISH	L	T	P	C
		2	0	0	2

Course Objectives	
1.	To develop the listening and reading skills of first year engineering and technology students.
2.	To help learners' develop vocabulary through reading skills.
3.	To enhance learners' grammatical knowledge.
4.	To enhance the learners' ability of writing different complex texts.
5.	To develop the competency of learners through LSRW skills.

UNIT-I	6

Listening: Listening to voicemail & messages; Listening and contextualizing.

Speaking: Replying to polite requests and offers, understanding basic instructions.

Reading: Short comprehension passages, practice in skimming & scanning

Writing: Writing Instructions

Language development: Parts of Speech, Wh - Questions, yes or no questions, Question tags

Vocabulary development: Prefixes-suffixes

UNIT-II	6

Listening: Listening commentaries and announcements

Speaking: Role Play exercises based on workplace contexts.

Reading: Comprehension questions including dialogues and conversations

Writing: Writing different types of Paragraph

Language development: Regular & Irregular Verbs, Tenses

Vocabulary development: Understanding contextual meaning, Synonyms

UNIT-III	6

Listening : Listening to a product launch-sensitizing leaners to the nuances of persuasive communication

Speaking : Debate-discussion on current issues

Reading : Short texts and longer passages-note making

Writing : Understanding text structure, use of reference words and discourse markers, jumbled sentences

Language development: Idioms and Phrases, Degrees of comparison

Vocabulary development: One word substitutes

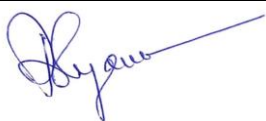**Approved by BoS Chairman**

UNIT-IV	6
Listening : Listening to short academic videos **Speaking :** Making short presentation through short films **Reading :** Intensive and Extensive reading-reading different types of magazines **Writing :** Letter writing- formal and informal **Language development:** Direct/indirect questions **Vocabulary development:** Phrasal verbs	

UNIT-V	6
Listening : Listening to talks/lectures by specialists on specific topics **Speaking :** Discussion on general and current topics **Reading :** Longer texts-cloze reading **Writing :** Writing short essays, developing outline, identifying main and subordinate ideas, Dialogue writing **Language development:** Spelling and Punctuations, Modal verbs **Vocabulary development:** Collocations	
	Total Instructional hours:30

Course Outcomes: Students will be able to	
CO1	Develop listening and reading skills for effective communication
CO2	Develop vocabulary skills
CO3	Build grammatical understanding
CO4	Explain opinions efficiently in writing formal and informal contexts
CO5	Develop knowledge through LSRW skills

Text Books	
1.	Board of Editors Using English, "A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Limited,Hyderabad:2015
2.	Richards,C.Jack," Interchange StudentsBook-2", New Delhi,CUP,2015.

Reference Books	
1.	Bailey, Stephen, "A practical guide for students", New York Rutledge, 2011.
2.	Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice" Oxford University Press: New Delhi, 2014.
3.	Dutt P.Kiranmai and Rajeevan Geeta, "Basic Communication Skills", Foundation Books, 2013.

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B.E/B.TECH	B23MAT101 MATRICES AND DIFFERENTIAL CALCULUS (Common to all Branches)	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To develop the use of matrices that is needed by engineers for practical applications.
2.	To understand the concept of functions of several variables.
3.	To recognize and classify ordinary differential equations.
4.	To apply the concept of ordinary differential equations in engineering disciplines.
5.	To learn the applications of Laplace transforms in engineering.
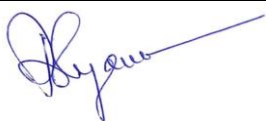
UNIT – I MATRICES	12
Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley Hamilton theorem – Quadratic form: Nature, Reduction to canonical form by orthogonal transformation.	

UNIT – II FUNCTIONS OF SEVERAL VARIABLES	12
Partial differentiation –Total derivative – Jacobians – Taylor's series expansion for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.	

UNIT – III ORDINARY DIFFERENTIAL EQUATIONS	12
Higher order linear ordinary differential equations with constant coefficients - Method of variation of parameters - Simultaneous differential equations.	

UNIT – IV APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS	12
Solution of specified differential equations connected with electric circuits - Law of Natural growth and decay - Simple harmonic motion (Differential equations and associated conditions need to be given).	

UNIT – V LAPLACE TRANSFORM	12
Existence conditions - Properties (excluding proofs) - Transform of standard functions -Transforms of derivatives and integrals - Inverse Laplace transform - Applications to solution of linear second order ordinary differential equations with constant coefficients.	

	Total Instructional hours : 60

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Course Outcomes : Students will be able to	
CO1	Make use of Eigen values and Eigen vectors to reduce the quadratic form into canonical form and to find the powers of a square matrix.
CO2	Construct maxima and minima problems.
CO3	Solve differential equations which existing in different engineering disciplines.
CO4	Develop the applications of differential equations in various engineering field.
CO5	Apply Laplace transform and inverse transform to solve differential equations with constant coefficients.

Text Books	
1.	Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2015.
2.	Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media -An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
3.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
4.	George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, "Thomas' Calculus", Pearson,14th Edition, 2018.

Reference Books	
1.	Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2019.
2.	Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
3.	Ramana B V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company, New Delhi, 2017.
4.	Veerarajan T., "Engineering Mathematics for Semester I and II", Tata Mc Graw Hill Publishing Company, New Delhi, 2019.
5.	Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e- book downloaded from www.EasyEngineering.net.pdf).

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B.E / B.Tech	B23HST101 - HERITAGE OF TAMILS (Common to all Branches)	L	T	P	C
		1	0	0	1

UNIT I LANGUAGE AND LITERATURE	3

Language Families in India - Dravidian Languages – Tamil as aClassical 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, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, 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.

	Total Instructional hours : 15

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II

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

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: 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 Civilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

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) – Reference Book.

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B.E / B.Tech	B23MET101 – Engineering Graphics (Common to All)	L	T	P	C
		3	2	0	4

Course Objective:

1. Understand the conventions and method of engineering drawing.
2. Construct and interpret the basic engineering drawings.
3. Improve their visualization skills so that they can apply these skills in new product development.
4. Enhance their technical communication skill in the form of communicative drawings.
5. Comprehend the theory of projection.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)   2

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   PLANE CURVES AND FREE HANDSKETCHING   14

Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

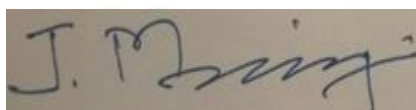### UNIT-II   PROJECTION OF POINTS, LINES AND PLANE SURFACE   14

Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT-III   PROJECTION OF SOLIDS   14

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

UNIT- IV   PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES   14

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of

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section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT-V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   14

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-prisms, pyramids and cylinders by visual ray method.

COMPUTER AIDED DRAFTING   3

Introduction to drafting packages and demonstration of their use.

Basic Geometrical constructions using AUTOCAD.

Total Instructional Hours: 75

Course Outcome

Student will be able to

CO1:   Construct the basic engineering curves and freehand sketching of basic geometrical constructions and multiple views of objects.

CO2:   Draw problems related to projections of points, straight lines, planes and solids.

CO3:   Build the projection of simple solids.

CO4:   Apply the knowledge acquired on practical applications of sectioning and development of solids.

CO5:   Construct simple solids and its sections in isometric view and projections and to draw its perspective views.
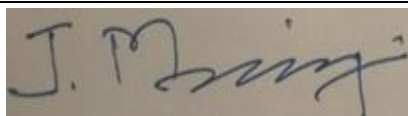
Text Books:

1. K.V.Natarajan, "A text book of Engineering Graphics", 28th Edition, Dhana Lakshmi Publishers, Chennai, 2015.

2. N.D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House,53rd Edition, 2014.

Reference Books:

1. K. Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Publishers, 2017.

2. K.R.Gopalakrishna., "Engineering Drawing" (Vol. I & II combined) Subhas Publications, Bangalore, 2018.

  N.S Parthasarathy and Vela Murali, "Engineering Drawing", O

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B.E / B.Tech	**B23PHI101 - ENGINEERING PHYSICS** (Common to all Branches)	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To gain knowledge on the basics of properties of matter, its applications and inculcate practical skills in the determination of elastic property of the materials.
2.	To acquire knowledge & experimental skills on the concepts of Photonics and their applications in fiberoptics.
3.	To have adequate knowledge on the concepts of electrical, magnetic properties of materials and enhance the practical skills in determination of electrical properties of the materials.
4.	To get knowledge on advanced physics concepts of quantum theory and its applications in SEM, TEM and induce practical skills in microscope.
5.	To enhance the fundamental knowledge of students in Crystal Physics and its Applications relevant to various streams of Engineering and Technology.

UNIT – I PROPERTIES OF MATTER	14

Elasticity-Modulus, types of modulii of elasticity, Stress-strain diagram and its uses-factors affecting elastic modulus and Twisting couple, torsion pendulum; theory and experiment.

Bending of beams- Bending moment - uniform and non- uniform bending; theory and experiment- I-shaped girders and its applications.

Determination of rigidity modulus – Torsion pendulum- Determination of Young's modulus by non-uniform bending method- Determination of Young's modulus by uniform bending method.

UNIT – II PHOTONICS AND FIBER OPTICS	12

Lasers; properties of laser-spontaneous and stimulated emission-amplification of light by population inversion- Einstein's A and B coefficients - derivation – Types of laser; Nd.-YAG Laser, Semiconductor lasers; homojunction and heterojunction, Industrial and Medical Applications.

Fiber Optics; Principle, Numerical Aperture and Acceptance Angle - Types of optical fibres–-Fiber optic communication System-Block diagram–Medical Applications-Endoscopy.

Determination of wavelength of the Laser using grating- Determination of particle size using Laser-Determination of Numerical aperture and acceptance angle of an optical fiber.
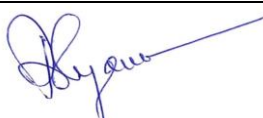
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UNIT – III ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS	12

Classical free electron theory – Relaxation time and collision time - Expression for electrical conductivity – Thermal conductivity – Wiedemann-Franz law –Lorentz number-Drawbacks of classical theory-Quantum theory- Fermi-Dirac statistics – variation of Fermi level with temperature.

Introduction to magnetic materials –Comparision of Dia, Para and Ferro magnetic materials – Domain theory of ferromagnetism- Hysteresis -Soft and Hard magnetic materials **-**Ferrites and its applications.

Determination of specific resistance of the wire using Carey Foster's Bridge.

UNIT – IV QUANTUM PHYSICS	12

Black body radiation; Planck's theory (derivation) - wave particle duality- debroglie's wavelength - concept of wave function and its physical significance.

Wave equation; Schroedinger's time independent and time dependent equations, particle in a one-dimensional rigid box. **Applications;** Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).

Determination of thickness of a thin wire by using travelling microscope.

UNIT – V CRYSTAL PHYSICS	10

Crystal Structures; Single crystalline, polycrystalline and amorphous materials - unit cell- space lattice-crystal systems- Bravais lattices- Miller indices- inter-planar distances – coordination number and packing factor for SC, BCC, FCC and HCP structures.

Crystal imperfections; Point and Line defects-Burger vector.

	Total Theory Instructional hours : 60

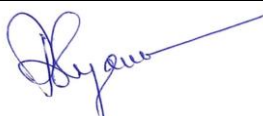| Course Outcomes : Students will be able to	
CO1	Categorize the basics of properties of matter and its applications, classify the elastic properties of materials by using uniform, non-uniform bending method and torsional pendulum apparatus.
CO2	Explain the basics of Laser, Fiber Optics and their applications, determination of Particle size, Wavelength of laser and acceptance angle, numerical aperture of optical fiber.
CO3	Justify the concepts of electrical, magnetic properties of materials, determination of Specific resistance of the material.
CO4	Interpret the basic knowledge of quantum theory that could be helpful in understanding the wave functions of the particle and determination of thickness of thin sheet by using travelling microscope.

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II

CO5	Classify and compare the different types of Crystals, their structures and its defects.

Text Books	
1.	Bhattacharya, D.K. & Poonam, T, "Engineering Physics", Oxford University Press,2015.
2.	Gaur, R.K. & Gupta, S.L. "Engineering Physics", Dhanpat Rai Publishers, 2012.
3.	Pandey, B.K. & Chaturvedi, S. "Engineering Physics", Cengage Learning India, 2012.
4.	Rajendran V, "Engineering Physics", Tata McGraw Hill, Publishing Company, NewDelhi, 2011.
5.	Wahab, M.A. —Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.

Reference Books	
1.	Halliday, D., Resnick, R. & Walker, J. "Principles of Physics"", Wiley, 2015.
2.	Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers", CengageLearning, 2010.
3.	Tipler, P.A. &Mosca, G. "Physics for Scientists and Engineers with Modern Physics", W.H.Freeman, 2007.
4.	Avadhanulu M.N**, "**Engineering Physics - Volume 1", S.Chand & Company Ltd.,NewDelhi, 2010.
5.	Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag, 2012.
6.	Senthil Kumar, G. Physics Laboratory I & II, VRB publishers Pvt. Ltd., Chennai (2016).

Equipment Needed for 30 Students

1. Diode Laser (2 mS power) , He –Ne Laser source(2mW), Optical Fibre Kit   - 06
2. Travelling Microscope ,Knife edge, Slotted weights   - 19
3. Carey Foster Bridge   - 06
4. Air Wedge Apparatus with Travelling Microscope   - 06
5. Torsional Pendulum   - 06

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II

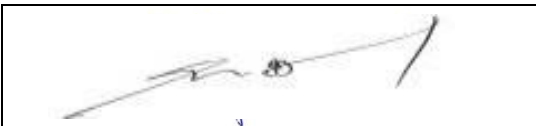| B.E / B.Tech	B23CSI101 – C PROGRAMMING (Common to CSE(AI&ML), AI&DS, BME, ECE, EEE)	L	T	P	C
		2	0	4	4

Course Objectives	
1.	To know the basics of problem-solving techniques.
2.	To provide exposure to problem-solving through programming.
3.	To develop C programming language with conditional statements and loops.
4.	To develop modular applications in C using functions pointers and structures
5.	To do input/output and file handling in C

UNIT - I	INTRODUCTION TO PROBLEM SOLVING & COMPUTER	8

Problem Solving: Problem Solving Techniques - Logical Thinking – Step for Solving the Problems – Compare Problem Solving and Logical Thinking – Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

UNIT - II	BASICS OF C PROGRAMMING	10

Introduction to programming paradigms - Structure of C program - Phases of developing a running computer program in C – Applications of C Language - C programming: Data Types – Storage Class - Constants – Enumeration Constants - Keywords – Operators: Operators – Types of Operators - Expressions - Precedence and Associativity – Input / Output statements – Decision making statements - Looping statements with example of Pattern – Preprocessor directives.

UNIT - III	ARRAYS AND POINTERS	9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays with example of Matrices Operations – Pointers: Pointer Declaration – Initialization - Pointer operators – Pointer Arithmetic – Dynamic Memory Allocation – Selection sort, Insertion sort, Bubblesort - Searching.

UNIT - IV	FUNCTION AND STRINGS	9

Function: definition of function, Declaration of function – Function Call - Prototype Declaration - Pass by value, Pass by reference – Recursion - Linear recursion, Binary Search using recursive functions - C standard functions and libraries - String operations: length, compare, concatenate, copy - String Arrays.
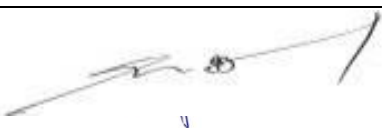
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UNIT - V	STRUCTURES AND FILE HANDLING	9

Introduction: need for structure data type, structure definition, Structure declaration, Structure within a structure – Array Structure - Union – File Handling: File Operations – File Types: Sequential and Random access – Case Study: AI Processing System using C.

Expt. No.	Description of the Experiments
1.	Experiment with I/O statements, operators, expressions
2.	Develop a C programs for Decision Making Construct. a)if-else b)switch-case c)goto, break-continue
3.	Develop a C programs for Loop Control statements. a)for b) Nested for c) while and do-while
4.	Develop a C programs for Array a)One Dimensional – Sorting and Searching b)Two Dimensional – Matrix Operations c) Traversal
5.	Develop a C program to perform the pointers. Linear Search b) Binary Search c) Pointer Operation
6.	Build a C programs for the recursive function
7.	Implement a C programs for string operations String operations using build in methods
8.	Develop a C program to experiment with Pass by value and Pass by Reference
9.	Develop a c program for structure and union a)Payroll using structure and union.b)Student records using structure and union.
10.	Develop a C program to perform file operations
	Total Instructional hours : (45+30) = 75

Course Outcomes : Students will be able to	
CO1	Demonstrate knowledge on C programming constructs
CO2	Construct C programs using decision making and control statements.
CO3	Experiment with programs in C using an array.
CO4	Build programs in C using strings, pointers, functions.

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CO5	Model the applications in C using Structures, Union and File Operations

Requirements for a Batch of 30 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Turbo C/C++ 4.5	30

Text Books	
1.	Yashavant P. Kanetkar. "Let Us C", 19th Edition, BPB Publications, 2022
2.	H. M. Deitel, P. J. Deitel, C: How to program, 9th edition, Pearson Education, 2020.

Reference Books	
1.	Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016
2.	Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015
3.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013
4.	Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.

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II

Semester - II

B.E/B.TECH	B23MAT201 INTEGRAL CALCULUS AND COMPLEX ANALYSIS **(Common to all Branches)**	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To recognize various techniques of integration.
2.	To apply integration techniques in evaluating area and volume of solids.
3.	To develop the use of Vector calculus in two and three dimensional spaces.
4.	To demonstrate understanding of the basic concepts of complex differentiation.
5.	To understand Cauchy theorem and Cauchy integral formulae and apply these to evaluate complex contour integrals.

UNIT – I INTEGRAL CALCULUS	12
Riemann sum – Definite and Indefinite integrals - Substitution rule (Exponential, logarithmic, Trigonometric functions) – Integration by parts – Integration of Rational functions by Partial fraction.	

UNIT – II MULTIPLE INTEGRALS	12
Double integrals: – Double integrals in Cartesian coordinates - Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals: Evaluation of triple integrals - Volume as triple integral (Simple problems).	

UNIT – III VECTOR CALCULUS	12
Gradient and directional derivative - Divergence and curl - Solenoidal and Irrotational vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and applications (for cubes and rectangular parallellopipeds).	

UNIT – IV COMPLEX DIFFERENTIATION	12
Analytic functions - Cauchy-Riemann equations (excluding proof) – Properties of analytic function – Harmonic conjugate- Construction of analytic function by Milne Thomson method – Bilinear transformation.	

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UNIT – V COMPLEX INTEGRATION	12
Cauchy's integral theorem – Cauchy's integral formula – residues - Cauchy's Residue theorem – Evaluation of real integrals – Stereographic projection – Use of circular contour and semicircular contour (excluding poles on real axis).	
	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Develop Fundamental Theorem of Calculus, techniques of Integration such as substitution, partial fractions and integration by parts.
CO2	Make use of integration to compute area and volume.
CO3	Apply the line, surface and volume integrals for verification of Green's, Gauss and Stokes theorems.
CO4	Develop an understanding of the standard techniques of complex variable theory in particular analytic function
CO5	Identify contour integrations with the help of residue theorem.

Text Books	
1.	Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
3.	George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, "Thomas' Calculus", Pearson, 14th Edition, 2018.

Reference Books	
1.	Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media - An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
2.	Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition 2019.
3.	O'Neil, P.V.,"Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 7th Edition 2017.
4.	Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New

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	Delhi, 2014.
5.	Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", (Tata McGraw Hill Education Pvt. Ltd), 6th Edition, New Delhi, 2012.
6.	Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e- book downloaded from www.EasyEngineering.net.pdf)

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B.E / B.Tech	B23HST201- TAMILS AND TECHNOLOGY	L	T	P	C
	(Common to all Branches)	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)- Thirumalai Nayakar Mahal - 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 goldCoins 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 Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

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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.	
	Total Instructional hours : 15

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
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: 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 Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
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) – Reference Book.

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B.E/B.Tech (Except CSBS)	B23ENI101–PROFESSIONAL COMMUNICATION	L	T	P	C
		3	0	2	4

Course Objectives	
1	To enhance listening and reading ability of learners to comprehend various forms of speech or conversations.
2	To develop learners' verbal ability through complex texts and speak effectively in real life and **workplace context.**
3	To make use of grammatical knowledge to enhance fluency.
4	To foster learners' ability to write convincing job applications and effective reports.
5	To develop learners language proficiency through LSRW skills

UNIT-I	9

Listening: Listening for general information-specific details- conversation- Audio /video (formal & informal);   Telephone conversation

Speaking: Self-Introduction; Introducing a friend; - politeness strategies- making   polite requests & polite offers.

Reading: Introduction to technical texts, scientific texts

Writing: Extended definitions, Writing checklists, Recommendation

Language development: Gerunds, Infinitives

Vocabulary development: Technical vocabulary, abbreviations, British & American spelling

UNIT-II	9

Listening: Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities

Speaking: Narrating personal experiences / Talking about events and situations

Reading: Reading longer technical texts, Summarizing

Writing: Interpreting graphical representations, Writing dialogues about formal and informal contexts.

Language development: Use of conjunctions and prepositions

Vocabulary development: Numerical adjectives, Transitional device

UNIT-III	9

Listening: Listen to a classroom lecture; listening to advertisements about products

Speaking: Picture description-describing locations in workplace, Presenting product, describing shape,

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size and weight- talking about quantities-talking about precautions, discussing advantages and disadvantages-making comparisons

Reading: Cause & effect texts, practice in speed reading

Writing: Process writing, Use of sequence words, Analytical and issue based essays

Language development: Subject verb agreement, Pronoun concord / pronoun antecedent

Vocabulary development: Sequence words, Misspelled words, Content v/s Function words.

UNIT-IV	9

Listening: Listening to TED Talks, Educational videos and completing exercises based on them

Speaking: Short speech (Just A Minute) -Extempore and persuasive speech, discussing and making plans-talking about tasks-talking about progress.

Reading: Reading for details in personal and professional emails

Writing: Drafting personal and professional emails, job application- cover letter, résumé preparation, Internship letter.

Language development: Clauses, if conditionals

Vocabulary development: Finding suitable synonyms, Paraphrasing

UNIT-V	9

Listening: Listening to debates/ discussions and panel discussions, listening to interviews

Speaking: Making predictions- talking about a given topic, giving opinions & facts, describing a process, discussing safety issues (making recommendations)

Reading: Reading and understanding technical articles

Writing: Writing reports, Minutes of meeting, Writing feasibility, survey and industrial reports

Language development: Reported speech, Active and Passive voice, Impersonal passive, Idioms.
Vocabulary development: Verbal analogies, Purpose statements

	Total Theory Instructional hours:45 **Total Lab Instructional hours:30**

Course Outcomes: Students will be able to	
CO1	Develop listening skills to respond appropriately in general and academic purposes
CO2	Develop strategies and skills to enhance their ability to read and comprehend
CO3	Apply vocabulary skills to improve their language skills
CO4	Build the writing skills with specific reference to technical writing
CO5	Demonstrate language proficiency through LSRW skills

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Text Books	
1.	Board of Editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016
2.	Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

Reference Books	
1.	Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice" Oxford University Press: New Delhi, 2014.
2.	Kumar, Suresh. E. "Engineering English" Orient Blackswan: Hyderabad, 2015
3.	Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4	Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
5	Communicative English for Engineers and Professionals- Nitin Bhatnagar & Mamta Bhatnagar
6	Skills for Success. Listening and Speaking. Level 4- Margret Brooks
7	Grammar F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011

Exercises for Batch of 30 Students

1. Listening Comprehension
2. Self- introduction
3. Short presentation
4. Group Discussion

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B.E / B.Tech	**B23CHI101 - ENGINEERING CHEMISTRY** **(Common to all Branches)**	**L**	**T**	**P**	**C**
		3	**0**	**2**	**4**

Course Objectives	
1.	To make the students conversant with boiler feed water requirements, related problems, water treatment and inculcate practical skills in the water quality analysis.
2.	To make the students conversant with basics of polymer chemistry.
3.	To make the students conversant with basic of electrochemical reactions, corrosion and induce experimental skills in the electro-analytical techniques.
4.	To make the student acquire sound knowledge of energy devices.
5.	To develop an understanding of the basic concepts of nano materials.

UNIT – I WATER TECHNOLOGY	**17**

Hardness of water: Types, expression of hardness and their units, hardness problems, boiler troubles - scale and sludge, caustic embrittlement, boiler corrosion, priming and foaming.

Treatment of Boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning).

External treatment: Ion exchange process, Zeolite process.

Desalination of brackish water: Reverse osmosis - municipal water treatment, break point chlorination.

Determination of alkalinity in water sample, Determination of total, temporary & permanent hardness of water by EDTA method. Estimation of iron content of the water sample using spectrophotometer.

UNIT – II POLYMERS	**9**

Polymers: Definition, polymerization, types - addition and condensation polymerization, free radical mechanism – tacticity – biodegradable polymer (PHBV) and conducting polymer (poly-aniline).

Plastics: Classification, preparation, properties and uses of PVC, teflon, nylon-6, 6 and epoxy resin.

Rubber: Vulcanization of rubber, synthetic rubbers -n-butyl rubber and SBR.

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Moulding: Ingredients - compression and Injection.

UNIT – III ELECTROCHEMISTRY AND CORROSION	16

Electrochemistry: Redox reaction, electrode potential - oxidation potential, reduction potential, Nernst equation (derivation) - measurement and applications - electrochemical series and its significance.

Corrosion: causes - types-chemical and electrochemical corrosion (galvanic and differential aeration), corrosion control - electrochemical protection (sacrificial anodic method and impressed current cathodic method).

Estimation of iron content of the given solution using potentiometer, Conductometric titration of strong acid vs strong base, Estimation of copper in brass.

UNIT – IV ENERGY DEVICES	9

Batteries: Types of batteries – primary (alkaline battery) and secondary battery (lead acid battery, lithium-ion-battery), Fuel Cells (H_2 - O_2 fuel cell).

Super Capacitors: Principle, construction, working and applications.

Photo voltaic cell: Solar cells - principle, construction, working and applications.

UNIT – V NANOCHEMISTRY	9

Basics: Distinction between molecules, nanoparticles and bulk materials- surface area to volume ratio.

Synthesis: Top-down process (ball milling) - Bottom-up process (chemical vapour deposition and sol-gel method).

Properties of nano materials - Optical, electrical, thermal and mechanical.

Applications of nano materials – Medicine, Industries, electronics and biomaterials.

	Total Instructional hours: 60

	Course Outcomes: Students will be able to
CO1	Determine the characterization of water and quantitative analysis of alkalinity, hardness and Iron. (K5)

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CO2	Develop the basics of polymer chemistry. (K3)
CO3	Interpret the principles of electrochemical reactions, corrosion and estimation of copper in Alloy. (K5)
CO4	Apply the concepts of energy devices and its engineering applications. (K3)
CO5	Organize the basics of Nano chemistry and its applications. (K3)

Text Books	
1.	Dara, S S and Umare, S S, "A Textbook of Engineering Chemistry", Chand S & Company Ltd., New Delhi, 2015.
2.	Jain, P C and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2015
3.	Vogel's Textbook of Quantitative Chemical Analysis, 8th edition, 2014.
Reference Books	
1.	Friedrich Emich, "Engineering Chemistry", Scientific International Pvt. Ltd., New Delhi, 2014.
2.	Prasanta Rath, "Engineering Chemistry", Cengage Learning India Pvt. Ltd., Delhi, 2015.
3.	Shikha Agarwal, "Engineering Chemistry - Fundamentals and Applications", Cambridge University Press, Delhi, 2015.
4.	Charles P. Poole and Frank J. Owens, "Introduction to nanotechnology", John Wiley Sons, New Jersey, 2003.

Equipment Needed for 30 Students

1. Conductivity Meter-10
2. Potentiometer-10
3. Spectrophotometer-02
4. Electronic Balance-01

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B.E / B.Tech	**B23ADI201 – PYHTON PROGRAMMING** **(Common to AI&DS, CSE, CSE(AI&ML))** **(Lab Integrated)**	**L**	**T**	**P**	**C**
		2	0	4	4

Course Objectives	
1.	To create simple python and object oriented programs using data types and control statements
2.	To develop a python programs using Strings and functions
3.	To use Python data structures such as lists, tuples, and Dictionaries
4.	To define python modules and packages
5.	To develop an applications using Numerical Python

UNIT - I	**OVERVIEW OF OOPS CONCEPTS AND PYTHON BASICS**	**6**

Object oriented programming overview - Python programming: Introduction – data types- Operators – Values and types – Variables – expressions – Statements – Functions - conditionals and Recursion – Iteration.

UNIT - II	**STRINGS & FUNCTIONS**	**6**

Accessing characters and substrings in strings - Data Encryption - Strings and Number System – String methods. Functions: Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

UNIT - III	**LISTS, TUPLES & DICTIONARIES**	**6**

Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods. Dictionaries:

UNIT - IV	**MODULES & PACKAGES**	**6**

Modules: Importing module, Math module, Random module. Python packages: Simple programs using the built-in functions of packages packages matplotlib, Numpy, pandas.

UNIT - V	**DATA MANIPULATION WITH PYTHON**	**6**

Jupyter and Colab Notebook System- Python Demonstration: Reading and Writing CSV files- Advanced Python Lambda and List Comprehensions- Numerical Python Library (NumPy) - NumPy array creation- reading arrays from disk- I/O with NumPy.

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List of Experiments:

Expt. No.	Description of the Experiments
1.	Write a program to demonstrate different basic data types in python.
2.	Create a menu driven program for reading the input from console and to perform different arithmetic operations on numbers in python..
3.	Write a Programs using Decision statements and looping statements.
4.	Write a Python program to demonstrate various built-in string handling function
5.	Construct a Python program to implement various string operations Without using built-in function
6.	Create Python Programs using user-defined functions with different types of function arguments. a) Create a simple calculator that can add, subtract, multiply and divide using functions. b) Implement the above concept by using pass by value and pass by reference.
7.	a) Implement linear search and binary search using list. b) Matrix operations using Nested List.
8.	Create a tuple and perform the following methods 1) Add items 2) len() 3) check for item in tuple 4)Access items
9.	Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()
10.	Write a python program to create a package (college), sub - package (all dept), modules (AI&DS, CSE) and create admin and cabin function to module.
11.	Simulate bouncing ball using Pygame and elliptical orbits in Pygame
12.	Write a Python program to perform read and write operations in a file, and find the occurrence of a given word in the text file using Jupyter / Lamda notebook
13.	Write a Python program to perform various array operations using Jupyter or Lamda note Book
13.	Write a Python program sorting numbers and strings using Jupyter perform various array operations using Jupyter or Lamda note Book
14.	Write a Python program for sorting numbers and Strings using Jupiter or Lamda notebook
	Total Instructional hours : (30+30)=60

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Course Outcomes : Students will be able to	
CO1	Make use of basic elements of Python programming to develop an application
CO2	Experiment with the various Strings and functions in Python
CO3	Develop Python programs to implement the operations in Lists, Tuples & Dictionaries..
CO4	Construct a simple application by using modules and packages.
CO5	Build an application using Jupyter or Colab notebook in Python

Text Books	
1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, O Reilly Publishers, 2016.
2.	Reema Thareja, "Python Programming using Problem Solving Approach", 4th Impression , Oxford University Press, 2019.

Reference Books	
1.	John V Guttag, "Introduction to Computation and Programming Using Python", 3rd illustrated edition, MIT Press, 2021.
2.	Guido Van Rossum and Fred L. Drake Jr, "An Introduction to Python", Network Theory Ltd., 2011.
3.	Robert Sedgewick, Kevin Wayne and Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd, 2015.

List of Equipment Required:		
S.NO.	Description of the Equipment	Quantity required (Nos.)
1	Python 3 interpreter for Windows/Linux	30

Approved by BoS Chairman

B.E / B.Tech	**B23CET201 – SOFT SKILLS** **(Common to all Branches)**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

Course Objectives
1.	To identify personality using evaluation method.
2.	To encourage creative thinking by practice.
3.	To enrich interpersonal skills through integrated activities.
4.	To develop social and professional etiquette.
5.	To identify and apply employability skills for professional success.

UNIT – I SELF EVALUATION	6
Introduction to soft skills, Familiarize oneself, Self-understanding, SWOT analysis, Goal Setting.	

UNIT – II INNOVATIVE THINKING	6
Divergent thinking, Encourage curiosity, Writing a story, Poster making.	

UNIT – III INTERPERSONAL SKILLS	6
Interpersonal skills - Need & Components – Understanding Intercultural Competence - Team Work-Problem Solving Skills - Conflict Management & Resolutions in Workplace, Leadership skills, Managerial skills.	

UNIT – IV BUSINESS ETIQUETTE	6
Define Etiquette -Types and Importance of Workplace Etiquette - Basic Corporate Etiquette - Telephone Etiquette - Meeting & E- mail Etiquette - Customer Service Etiquette.	

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UNIT – V CORPORATE SKILLS	6
Work Ethics- Adaptability-Analytical Reasoning- Lateral Thinking-Stress & Time Management.	
	Total Instructional hours : 30

Course Outcomes : Students will be able to	
CO1	Identify different personalities.
CO2	Show creative skill in different aspects.
CO3	Utilize leadership skills with ability to work in a team.
CO4	Analyze work place etiquette.
CO5	Develop adequate soft skills required for the workplace.

Reference Books	
1.	Butterfield, Jeff "Soft Skills for Everyone" Cengage Learning, New Delhi, 2015.
2.	S.Hariharanetal "Soft Skills" MJP Publishers: Chennai, 2010.
3.	Peter, Francis "Soft Skills and Professional Communication" New Delhi: Tata McGraw Hill. 2012. Print.
4.	Meenakshi Raman, Shalini Upadhyay, 'Soft Skills', Cengage Learning India Pvt. Ltd, Delhi, 2018.
5.	M.S.Rao, 'Soft Skills Enhancing Employability', I. K. International Publishing House Pvt. Ltd, New Delhi, 2010
6	Sabina Pillai, Agna Fernandez, 'Soft Skills and Employability Skills', Cambridge University Press, 2018.
7	John Peter.A, 'Self – Development and Professional Excellence', Cengage Learning India Pvt. Ltd, Delhi, 2019.

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Semester - III

B.Tech	B23EET202 - BASIC ELECTRICAL,ELECTRONICS AND INSTRUMENTATION ENGINEERING (Common to AI&DS and CSE(AIML))	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To Understand the electric circuit laws.
2.	To Understand the single and three phase circuits and wiring.
3.	To Understand the working principles of electrical machines.
4.	To Understand the working principle of various electronic devices.
5.	To Understand the working principle of measuring instruments.

UNIT-I	ELECTRICAL CIRCUITS	9

Basic circuit components -Ohms Law - Kirchoff's Law – Instantaneous Power – Inductors- Capacitors – Independent and Dependent Sources. Steady state solution of DC circuits - Nodal analysis, Mesh analysis. Theorem's-Thevinin's Theorem, Norton's Theorem, Maximum Power transfer theorem-Superposition Theorem.

UNIT-II	AC CIRCUITS	9

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads, Housing wiring, industrial wiring, materials of wiring.

UNIT-III	ELECTRICAL MACHINES	9

Construction and working of; DC machines, Transformers (single and three phase), Synchronous machines, three phase and single phase induction motors. **(Qualitative)**

UNIT-IV	ELECTRONIC DEVICES AND CIRCUITS	9

Types of Materials – Silicon & Germanium- N type and P type materials – PN Junction - Forward and Reverse Bias –Semiconductor Diodes. Bipolar Junction Transistor- Characteristics – Field Effect Transistors – Transistor Biasing. Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier. **(Qualitative)**

UNIT-V	MEASUREMENTS AND INSTRUMENTATION	9

Classification of instruments - Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters - three-phase power measurements – Transducers –Classification - LVDT, RTD and Thermistor.**(Qualitative)**

	Total Instructional hours:45

Course Outcomes:	
Students will be able to	
CO1	Apply basic circuit laws and theorems to analyze the given electrical circuits.
CO2	Interpret waveforms, RMS value, power and power factor in AC circuits.
CO3	Outline the basic construction of wiring and materials.
CO4	Explain the construction and operation of DC machines, transformers, induction motors and synchronous machines.
CO5	Explain the operation and characteristics of basic semiconductor devices.
CO6	Explain the construction and working principle of various measuring instruments and indicating instruments.

Text Books	
1.	Leonard S Bobrow, Foundations of Electrical Engineering, Oxford University Press, 2013.
2.	Kothari D P and Nagarath I.J,Electrical Machines —Basic Electrical and Electronics Engineering, McGraw Hill Education (India) Private Limited, Third Reprint, 2016.
3.	Sawhney A.K, DhanpatRai, 'A Course in Electrical & Electronic Measurements & Instrumentation', 2010.

Reference Books	
1.	N K De, DipuSarkar, Basic Electrical Engineering, Universities Press (India) Pvt. Ltd, 2016.
2.	Vincent Del Toro, Electrical Engineering Fundamentals, Pearson Education, Second Edition New Delhi, 2015.
3.	John Bird, Electrical Circuit Theory and Technology, Elsevier, Fifth Edition, 2014.
4.	Murthy D.V.S. 'Transducers and Instrumentation', Prentice Hall of India Pvt. Ltd, 2015.

BoS Chairman

B.E. / B.Tech	**B23MEP101 - ENGINEERING PRACTICES LABORATORY (GROUP - A & B)** (Common to all Branches)	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives

1.	Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work, sawing, planning, making joints in wood materials used in common household wood work.
2.	Welding various joints in steel plates using arc welding work; machining various simple processes like turning, drilling, tapping in parts; assembling simple mechanical assembly of common household equipments, making a tray out of metal sheet using sheet metal work.
3.	To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical Engineering.
4.	To provide exposure to the students with hands on experience on various basic Engineering practices in Electronics Engineering.

GROUP – A (CIVIL & MECHANICAL)	

I	**Civil Engineering Practices**	**12**

Plumbing Works Making basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings.

Carpentry Preparation of wooden joints by sawing, planning and cutting

1.	Planning & Polishing operation
2.	Half lap joint
3.	Cross lap joint

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II	Mechanical Engineering Practices	18

Welding Workshop

Study of welding tools and equipment's - Study of various welding methods - Instruction of BI standards and reading of welding drawings.

Exercise in arc welding for making

1.	Lap joint
2.	Butt joint
3.	Demonstration of gas welding and cutting.

Machine Shop

1.	Drilling and Tapping
2.	Lathe Exercise – Facing operation
3.	Lathe Exercise – Straight turning and Chamfering

Sheet metal

Making of small parts using sheet metal

1.	Making of Square Tray

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GROUP – B (ELECTRICAL & ELECTRONICS)	30

Expt. No.	Description of the Experiments
1.	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2.	Fluorescent lamp and Stair case wiring.
3.	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
4.	Measurement of energy using single phase energy meter.
5.	Measurement of resistance to earth of an electrical equipment.
6.	Study of Electronic components and equipment's – Resistor color coding
7.	Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
8.	Study of logic gates AND, OR, EX-OR and NOT.
9.	Soldering & desoldering practices.
10.	Study of Fan, Iron Box, Emergency Lamp, Telephone and FM Radio.
	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Explain the pipe connections and identify the various components used in plumbing.
CO2	Develop simple wooden joints using wood working tools and simple components using lathe and drilling machine.
CO3	Construct simple lap, butt and tee joints using arc welding equipment and simple parts using sheet metal.
CO4	Construct Residential house wiring, Fluorescent lamp wiring and Stair case wiring.
CO5	Measure electrical quantities such as voltage, current, power & power factor in RLC Circuit, resistance to earth, AC signal parameter (peak-peak, RMS period, frequency) and ripple factor.
CO6	Examine logic gates (AND, OR, EX-OR and NOT), Electronic components and equipment's.

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	LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS	
	GROUP – A (CIVIL & MECHANICAL)	
Sl. No.	**Description of Equipment**	**Quantity required**
1.	Assorted components for plumbing, Consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15
2.	Carpentry vice (fitted to work bench)	15
3.	Standard woodworking tools	15
4.	Models of industrial trusses, door joints, furniture joints	5
5.	Power Tools:	
	(a) Rotary Hammer	2
	(b) Demolition Hammer	2
	(c) Circular Saw	2
	(d) Planer	2
	(e) Hand Drilling Machine	2
	(f) Jigsaw	2
6.	Arc welding transformer with cables and holders	5
7.	Welding booth with exhaust facility	5
8.	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5
9.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2
10.	Centre lathe	2
11.	Hearth furnace, anvil and smithy tools	2
12.	Moulding table, foundry tools	2
13.	Power Tool: Angle Grinder	2
14.	Study-purpose items: Centrifugal pump, Airconditioner	1

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SI. No.	Description of Equipment	Quantity required
	GROUP – B (ELECTRICAL & ELECTRONICS)	
1.	Assorted Electrical Components for House Wiring	15 sets
2.	Electrical Measuring Instruments	10 sets
3.	Iron Box	1
4.	Fan and Regulator	1
5.	Emergency Lamp	1
6.	Megger	1
7.	Digital Live Wire Detector	2
8.	Soldering Guns	10
9.	Assorted Electronic Components for Making Circuits	50
10.	Multipurpose PCBs	10
11.	Multi Meters	10
12.	Telephone	2
13.	FM radio	2
14.	Regulated Power Supply	2
15.	CRO (30MHz)	2
16.	Bread board	10
17.	Digital IC types (IC 7432, IC 7408, IC 7400, IC 7404, IC 7402, IC 7486)	Each 10

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Semester - III

B.E. – CSE(AI&ML)	B23AMT301 - COMPUTER ORGANIZATION & ARCHITECTURE	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To present the Digital fundamentals, Boolean algebra and its applications in digital systems.

2. To familiarize with the design of various combinational digital circuits using logic gates.

3. To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits.

4. To learn the basic of pipelined execution.

5. To understand the memory hierarchies, cache memories and virtual memories.

UNIT- I   INTRODUCTION TO DIGITAL CIRCUITS   9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Min terms and Max terms, Karnaugh map Minimization and Quine-McCuskey method of minimization.

UNIT- II   COMBINATIONAL CIRCUITS   9

Design of Half and Full Adders, Half and Full Sub tractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

UNIT- III   COMPUTER ARCHITECTURE AND REGISTERS   9

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uni processors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.

UNIT- IV   PROCESSOR AND CONTROL UNIT   9

A Basic MIPS implementation - Building a Data path - Control Implementation Scheme -Pipelining - Pipelined data path and control - Handling Data Hazards & Control Hazards -Exceptions.

UNIT- V   MEMORY AND I/O ORGANIZATION   9

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory. Parallel Bus Architectures,

Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Infer the Boolean functions using KMap

CO2: Apply the various combinational digital circuits using logic gates.

CO3: Develop the basics of computers, operations and instructions with design of arithmetic and logic unit.

CO4: Identify pipelined execution and design control unit.

CO5: Examine the various memory systems and I/O communication.

Text Books:

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 5th Edition, Pearson, 2014.

2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

R

1. S. Salivahanan and S. Arivazhagan, "Digital Electronics", First Edition, Vikas Publishing House pvt Ltd2012.

2. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 2012.

BoS Chairman

B.E. – CSE(AI&ML)	B23AMT302 - DATA STRUCTURES AND ALGORITHMS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the basic concepts of linear data structures

2. To learn about non-linear data structures

3. To understand the graph structures.

4. To develop skills to apply appropriate sorting and searching techniques in problem solving.

5. To get exposure to the various algorithm design and analysis techniques.

UNIT- I   LINEAR STRUCTURES   9

List ADT: Implementation using arrays, linked list, cursor-based linked lists- Doubly-linked lists, applications of lists, Stack ADT: Concept and Applications- Queue ADT: Queue, Circular queue, Applications.

UNIT- II   NON-LINEAR DATA STRUCTURES   9

Tree ADT: Basics, Tree traversals, Binary Tree, expression trees, applications, binary search tree, Threaded Binary Tree- AVL trees, Binary Heaps, B-Tree, B+Tree.

UNIT- III   GRAPHS   9

Definitions – Topological sort – breadth-first traversal -shortest-path algorithms – minimum spanning tree. Prim's and Kruskal's algorithms – Depth-first traversal. Applications of graphs.

UNIT- IV   SORTING AND SEARCHING   9

Sorting: Insertion Sort – Shell Sort – Heap Sort – Merge Sort –Quick Sort – External Sorting
Search: Sequential Search, Binary Search, BFS and DFS, Hashing: Hash Function - Separate Chaining - Open addressing.

UNIT- V   ALGORITHM DESIGN AND ANALYSIS   9

Algorithm analysis - Algorithm specification, Recursion, Performance analysis, Asymptotic notations. The Big-O, Omega and Theta notation. Greedy algorithms – Divide and conquer - Dynamic programming. Backtracking – Branch and Bound.

                                          Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Build programs to implement linear data structures such as list, stack and queue

CO2: Apply the concept of non-linear data structure in real world scenarios.

CO3: Develop programs to implement graph to solve problems.

CO4: Choose the appropriate sorting ,searching algorithm for an application

CO5: Apply efficient algorithmic solution and data structures to real-world problems

Text Books:

1. E Horowitz and S Sahni, "Fundamentals of Data Structures", Second Edition, Galgotia Booksource,2010
2. 2.Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2010.

Reference Books:

1. R. F. Gilberg, B.A. Forouzan, "Data Structures: A Pseudocode approach with C", Second Edition,2009.
2. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson India, 2009.

BoS Chairman

B.E. – CSE(AI&ML)	B23AMT303 - Artificial Intelligence Foundations	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To understand the various characteristics of Intelligent agents
2. To learn various AI search algorithms
3. To understand the Logical Agents in AI
4. To learn the concept of planning in AI
5. To understand various AI Applications

UNIT- I   INTRODUCTION AND PROBLEM SOLVING   9

Introduction - Agents and Environments- Ethics of AI - Foundations of AI - Intelligent agent - Types of agents – Structure of Intelligent agents – Problem solving agents

UNIT- II   PROBLEM SOLVING METHODS   9

Introduction to Problem Solving by searching Methods-Uninformed search strategies-Uniform Cost Search, Breadth First Search- Depth First Search-Depthlimited search, Iterative deepening depth-first, Informed Search Methods- Best First Search, A* Search, Minimax Search, Alpha-Beta Pruning

UNIT- III   REPRESENTATION OF KNOWLEDGE   9

Basic Knowledge Representation and Reasoning: Propositional Logic- agents based on propositional logic- First-Order Logic - syntax and semantics-Forward Chaining and Backward Chaining - Introduction to Probabilistic Reasoning

UNIT- IV   PLANNING   9

Planning with state space search –Partial-order planning - Planning and acting in the real world- Acting under uncertainty - Bayes's rules - Semantics of Belief networks - Inference in Belief networks - Making simple decisions – Making complex decisions

UNIT- V   APPLICATIONS   9

AI Applications - Natural Language processing: Language Models - Information Retrieval - Natural language Communication: Machine Translation - Speech Recognition - Robotics: Robot hardware - Robotic Perception - planning – moving

Total Instructional hours: 45

Course Outcomes:

  Students will be able to

CO1: Illustrate fundamental concepts of artificial intelligence (AI), including its history and key problems.

CO2: Examine the key concepts of search algorithms and their application in AI problem-solving.

CO3: Develop agents capable of logical reasoning.

CO4: Apply Bayes rule to solve the problem logically.

CO5: Build applications for NLP that use Artificial Intelligence.

Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", Pearson Publishers, Fourth Edition, 2021.

Reference Books:

1. Amit Konar, "Artificial Intelligence and Soft Computing: Behavioural and Cognitive Modeling of the Human Brain", CRC Press, 2018.
2. Dan W Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning Pvt. Ltd., 2015.

BoS Chairman

B.E / CSE(AI&ML)	B23AMI301 OBJECT ORIENTED PROGRAMMING USING JAVA	T	P	TU	C
		2	4	0	4

Course Objectives:

1.To understand the basic concepts of java programming.

2.To learn about object and classes and its methods.

3.To understand the inheritance and polymorphism techniques to develop software applications.

4.To apply appropriate exception handling mechanism in problem solving.

5.To get exposure to the various I/O programming techniques.

UNIT-I   **INTRODUCTION TO JAVA**   **9**

Basics of JAVA programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Array in Java.

UNIT -II   **OBJECTS AND CLASSES**   **9**

Basics of objects and classes in java, constructor, Finalizer, Visibility modifiers, methods and objects, inbuilt classes like String, Character, String Buffer, File, this reference.

UNIT -III   **INHERITANCE AND POLYMORPHISM**   **9**

Inheritance in Java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in JAVA, package in JAVA, UTIL package.

UNIT -IV   **MULTITHREADING**   **9**

Thread life cycle and methods, runnable interface, thread synchronization, exception handling with try-catch, finally, collection in java.

UNIT - V   **I/O PROGRAMMING**   **9**

Text and Binary, Binary I/O classes, object I/O, random access files, Serialization and Deserialization concepts.

List of Experiments

Expt. No.	Description of the Experiments
1	Write a java program for recursive and non-recursive functions
2	Write a java program for matrix multiplication.
3	Write a java program for Method overloading and Constructor overloading
4	write a java program for looping concepts

5   Write a java program to display the employee details using Scanner class
6   Write a java program using String functions
7   a) Write a java program to represent Abstract class with example.
        b) Write a java program to implement Interface using extends keyword
8   a) Write a java program to create user defined package
        b) Write a java program to create inner classes
9   a) Write a java program for creating multiple catch blocks
        b) Write a java program for producer and consumer problem using Threads
10   Write a Java program that implements a multi-thread application that has three threads
11   a) Write a java program to display File class properties
        b) Write a java program to represent Array List class
        c)Write a Java program loads phone no, name from a text file using hash table
12   Write an applet program that displays a simple message
13   a) Write a Java program using Applet
        b) Write a program for passing parameters using Applet
14   Write a java program for Event handling
15   Write a java program that connects to a database using JDBC
16   a) Write a java program to connect to a database using JDBC and insert values into it
        b) Write a java program to connect to a database using JDBC and delete values from it
17   Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for
digits and for the + - * % operations. Add a text field to display the result

                                                    Total Instructional hours: 75

Course Outcomes:

Students will be able to

CO1: Make Use of the syntax and semantics of java programming language and basic concepts of
          OOP.

CO2: Apply object oriented concepts on real time scenarios.

CO3 : Develop Inheritance and polymorphism mechanisms to create efficient software applications.

CO4: Apply exception handling and multithreading techniques to create Java applications to solve real
          world problems.

CO5 : Experiment with Standard input-output operations.

Text Books:

    1. Herbert Scheldt, "Java the complete reference", 9th edition, McGraw Hill Education, 2014.

    2. T. Budd, "Understanding Object-Oriented Programming with Java", updated edition, Pearson

Education, 2000.

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Reference Books:

1. Daniel Liang, "Introduction to Java Programming", (Comprehensive Version), Seventh Edition,

Pearson,2009.

2. Sachin Malhotra & Saurabh Chaudhary, "Programming in Java", Oxford University Press,2014

3. Herbert Schild, "The Complete Reference", Java 2 (Fourth Edition), TMH,2017.

List of Equipment Required:

Requirements for a Batch of 30 Students

Sl. No.	Description of the Equipment	Quantity required (Nos.)
1.	Hp Pro 3090 Operating systems: Windows* 7 or later, macOS, and Linux. Java 11 and above, Tomcat Apache, Netbeans 8.X and above	30

BoS Chairman

B.E. – CSE(AI&ML)	B23AMP301 - DATA STRUCTURES AND ALGORITHMS LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To demonstrate array implementation of linear data structure algorithms.

2. To implement the applications using Stack

3. To implement Binary search tree and AVL tree algorithms.

4. To implement Dijkstra's and Prim's algorithm.

5. To understand various Sorting, Searching and Hashing algorithms.

List of Experiments

Expt.No.   **Description of the Experiments**

1. Array implementation of Stack, Queue and Circular Queue ADT.

2. Implementation of Singly Linked List.

3. Linked list implementation of Stack and Linear Queue ADT.

4. Implementation of Polynomial Manipulation using Linked list.

5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion.

6. Implementation of Binary Search Trees.

7. Implementation of AVL Trees.

8. Representation of Graph

    (a) Graph Traversal-Breadth First Traversal

    (b) Graph Traversal-Depth First Traversal

9. Implementation of Dijkstras &Prims Algorithm.

10. Implementation of Linear Search and Binary Search.

11. Implementation of Insertion Sort, Selection Sort and Merge Sort.

12. Implementation of Open Addressing (Linear Probing and Quadratic Probing).

                              Total Instructional hours: 45

BoS Chairman

Course Outcomes:

Students will be able to

CO1: Apply Linear data structure algorithms.

CO2: Develop applications using Stacks and Linked lists

CO3: Experiment with Binary Search tree and AVL tree operations.

CO4: Build and Implement graph algorithms.

CO5: Analyze the various Searching, Sorting and Hashing algorithms.

BoS Chairman

B.E	B23AMP302 - Artificial Intelligence Foundations Laboratory	T	P	TU	C
		0	4	0	2

Course Objectives:

Implement and evaluate AI Using Python Programming Languages.

List of Experiments:

Expt. No.	Description of the Experiments
1.	Implement depth first search
2.	Implement uniform cost search
3.	Build A* search algorithm
4.	Travelling Salesperson Problem using heuristic approach.
5.	Knowledge representation and inference – Predicate logic.
6.	Construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using a standard heart disease data set
7.	Reasoning with uncertainty – Fuzzy inference.
8.	Implementation of Tic Tac Toe problem
9.	Implement 8- puzzle problem.
10.	Designing a chat bot application

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1:: Implement uninformed and informed search techniques

CO2: Apply and analyze various problem solving techniques on Artificial Intelligent problems

CO3: Identify the given problem and design the rule based systems

CO4: Develop better understand to represent various real life problem domains using logic based techniques.

CO5: Analyze Understand, visualize and preprocess the data from a real-time source

BoS Chairman

B.E / B.TECH	B23MAT302 - DISCRETE MATHEMATICS (Common to CSE, AI&ML, AI&DS & CSBS)	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To extend student's logical and mathematical maturity and ability to deal with abstraction.
2.	To solve counting problems involving the Combinatorics.
3.	To understand the basic concepts of graph theory.
4.	To familiarize the applications of algebraic structures.
5.	To understand the concepts of lattices and boolean algebra.

UNIT – I LOGIC AND PROOFS	12
Propositional logic - Propositional equivalences - Predicates and quantifiers – Nested quantifiers - Rules of inference - Introduction to proofs - Proof methods and strategy.	

UNIT – II COMBINATORICS	12
Mathematical induction - Strong induction and well ordering - The basics of counting - Permutations and combinations - Generating functions - Inclusion and exclusion principle and its applications.	

UNIT – III GRAPHS	12
Graphs and graph models - Graph terminology and special types of graphs - Matrix representation of graphs and graph isomorphism - Euler and Hamilton Paths - Graph coloring.	

UNIT – IV ALGEBRAIC STRUCTURES	12
Algebraic systems - Groups - Subgroups - Homomorphisms - Normal subgroup and cosets - Lagrange's theorem - Definition and examples of rings and fields.	

UNIT – V LATTICES AND BOOLEAN ALGEBRA	12
Partial ordering - Posets - Lattices as posets - Properties of lattices - Lattices as algebraic systems - Sub lattices - Boolean algebra - Basic postulates of Boolean algebra.	

	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Construct the Propositional and Predicate Calculus.
CO2	Solve the Mathematical Induction and recurrence relation.

CO3	Make use of Graph models and special types of graphs.
CO4	Develop the concepts of groups.
CO5	Identify the Lattice and Boolean algebra.

Text Books
1.	Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
2.	Rosen, K.H., "Discrete Mathematics and its Applications", 8th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2018.
3.	Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", Prentice Hall of India, 2016.

Reference Books
1.	Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2007.
2.	Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

Approved by BoS Chairman

B.E.	B23CST303 - COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To study the concepts of data communications and functions of different layers of ISO/ OSI reference architecture
2.	To understand the error detection and correction methods and types of LAN
3.	To study the concepts of sub netting and routing mechanisms.
4.	To understand the different types of protocols and network components.
5.	To study and configure Switches and Routers..

UNIT - I	INTRODUCTION	9

Computer networks and distributed systems, Classification- Preliminaries of layered network structures. Data communication Components: Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media. LAN: Wired LAN, Wireless LAN, Virtual LAN. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT - II	DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER	9

Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back–N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT - III	NETWORK LAYER	9

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP– Delivery, Forwarding and Unicast Routing protocols.

UNIT - IV	TRANSPORT LAYER	9

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms.

UNIT - V	APPLICATION LAYER AND SECURITY	9

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching.

Approved by BoS Chairman

Total Instructional hours : 45

Course Outcomes: Students will be able to	
CO1	Summarize t he fundamentals of data communications and functions of layered architecture.
CO2	Interpret the error detection and correction methods and understand the different network technologies in Data link layer and MAC
CO3	Make use of protocols for various functions in the network.
CO4	Configure router and switches for efficient data transfer
CO5	Dissect application layer protocols and also use cryptography

Text Books	
1.	James F.Kurose & Keith W.Ross, "Computer Networking", 8th Edition, Pearson Education, 2022.
2.	William Stallings, "Data and Computer Communications", 10th Ed, Pearson Education, 2021.

Reference Books	
1.	Charlie Kaufman, Radia Perlman, Mike Speciner & Ray Perlner, "Network Security: Private Communication in a Public World" 3rd Edition, Pearson Education, 2022.
2.	W. Richard Stevens, "UNIX Network Programming, Vol. 1,2 & 3", Prentice-Hall of India, 2004.
3.	Douglas E. Comer and M.S. Narayanan, "Computer Networks and Internets", Pearson, 2008

CO Mapping with PO & PSO

CO/PO & PSO		PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K6)	PO6 (K3) (A3)	PO7 (K2) (A3)	PO8 (K3) (A3)	PO9 (A3)	PO10 (A3)	PO11 (K3) (A3)	PO12 (A3)	PSO1 (K4) (A3)	PSO2 (K3) (A3)
CO1	**K2**	2	2	1	-	-	-	-	-	-	-	-	1	2	1
CO2	**K2**	2	2	1	-	-	-	-	-	-	-	-	1	2	1
CO3	**K3**	3	3	1	-	-	-	-	-	-	-	-	1	3	2
CO4	**K4**	3	3	2	-	-	-	-	-	-	-	-	1	3	2
CO5	**K4**	3	3	2	-	-	-	-	-	-	-	-	1	3	2
Weighted Average		3	3	2	-	-	-	-	-	-	-	-	1	3	2

3 – Substantial   **2- Moderate**   **1- Low**   **'-' – No Correlation**

Approved by BoS Chairman

Semester - IV

B.E(CSE)-AI&ML	B23AMT401 - SOFTWARE ENGINEERING WITH AGILE METHODLOGY	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand Software Engineering Life cycle Models

2. To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.

3. To provide a good understanding of software design and a set of software technologies and APIs.

4. To understand the benefits and pitfalls of working in an Agile team.

5. To understand Agile development and testing.

UNIT I   SOFTWARE PROCESS   9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models.

UNIT II   AGILE METHODOLOGY   9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT III   AGILE PROCESSES   9

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT IV   AGILITY AND REQUIREMENTS ENGINEERING   9

Impact of Agile Processes in RE-Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT- V   AGILITY AND QUALITY ASSURANCE   9

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Identify the key activities in managing a software project.

CO2: Realize the importance of interacting with business stakeholders in determining the requirements for a software system

CO3:Perform iterative software development processes: how to plan them, how to execute them.

CO4: Perform Software process improvement as an ongoing task for development teams.

CO5: Show how agile approaches can be scaled up to the enterprise level.

Text Books:

1. Roger S. Pressman, ¯Software Engineering – A Practitioner‟s Approach‖, Seventh Edition, Mc Graw-Hill International Edition, 2010.

2. Hazza and Dubinsky, ¯Agile Software Engineering, Series: Undergraduate Topics in Computer Science‖, Springer, 2009.

Reference Books:

1. Rajib Mall, ¯Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.

2. Craig Larman, ¯Agile and Iterative Development: A Manager_s Guide‖, Addison-Wesley, 2004..

Kevin C. Desouza, ¯Agile Information Systems: Conceptualization, Construction, and Management‖, Butterworth-Heinemann, 2007.

BoS Chairman

B.E / B.TECH	B23MAT404 – PROBABILITY AND STATISTICS (Common to AGRI, AI&DS & AI&ML)	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To introduce the basic concepts of probability and random variables.
2.	To understand the basic concepts of two dimensional random variables.
3.	To acquaint the knowledge in testing of hypothesis for small and large samples with applications in real life problems.
4.	To provide the basic concepts for classifications of design of experiments.
5.	To expose to the basic concepts of classifications of design of experiments which apply in agriculture and statistical quality control.

UNIT I - ONE DIMENSIONAL RANDOM VARIABLES	12

Discrete and continuous random variables - Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II - TWO DIMENSIONAL RANDOM VARIABLES	12

Definition - Joint distributions - Marginal and conditional distributions - Covariance - Correlation and linear regression - Central limit theorem (for independent and identically distributed random variables - without proof).

UNIT III - TESTING OF HYPOTHESIS	12

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, Chisquare and F distributions for mean, variance - Contingency table (test for independent) - Goodness of fit.

UNIT IV - DESIGN OF EXPERIMENTS	12

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

UNIT V - STATISTICAL QUALITY CONTROL	12

Control charts for measurements ($\bar{X}$ and R charts) - Control charts for attributes (p, c and np charts) - Tolerance limits - Acceptance sampling.

	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Interpret the fundamental knowledge of the concepts of probability and standard distributions.
CO2	Develop the basic concepts of one and two dimensional random variables and apply in engineering applications.
CO3	Demonstrate a solid understanding of testing of hypothesis.
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
CO5	Develop the sampling distributions and statistical quality control techniques used in engineering and management problems.

Text Books	
1.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2020.
2.	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2009.

Reference Books	
1.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 9th Edition, 2016.
2.	Papoulis. A. and Unnikrishnapillai. S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2017.
3.	Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier, 2014.
4.	Iyengar. T. K. V, Krishna Gandhi. B, Ranganthan. S and Prasad. M.V.S.S.N "Probability and Statistics", S. Chand Publications, Edition, 2017.
5.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2013.

B.Tech	**B23ADT401 - OPERATING SYSTEMS FOUNDATIONS** **Common to AI&DS, CSE(AI&ML, CSBS)**	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To study the basic concepts and functions of operating system.
2. To learn about the processes, threads and scheduling algorithms.
3. To review the various memory management schemes with examples.
4. To understand the I/O management and file systems.
5. To interpret the basics of Linux system and perform administrative tasks on Linux servers

UNIT- I   OPERATING SYSTEM OVERVIEW   9

Computer System Overview - Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations-System Calls, System Programs, OS Generation and System Boot.

UNIT- II   PROCESS MANAGEMENT   9

Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling – Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization – The critical-section problem, Synchronization hardware, Semaphores, Critical regions, Monitors; Deadlock – System model, Methods for handling deadlocks.

UNIT- III   STORAGE MANAGEMENT   9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT- IV   FILE SYSTEM AND I/O SYSTEMS   9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management; File-System Interface – File concept, Access methods, File system mounting, File Sharing and Protection; File System Implementation- Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface.

UNIT- V   CASE STUDY   9

Linux System – Design Principles, Kernel Modules, Process Management, Scheduling,

Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Illustrate the operating system concepts and its functionalities.

CO2: Identify the issues in deadlock and apply various CPU scheduling algorithms.

CO3: Implement page replacement algorithms, memory management problems and segmentation

CO4: Apply various disk scheduling algorithms and disk management strategies.

CO5: Utilize the administrative tasks on Linux servers

Text Books:

1. Silberschatz and Galvin, "Operating System Concepts", Ninth Edition, John Wiley and Sons, 2012.

Reference Books:

1. William Stallings, "Operating Systems - Internals and Design Principles", 7th Edition, Prentice Hall,2011.

2. Stevens W R and Rago S A, "Advanced Programming in the Unix Environment", Second Edition, Addison-Wesley, 2013.

3. Bhatt, Pramod, Chandra P, "An Introduction to Operating System" Fifth Edition, PHI Learning Pvt Ltd, 2019.

4. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2009.

5. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.

BoS Chairman

B.Tech	B23ADT302 FOUNDATIONS OF DATA SCIENCE	T	P	TU	C
		3	0	0	3

Course Objectives

1. To introduce the basic concepts of Vector spaces in linear algebra.

2. To introduce the basic concepts of Data Science.

3. To understand the mathematical skills in statistics

4. To acquire the skills in data pre-processing steps.

5. To learn the concept of clustering approaches and to visualize the processed data using visualization techniques.

UNIT - I   VECTOR SPACES   9

Vector spaces and subspaces - Linear independence and dependence - Basis and Dimension - Null spaces, column spaces and Linear transformations - LU decomposition method - Singular Value Decomposition method.

UNIT- II   INTRODUCTION TO DATA SCIENCE
          9

Need for Data Science - Benefits and uses - Facets of data - Types of data- Organization of data- Data Science process- Data Science life cycle- Role of Data Science- Big Data - sources and characteristics of Big Data

UNIT- III   DESCRIBING DATA   9

Frequency distributions - Outliers - Relative frequency distributions - Cumulative frequency distributions - Frequency distributions for nominal data - Interpreting distributions - Graphs - Averages - Mode - Median - Mean - Averages for qualitative and ranked data - Describing variability Tentative- Range - Variance - Standard deviation - Degrees of freedom - Interquartile range - Variability for qualitative and ranked data

UNIT IV   DATA PREPROCESSING   9

Data pre-processing: Data cleaning - Data integration and Data transformation - Data Reduction - Data Discretization - Exploratory Data Analysis - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA - The Data Science Process

UNIT- V   CLUSTERING AND DATA VISUALIZATION
          9

Clustering: Choosing distance metrics - Different clustering approaches - Hierarchical and agglomerative clustering - k-means - Applications - Visual Analytics. -Visualization with Matplotlib - Line plots - Scatter plots - Visualizing errors - Density and contour plots- Histograms, Binnings and density - Three dimensional plotting.

Course Outcomes:

Students will be able to

CO1: Understand the concepts of Vector spaces

CO2: Summarize the data science basics and its life cycle.

CO3: Outline the relationship between data dependencies using statistics

CO4: Summarize the data pre-processing methods and implement the EDA

CO5: Build the visualization of data using the visualization tools.

Text Books:

1. David C. Lay, "Linear Algebra and its Applications", Pearson Education Asia, New Delhi, 5 th Edition, 2016.

2. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016.

3. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.

Reference Books:

1. Kreyzig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley and sons, 2011

2. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2017.

3. Mario Dobler and Tim Großmann, "The Data Visualization Workshop", O'Reilly Media, 2020.

4. Jake VanderPlas, "Python Data Science Handbook", O'Relly, 2017.

5. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk from The Frontline", O'Reilly, 2014.

BoS Chairman

B.E/ B.Tech	**B23ADI401 MACHINE LEARNING**	**L**	**T**	**P**	**C**
	Common to AI&DS, CSE(AI&ML)	**3**	**0**	**2**	**4**

Course Objectives:

1. To understand the basics concepts of machine learning.
2. To provide knowledge on supervised learning.
3. To learn the concepts of unsupervised learning.
4. To develop skills on neural networks.
5. To learn about the advanced trends in machine learning.

UNIT- I INTRODUCTION 9

Machine learning – Types – applications – preparing to model – Activities – Data – exploring structure of data – Data Quality and remediation – Data preprocessing – modeling and evaluation – selecting a model – Training a model – model representation and Interpretability – evaluating performance of a model – Improving performance

UNIT- II SUPERVISED LEARNING 9

Linear models for regression – Linear models for classification – Discriminant functions, probabilistic Generative models, probabilistic Discriminative models – Decision tree learning – Bayesian learning – Naïve Bayes – Ensemble methods, Bagging, Boosting.

UNIT- III UNSUPERVISED LEARNING 9

Clustering – Types – applications – partitioning methods – K-means algorithm – K-mediods – Hierarchical methods – Density based methods – DBSCAN – finding patterns – using association rules – Hidden Markov model

UNIT- IV NEURAL NETWORKS 9

Neural network representation – problems – perceptron's – multilayer networks and back propagation algorithms – Unit saturation – ReLU, hyperparameter tuning, batch normalization, regularization, dropout.

UNIT- V DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS 9

Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – t test, McNemar's

test, K-fold CV paired t test.

List of Experiments:

Expt. No.	Description of the Experiments
1.	Analysis the different types of discriminant function to perform machine learning classification
2.	Implement and demonstrate the working of the decision tree-based ID3 algorithm
3.	Build a Simple Support Vector Machines using a data set
4.	Implement sentiment analysis using random forest optimization algorithm
5.	Implement a k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions
6.	Construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using a standard heart disease data set
7.	Build an Artificial Neural Network by implementing the Single-layer Perceptron and test the same using appropriate data sets
8.	Build an Artificial Neural Network by implementing the Multi-layer Perceptron and test the same using appropriate data sets
9.	Implement two sample T-test
10.	Implement the Kfold cross validation test on cancer data set

Total Instructional hours: 75

Course Outcomes:

Students will be able to

CO1: Explain the basic concepts of machine learning.

CO2: Develop their skills on supervised learning

CO3: Develop unsupervised learning techniques

CO4: Apply the concept of neural networks.

CO5: Construct different validation models to evaluate the data sets.

Text Books:

1. Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", Pearson, 2019.

2. Mettusrinivas, G.Sucharitha and Anjana Matta, "Machine learning algorithms and applications", Cambridge University Press,1st Edition, Wiley, 2017.

Reference Books:

1. Ethem Alpaydin, "Introduction to Machine Learning, Adaptive Computation and Machine Learning Series", Third Edition, MIT Press, 2014.

2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall, CRC Press, Second Edition, 2014.

3. Anuradha Srinivasaraghava and Vincy Joseph, "Machine Learning", First Edition, Wiley, 2019.

4. Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

BoS Chairman

B.Tech	B23ADP301- DATA SCIENCE LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To understand the Python Programming packages like Numpy, Pandas and Matplotlib.

2. To prepare data for data analysis through understanding its distribution.

3. To understand and implement the Classification and Regression Model.

4. To learn the concept of Clustering model

5. To acquire knowledge in plotting using visualization tools.

List of Experiments:

Expt. No.	Description of the Experiments
1.	Working with Jupyter Notebook on fundamental Concepts.
2.	Computations using NumPy functions – Computation on Arrays, Aggregation, Indexing and Sorting.
3.	Data manipulations using Pandas – Handling of missing data and hierarchical indexing
4.	Case study to demonstrate Curve Fitting.
5.	Regression model for prediction
6.	Classification Model
7.	Find the outliers using plot.
8.	Plot the histogram, bar chart and pie chart on sample data
9.	Clustering model
10.	Data Visualization using Matplotlib – Implementation of 2D plotting and 3D plotting

Course Outcomes:

Students will be able to

CO1: Experiment with Jupyter Notebook, Pandas and Matplotlib for data analysis.
CO2: Apply statistical methods to hypotheses testing and inference problems.
CO3: Build a regression model to predict the data.
CO4: Make use of packages for classification and evaluate the performance of the classifier.
CO5: Apply different visualization techniques on various massive datasets

BoS Chairman

B.E	B23CST401- DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To understand the basic concepts of Database Management Systems.
2.	To know different normalization techniques
3.	To learn about the Structured Query Language (SQL)
4.	To provide knowledge in PL/SQL
5.	To provide knowledge of transaction, locks and recovery strategies of DBMS.

UNIT - I	INTRODUCTION TO DATABASE	9

Introduction: Overview of DBMS fundamentals -Databases and Database Users - Relational Databases - Advantages of Using the DBMS Approach; Database System Architecture – Data Models, Schemas, and Instances - Database Languages.

UNIT - II	DATA MODELING AND DATABASE DESIGN	9

Entity-Relationship model - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets and Structural Constraints - Functional dependencies - 2NF, 3NF, BCNF.

UNIT - III	UNDERSTANDING SQL	9

SQL Data Definition and Data Types - SQL – Constraints: Key and Referential Integrity Constraints - Basic Retrieval Queries in SQL- Joins –Sub queries –Nested subquery - Single row subquery – Multiple row sub query – Correlated sub query – Views.

UNIT - IV	ADVANCED SQL	9

Basics of PL/SQL variables – Constants – Procedures parameters – Procedures – Functions – Triggers – Embedded SQL – Kafka - Cassandra and Mongo DB - Case study for NOSQL databases.

UNIT - V	TRANSACTION PROCESSING	9

Transaction processing: Introduction – ACID Properties - Need for concurrency control – Desirable properties of transaction – Schedule and recoverability - Types of locks – Two phase locking – Deadlock – Timestamp based concurrency control – Recovery techniques.

Total Instructional hours : 45

Approved by BoS Chairman

Course Outcomes : Students will be able to	
CO1	Outline the basics of database management systems.
CO2	Develop the ER model to Relational model to perform database design effectively.
CO3	Apply various normalization techniques on database table.
CO4	Examine the SQL for DB creation and updation.
CO5	Classify transaction and locking protocols.

Text Books	
1.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2021.
2.	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 7th Edition, McGraw Hill, 2021.

CO Mapping with PO & PSO

CO/PO & PSO		PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K6)	PO6 (K3) (A3)	PO7 (K2) (A3)	PO8 (K3) (A3)	PO9 (A3)	PO10 (A3)	PO11 (K3) (A3)	PO12 (A3)	PSO1 (K4) (A3)	PSO2 (K3) (A3)
CO1	**K2**	3	2	1	-	-	-	-	-	-	-	-	1	2	1
CO2	**K3**	3	2	1	-	-	-	-	-	-	-	-	1	2	1
CO3	**K3**	3	3	1	-	-	-	-	-	-	-	-	2	3	2
CO4	**K4**	3	3	2	-	1	-	-	-	-	-	-	2	3	2
CO5	**K4**	3	3	2	-	1	-	-	-	-	-	-	2	3	2
Weighted Average		3	3	1	-	1	-	-	-	-	-	-	2	3	2

3 – Substantial   **2- Moderate**   **1- Low**   **'-' – No Correlation**

Approved by BoS Chairman