COURSE STRUCTURE AND SYLLABUS

For

B.Tech.

CSE (Artificial Intelligence & Machine Learning)

(for *2024-25 Admitted*)

Learning is Supreme Deity

PRAGATI ENGINEERING COLLEGE

(An Autonomous Institution)

ADB Road, Surampalem, Kakinada District, A.P.-533 437

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)

(Recognized by UGC under sections 2 (f) and 12 (b) of UGC act, 1956)

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE STRUCTURE

INDUCTION PROGRAMME

S.No.	Course Name	Category	L	T	P	Credits
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0	0	6	0
2	Career Counselling	MC	2	0	2	0
3	Orientation to all branches -- career options, tools, etc.	MC	3	0	0	0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2	0	3	0
5	Proficiency Modules & Productivity Tools	ES	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7	Remedial Training in Foundation Courses	MC	2	1	2	0
8	Human Values & Professional Ethics	MC	3	0	0	0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0
10	Concepts of Programming	ES	2	0	2	0

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

2024-2025 Admitted Batch
COURSE STRUCTURE
I YEAR – I SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BE101T	Communicative English	2	0	0	2
2	BS&H	24BM101T	Linear Algebra and Calculus	3	0	0	3
3	BS&H	24BC101T	Chemistry	3	0	0	3
4	Engineering Science	24CM101T	Basic Civil and Mechanical Engineering	3	0	0	3
5	Engineering Science	24CS101T	Introduction to Programming	3	0	0	3
6	Engineering Science	24ME102P	Engineering Workshop	0	0	3	1.5
7	BS&H	24BE101P	Communicative English Laboratory	0	0	2	1
8	Engineering Science	24CS101P	Computer Programming Laboratory	0	0	3	1.5
9	BS&H	24BC101P	Chemistry Laboratory	0	0	2	1
10	BS&H	24MH101P	Health and wellness, Yoga and sports	0	0	1	0.5
Total Credits							**19.5**

I YEAR– II SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BP201T	Engineering Physics	3	0	0	3
2	BS&H	24BM201T	Differential equations & Vector Calculus	3	0	0	3
3	BS&H	24EE201T	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	24ME201T	Engineering Graphics	2	0	2	3
5	Professional Core	24CS201T	Data Structures	3	0	0	3
6	Engineering Science	24BP201P	Engineering Physics Lab	0	0	2	1
7	BS&H	24EE201P	Electrical and Electronics Engineering Workshop	0	0	3	1.5
8	Professional Core	24CS201P	Data Structures Lab	0	0	3	1.5
9	BS&H	24IT201P	IT Workshop	0	0	2	1
10	BS&H	24MH202P	NSS/NCC/Scouts& Guides/Community Service	0	0	1	0.5
Total Credits							**20.5**

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II YEAR – I SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BM304T	Discrete Mathematics & Graph Theory	3	0	0	3
2	BS&H	24HM301T	Universal Human Values - Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	Engineering Science	24AI301T	Artificial Intelligence	3	0	0	3
4	Professional Core	24CS301T	Advanced Data Structures & Algorithms Analysis	3	0	0	3
5	Professional Core	24CS302T	Object-Oriented Programming Through JAVA	3	0	0	3
6	Professional Core	24CS301P	Advanced Data Structures and Algorithms Analysis Laboratory	0	0	3	1.5
7	Professional Core	24CS302P	Object-Oriented Programming Through JAVA Laboratory	0	0	3	1.5
8	Skill Enhancement course	24AI301S	Python programming	0	1	2	2
9	Audit Course	24BC301T	Environmental Science	2	0	0	-
Total Credits							**20**

II YEAR – II SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	Management Course- I	24ME405T	Optimization Techniques	2	0	0	2
2	Engineering Science/ Basic Science	24BM402T	Probability & Statistics	3	0	0	3
3	Professional Core	24AM401T	Machine Learning	3	0	0	3
4	Professional Core	24IT401T	Database Management Systems	3	0	0	3
5	Professional Core	24EC406T	Digital Logic and Computer Organization	3	0	0	3
6	Professional Core	24AI401T	AI & ML Laboratory	0	0	3	1.5
7	Professional Core	24IT401P	Database Management Systems Laboratory	0	0	3	1.5
8	Skill Enhancement course	24CS401S	Full Stack Development-1	0	1	2	2
9	BS&H	24HM401P	Design Thinking & Innovation	1	0	2	2
Total Credits							**21**
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
COMMUNICATIVE ENGLISH
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Humanities		**Course Code**	24BE101T
Course Type	Theory		**L-T-P-C**	2-0-0-2
Prerequisites	LSRW Skills.	**Continuous Internal Assessment**		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES	
1	The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students.
2	It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
3	This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.	K2
CO2	Apply grammatical structures to formulate sentences and correct word forms.	K3
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions.	K4
CO4	Evaluate reading/listening texts and to write summaries based on glob	K5
CO5	Create a coherent paragraph, essay, and resume.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT I
Lesson: HUMAN VALUES: Gift of Magi (Short Story)
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing: Mechanics of Writing- Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures- forming questions.
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II
Lesson: NATURE: The Brook by Alfred Tennyson (Poem)
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/ small groups on specific topics followed by short structure talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices – linkers, use of articles and zero article; Prepositions.
Vocabulary: Homonyms ,Homophones, Homographs.

UNIT III
Lesson: BIOGRAPHY: ElonMusk
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing.
Grammar: Verbs-tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary: Compound words, Collocations.

UNIT IV
Lesson: INSPIRATION: The Toys o f Peace by Saki
Listening : Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading : Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters, Resumes
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary : Words often confused, Jargons.

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(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

UNIT V
Lesson: MOTIVATION : The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts.
Reading: Reading comprehension.
Writing: Writing structured essays on specific topics.
Grammar: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Vocabulary : Technical Jargons.

TEXT BOOKS
1. Path finder: Communicative English for Undergraduate Students, 1ˢᵗ Edition, Orient Black Swan, 2023. (Units1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023(Units4 &5).

REFERENCE BOOKS
1. Dubey, ShamJi & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press,2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

WEB RESOURCES
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
LINEAR ALGEBRA AND CALCULUS
(Common to All Branches)

Course Category	Basic Sciences		Course Code	24BM101T
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	Matrix Algebra, Limits, Continuity, Differentiability and inerrability	Continuous Internal Assessment		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Developanduseofmatrixalgebratechniquesthatareneededbyengineersforpractical applications.	K3
CO2	Find the Eigen values and Eigen vectors and able to reduce the given quadratic form into canonical form by orthogonal transformation.	K3
CO3	Utilize mean value theorems to real life problems.	K3
CO4	Familiarize with functions of several variables which is useful in optimization & learn important tools of calculus in higher dimensions	K3
CO5	Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT
UNIT I - Matrices:
Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, **System of linear equations**: Solving system of Homogeneous linear equations and solving Non-Homo generous linear equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel Iteration Methods**.**

UNIT II - Eigen values, Eigenvectors and Orthogonal Transformation:
Eigen values, Eigenvectors and their properties, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Diagonalization of a matrix, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III - Calculus:
Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems. Taylor's and Maclaurin series.

UNIT IV - Partial differentiation and Applications (Multi variable calculus):
Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V - Multiple Integrals (Multi variable Calculus):
Double integrals, change of order of integration, triple integrals, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS
1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition.
5. Higher Engineering Mathematics, H. K Das, Er. RajnishVerma, S. Chand Publications,2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

WEB RESOURCES
1. https://en.wikipedia.org/wiki/System_of_linear_equations
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://www.math.hmc.edu/calculus/tutorials/eigenstuff/
4. https://en.wikipedia.org/wiki/Quadratic_form
5. https://en.wikipedia.org/wiki/Calculus
6. https://en.wikipedia.org/wiki/Partial_derivative
7. https://www.whitman.edu/mathematics/calculus_online/section14.03.html
8. https://en.wikipedia.org/wiki/Multiple_integral
9. http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Engineering Science		Course Code	24CM101T
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment		30
		Semester End Examination		70
		Total Marks		100

PART-A : BASIC CIVIL ENGINEERING

COURSE OBJECTIVES	
1	Get familiarized with the scope and importance of Civil Engineering sub-divisions
2	Introduce the preliminary concepts of surveying.
3	Acquire preliminary knowledge on Transportation and its importance in nation's economy.
4	Get familiarized with the importance of quality, conveyance and storage of water.
5	Introduction to basic civil engineering materials and construction techniques.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Enlist various basic characteristics and sub-divisions of Civil Engineering, pre-fabricated materials and technology to appreciate their role in ensuring better society.	K2
CO2	Illustrate the concepts of surveying and basics of Foundation Engineering.	K3
CO3	Know the significance of various domains in transportation engineering and be acquitted with types of pavements. Get an overview about Environmental Engineering and Water Resource Engineering.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	1
CO3	1	1	1	-	-	2	-	-	1	-	-	1

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT I
Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering-Structural Engineering- Geo-technical Engineering- Transportation Engineering -Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning-Construction Materials-Cement- Aggregate -Bricks-Stones-Sand-Cement Concrete-Steel-Timber. Introduction to Prefabricated construction Techniques.

UNIT II
Surveying : Objectives of Surveying- Horizontal Measurements- Angular MeasurementsIntroduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.
Foundations: Types of foundations — Bearing capacity and settlement — Requirement of good foundations.

UNIT III
Transportation Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.
Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

TEXT BOOKS
1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, SatheeshGopi, Pearson Publications, 2009, First Edition.

REFERENCE BOOKS
1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

WEB RESOURCES
1. https://nptel.ac.in/courses/105101087
2. https://nptel.ac.in/courses/105104101
3. https://nptel.ac.in/courses/105104103

PART – B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES	
1	Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2	Explain different engineering materials and different manufacturing processes.
3	Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand the different manufacturing processes.	K2
CO2	Explain the basics of thermal engineering and its applications.	K3
CO3	Describe the working of different mechanical power transmission systems, power plants and basics of robotics and its applications.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	2	-

COURSE CONTENT

UNIT –I -

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT - II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT - III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.

2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.

3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.

4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

Web References:

1. https://ocw.mit.edu/courses/2-000-how-and-why-machines-work-spring-2002/

2. https://ocw.mit.edu/courses/2-008-design-and-manufacturing-ii-spring-2004/

3. https://ocw.mit.edu/courses/2-12-introduction-to-robotics-fall-2005/

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
INTRODUCTIONTOPROGRAMMING
(Common to All Branches)

Course Category	Engineering Science		**Course Code**	24CS101T
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	30	
		Semester End Examination	70	
		Total Marks	100	

COURSEOBJECTIVES	
1	To introduce students to the fundamentals of computer programming.
2	To provide hands-on experience with coding and debugging.
3	To foster logical thinking and problem-solving skills using programming.
4	Tofamiliarizestudentswithprogrammingconceptssuchasdatatypes,control structures, functions and arrays.
5	To encourage collaborative e learning and team work in coding projects.

COURSEOUTCOMES		
Upon successful completion of the course, the student will be ableto :		**Cognitive Level**
CO1	Understand basics of computers, the concept of algorithm and algorithmic thinking.	K3
CO2	Analyze a problem and develop an algorithm to solve it.	K4
CO3	Implement various algorithms using the C programming language.	K5
CO4	Understand more advanced features of C language.	K3
CO5	Developproblem-solvingskillsandtheabilitytodebugandoptimizethecode.	K4

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

ContributionofCourseOutcomestowardsachievementofProgramOutcomes(1– Low, 2 -Medium, 3– High)												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	-	-
CO4	2	3	3	3	1	-	-	-	-	-	-	-
CO5	3	3	3	3	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT-I
Introduction to Programming and Problem Solving
History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operations, Type Conversion and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT-II
Control Structures
Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Programming Examples.

UNIT-III
Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Arrays Applications , Introduction to Strings, String input and output functions, String handling functions.

UNIT-IV
Pointers & User Defined Data types
Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT-V
Functions& File Handling
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Life time of Variables, Storage Classes, Basics of File Handling.
Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS
1. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall,2005, 2nd Edition
2. Schaum's Outline of Programming with C,Byron S Gottfried, McGraw-Hill Education,4th edition, 2018

REFERENCEBOOKS
1. Computing fundamentals and C Programming, Balaguruswamy,E., Mc Graw-Hill Education, 7th Edition, 2017
2. Programming in C, Rema Theraja, Oxford,2016,2nd edition
3. C Programming, A ProblemSolvingApproach,Forouzan,Gilberg,Prasad,CENGAGE,3rd edition, 2009

WEB RESOURCES
1. http://nptel.ac.in/courses/106104128/
2. http://students.iitk.ac.in/programmingclub/course/#notes
3. http://c-faq.com/~scs/cclass/cclass.html

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
ENGINEERING WORKSHOP
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Engineering Science	Course Code	24ME102P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES	

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1 Identify workshop tools and their operational capabilities.	K2
CO2 Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.	K3
CO3 Apply knowledge in preparation of pipe joints and practice of Plumbing tools.	K3
CO4 Apply basic electrical engineering knowledge for House Wiring Practice	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	1	3	-	-	-	-	3	-	-
CO2	3	-	3	1	3	-	-	-	-	3	-	-
CO3	3	-	3	1	3	-	-	-	-	3	-	-
CO4	3	-	3	1	3	-	-	-	-	3	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

1.**Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
Note: Minimum of 12 Experiments to be conducted from the above covering all the trades.

Textbooks:
1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, DhanpathRai& Co., 2015 & 2017.

Reference Books:
1. Elements of Workshop Technology, Vol. I by S. K. HajraChoudhury& Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. &Upadhyay P.A.; AtulPrakashan, 2021-22.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
COMMUNICATIVE ENGLISH LABORATORY
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Humanities	Course Code	24BE101P
Course Type	Laboratory	L-T-P-C	0-0-2-1
Prerequisites	LSRW Skills	Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning.
2	The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.	K2
CO2	Apply communication skills through various language learning activities.	K3
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.	K4
CO4	Evaluate and exhibit professionalism in participating in debates and group discussions.	K5
CO5	Able to present ideas effectively and manage interviews confidently.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT - I
Vowels & Consonants.
Neutralization/Accent Rules.

UNIT - II
Communication Skills & JAM.
Role Play or Conversational Practice.

UNIT - III
E-mail Writing.
Resume Writing, Cover letter, SOP.

UNIT - IV
Group Discussions-methods & practice.
Debates-Methods &Practice.

UNIT - V
PPT Presentations/ Poster Presentation.
Interviews Skills.

Laboratory Manual Lab Book
1. Strengthen Your Steps: A Multi-Model Course in Communication Skills published by Maruti Publications

REFERENCE BOOKS
1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw- Hill Education India,2016
3. Hewing's, Martin. Cambridge Academic English (B2).CUP,2012.
4. J.Sethi & P.V.Dhamija. A Course in Phonetics and Spoken English,(2ndEd),Kindle, 2013

WEB RESOURCES
Spoken English:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw
Voice & Accent:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA
Suggested Software:
1. Walden Infotech
2. Young India Films

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
COMPUTER PROGRAMMING LABORATORY
(Common to All Branches)

Course Category	Engineering Science		Course Code	24CS101P
Course Type	Laboratory		**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES

The course aims to give students hands–on experience and train the month e concepts of the C-programming language.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Read, understand, and trace the execution of programs written in C language.	K3
CO2	Select the right control structure for solving the problem.	K3
CO3	Develop C programs which utilize memory efficiently using programming Constructs like pointers.	K3
CO4	Develop, Debug and Execute programs to demonstrate the Applications of arrays, functions, basic concepts of pointer sin C.	K5

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low,2 -Medium, 3– High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

WEEK 1
Objective: Getting familiar with the programming environment on the computer and writing the first program.
Suggested Experiments/Activities:
Tutorial 1 : Problem-solving using Computers.
Lab1: Familiarization with programming environment
  i. Basic Linux environment and its editors likeVi,Vim & Emacsetc.
  ii. Exposure to Turbo C, gcc
  iii. Writing simple programs using printf(),scanf()

WEEK 2
Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.
Suggested Experiments/Activities:
Tutorial 2: Problem-solving using Algorithms and Flowcharts.
Lab 2: Converting algorithms /flowcharts into C Source code.
Developing the algorithms/flowcharts for the following sample programs
  i) Sum and average of 3numbers
  ii) Conversion of Fahrenheit to Celsius and vice versa
  iii) Simple interest calculation

WEEK 3
Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.
Suggested Experiments/Activities:
Tutorial 3: Variable types and type conversions:
Lab3: Simple computational problems using arithmetic expressions.
  i) Finding the square root of a given number
  ii) Finding compound interest
  iii) Area of a triangle using heron's formulae
  iv) Distance travelled by an object

WEEK4
Objective : Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.
Suggested Experiments/Activities:
Tutorial 4: Operators and the precedence and as associatively:
Lab 4: Simple computational problems using the operator' precedence and associatively
  i) Evaluate the following expressions.
    a. A+B*C+(D*E)+F*G
    b. A/B*C-B+A*D/3
    c. A+++B---A
    d. J=(i++)+(++i)
  ii) Find the maximum of three numbers using conditional operator
  iii) Takemarksof5subjectsinintegers, and find the total, average in float

WEEK5
Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".
Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.
  i) Write a C program to find them axandm in off our numbers using if-else.
  ii) Write a C program to generate electricity bill.
  iii) Find the roots of the quadratic equation.
  iv) Write a C program to simulate a calculator using switch case.
  v) Write a C program to find the given year is a leap year or not.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

WEEK6

Objective : Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterativeproblemse.g.,the sum of series

    i)   Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Computes in e and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers.

WEEK7

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-Dand more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-Darrays,explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7:1DArrays: searching.

Lab 7: 1D Array manipulation, linear search

    i)   Find the min and max of a1-D integer array.

    ii) Perform linear search on 1 D array.

    iii) There verse of a 1 D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

WEEK8

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab8: Matrix problems, String operations, Bubble sort

    i)   Addition of two matrices

    ii) Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v) Reverse a string using built-in and without built-in string functions

WEEK9

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & amp; value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

    i)   Write a C program to find the sum of a1Darrayusingmalloc()

    ii) Write a C program to find the total, average of n students using structures

    iii) Entern students data using calloc() and display failed students list

    iv) Readstudentnameandmarksfromthecommandlineanddisplaythestudentdetailsalongwith the total.

    v) Write a C program to implement realloc ()

WEEK10

Objective : Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists

Lab 10: Bit fields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

    i)   Create and display a singly linked list using self-referential structure.

    ii) Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bit fields.

    iv) Write a C program to copy one structure variable to another structure of the same type.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

WEEK 11
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration
Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent,
Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

      i) Write a C function to calculate NCR value.
      ii) Write a C function to find the length of a string.
      iii) Write a C function to transpose of a matrix.
      iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
Suggested Experiments/Activities:
Tutorial 12: Recursion, the structure of recursive calls
Lab12: Recursive functions

      i) Write a recursive function to generate Fibonacci series.
      ii) Write a recursive function to find the lcm of two numbers.
      iii) Write a recursive function to find the factorial of a number.
      iv) Write a C Program to implement Ackermann function using recursion.
      v) Write a recursive function to find the sum of series.

WEEK13
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers
Suggested Experiments/Activities:
Tutorial 13: Call by reference, dangling pointers
Lab 13: Simple functions using Call by reference, Dangling pointers.

      i) Write a C program to swap two numbers using call by reference.
      ii) Demonstrate Dangling pointer problem using a C program.
      iii) Write a C program to copy one string into another using pointer.
      iv) Write a C program to find no of lower case, uppercase, digits and other characters using pointers.

WEEK14
Objective : To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.
Suggested Experiments/Activities:
Tutorial 14: File handling
Lab 14: File operations

      i) Write a C program to write and read text into a file.
      ii) Write a C program to write and read text into a binary file usingf read() and f write()
      iii) Copy the contents of one file to another file.
      iv) Write a C program to merge two files into the third file using command-line arguments.
      v) Find no.of lines, words and characters in a file
      vi) Write a C program to print last n characters of a given file.

TEXT BOOKS
      1. Ajay Mittal, Programming in C: A practical approach, Pearson.
      2. Byron Gottfried, Schaum 's Outline of Programming with C, McGrawHill

REFERENCEBOOKS
      1. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Prentice-Hall of India
      2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

WEB RESOURCES
      1. https://www.researchgate.net/publication/322908864_C_Programming_Lab_Manual
      2. https://www.javatpoint.com/c-programs

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
CHEMISTRY LABORATORY
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Basic Sciences	Course Code	24BC102P
Course Type	Laboratory	L-T-P-C	0-0-2-1
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES
Verify the fundamental concepts with experiments.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Determine the cell constant and conductance of solutions.	K3
CO2	Prepare advanced polymer Bakelite materials.	K2
CO3	Estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of Nano particles	K3
CO4	Analyze the IR spectra of some organic compounds.	K4
CO5	Determine the concentration of different metal ions present in water by complex metric titrations.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3						2				
CO2	2	3	2					2				
CO3	2	3	3	2				2				
CO4	2	2	2	1				2				
CO5	2	2	2					2				

List of Experiments:
1. Determination of Hardness of a groundwater sample
2. Conduct metric titration of strong acid vs. strong base
3. Conduct metric titration of weak acid vs. strong base
4. Preparation of Nano particles. (Cu/Zn)
5. Determination of Vitamin-C
6. Estimation of $KMnO_4$ by using standard oxalic acid solution
7. Preparation of Phenol-formaldehyde resin (Bakelite)
8. Determination of total alkalinity of given sample of water
9. Wave length measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nano materials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

Reference:
"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publicationsby J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year I Semester
HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Humanities		Course Code	24MH101P
Course Type	Theory		**L-T-P-C**	0-0-1-0.5
Prerequisites			**Continuous Evaluation**	90
			Viva Voce	10
			Total Marks	100

COURSE OBJECTIVES
The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	UnderstandtheimportanceofyogaandsportsforPhysicalfitnessandsoundhealth.
CO2	Demonstrate an understanding of health-related fitness components.
CO3	Compare and contrast various activities that help enhance their health.
CO4	Assess current personal fitness levels.
CO5	Develop Positive Personality

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1		1				3
CO2						1	1					3
CO3						1						3
CO4						1						3
CO5						1		1				3

COURSE CONTENT

UNIT – I: Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:
i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT – II: Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asan as- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:
Yoga practices Asana, Kriya, Mudra, Bandha, Dhyana, SuryaNamaskar

UNIT – III: Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

Activities:
i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
Practicing general and specific warm up, aerobics
ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:
1. Gordon Edlin, Eric Golanty. Health and Wellness,14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company,1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks,2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics,Inc.2014

General Guidelines:
1. Institutes must assign slots in the Time table for the activities of Health/Sports/Yoga.
2. Institutes must provide field /facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
ENGINEERING PHYSICS
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Basic Sciences		Course Code	24BP201T
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	Intermediate Physics		Continuous Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization required to design instruments with higher resolution.
2	Impart the knowledge of Dielectric& Magnetic materials for engineering Applications.
3	Understand the basics of Semiconductors and their working mechanism for their utility in Engineering applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyzetheintensityvariationoflightduetopolarization,interferenceanddiffraction	K4
CO2	Familiarize with the basics of crystals and their structures.	K2
CO3	Applying the concepts of quantum mechanics for calculation of free quantum particle energies and phenomenon of electrical & thermal conductivities to sub microscopic particles	K3
CO4	Apply the basics of phenomenon related to dielectric materials and Magnetic Materials to study their dependence on temperature and frequency response.	K3
CO5	Understand the Band formation, electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	1	-	-	-	-	-	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	1

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT – I -WAVE OPTICS
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.
Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

UNIT - II - CRYSTALLOGRAPHY AND X-RAY DIFFRACTION
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.
X - ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT – III - DIELECTRIC AND MAGNETIC MATERIALS
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss
Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro&Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT – IV - QUANTUM MECHANICS AND FREE ELECTRON THEORY
Quantum Mechanics: Introduction-Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.
Free Electron Theory: Introduction-Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT - V - BAND THEORY OF SOLIDS & SEMICONDUCTOR PHYSICS
BAND THEORY OF SOLIDS
Bloch's Theorem (Qualitative) - Kronig Penny Model(Qualitative)-E vs K diagram-V vs K diagram, Effective mass of electron- Classification of Crystalline Solids-Concept of hole

SEMICONDUCTOR PHYSICS
Semiconductors: Introduction-Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

TEXT BOOKS
"A Text book of Engineering Physics" by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,
"Engineering Physics" by Tirupati Naidu &Veeranjaneyalu, V G S Publishers
"Engineering Physics" by P.K Palanisamy,Sci Tech Publication

REFERENCE BOOKS
Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition
Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited
"Engineering Physics" by M.R.Srinivasan, New Age international publishers.
"Solid State Physics" by SO Pilai., - New age International Publishers

WEB RESOURCES
Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html
Unit I:https://nptel.ac.in/courses/122/107/122107035/#
Unit II: https://nptel.ac.in/courses/113/104/113104014/
Unit III: https://nptel.ac.in/courses/113/104/113104090/
         https://youtu.be/DDLljK1ODeg
Unit IV :https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html
        https://nptel.ac.in/courses/115/101/115101107/
        https://nptel.ac.in/courses/115/105/115105122/
Unit V :https://www.electronics-tutorials.ws/diode/diode_1.html
        https://nptel.ac.in/courses/115/105/115105099/
        https://nptel.ac.in/courses/108/108/108108122/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches)

Course Category	Basic Sciences		Course Code	24BM201T
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Differentiation, Integration and Partial Differentiation. Differential Equations (Variable Separable)		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and multi variable calculus
2	To familiarize the students with the foundations of line, surface and volume integrals.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Solve the first order differential equations related to various engineering fields.	K3
CO2	Solve the higher order differential equations to various engineering fields.	K3
CO3	Identify solution methods for partial differential equations that model physical processes.	K3
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence.	K3
CO5	Estimate the work done against a field, circulation and flux using vector calculus.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester

COURSE CONTENT

UNIT I
Differential equations of first order and first degree:
Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. **Applications**: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II
Linear differential equations of higher order (Constant Coefficients):
Definitions, homogenous and non-homogenous differential equations, complimentary function, particular integral, general solution, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to   L-C-R Circuit problems and Simple Harmonic motion.

UNIT III
Partial Differential Equations:
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients

UNIT IV
Vector differentiation:
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient and applications, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V
Vector integration:
Line integral-circulation-work done by the force, Scalar potential, surface integral-flux, Green's theorem in a plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

TEXT BOOKS
1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS
1. Thomas Calculus, George B.Thomas, Maurice D.Weir and JoelHass, Pearson Publishers,2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG.Zill andWarrenS.Wright, Jones and Bartlett,2018.
3. Advanced Modern Engineering Mathematics,GlynJames, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5the Edition (9th reprint)
5. Higher Engineering Mathematics, B.V.Ramana,, McGraw HillEducation,2017
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

WEB RESOURCES
1. https://mathworld.wolfram.com/First-OrderOrdinaryDifferentialEquation.html
2. https://en.wikipedia.org/wiki/Differential_equation
3. https://en.wikipedia.org/wiki/Partial_differential_equation
4. https://en.wikipedia.org/wiki/Vector_calculus
5. https://en.wikipedia.org/wiki/Vector_calculus

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Engineering Science	Course Code	24EE201T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

PART-A:BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES

To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Know the fundamental laws, operating principles of motors, generators, MC and MI instruments	K2
CO2	Apply the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.	K3
CO3	Apply the mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	2	-	-	-	-	-	-
CO3	3	3	-	-	-	-	2	2	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT - I
DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.
AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT - II
Machines and Measuring Instruments
Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.
Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT – III
Energy Resources, Electricity Bill & Safety Measures
Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.
Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.
Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehta, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART-B :BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES	
1	To impart knowledge on semiconductor devices.
2	To introduce concepts of biasing and applications of diodes and transistors.
3	To introduce fundamentals of digital electronics.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the basic concepts of diodes and transistors	K2
CO2	Understand the working principles of semiconductor devices and applications	K2
CO3	Understand number system, Boolean algebra, basics of combinational and sequential circuits	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	2										
CO3	2	2										

COURSE CONTENT

UNIT – I - SEMICONDUCTORDEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT -II - BASICELECTRONICCIRCUITSANDINSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Block diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT – III - DIGITAL ELECTRONICS

Overview of Number Systems, BCD codes, Functionality of Logic Gates– NOT,OR,AND,NOR,NAND,XOR and XNOR. Excess-3code, Graycode, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Textbooks:
1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation,2021.
2. Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001
Reference Books:
1. R.S.Sedha, A Text book of Electronic Devices and Circuits, S.Chand&Co,2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.
Web References:
1. NPTEL- https://archive.nptel.ac.in/courses/108/108/108108122/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

2. Neso Academy- https://www.nesoacademy.org/ec/05-digital-electronics

I Year II Semester
ENGINEERING GRAPHICS
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

Course Category	Engineering Science		Course Code	24ME201T
Course Type	Theory		**L-T-P-C**	1-0-4-3
Prerequisites		**Continuous Internal Assessment**	30	
		Semester End Examination	70	
		Total Marks	100	

COURSE OBJECTIVES	
1	To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2	To impart knowledge on the projection of points, lines and plane surfaces.
3	To improve the visualization skills for better understanding of projection of solids.
4	To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.	K2
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.	K3
CO3	Understand and draw projection of solids in various positions in first quadrant.	K3
CO4	Explain principles behind development of surfaces.	K2
CO5	Prepare isometric and perspective sections of simple solids.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	1	-
CO2	3	2	2	-	-	-	-	-	-	-	1	-
CO3	3	2	2	-	-	-	-	-	-	-	1	-
CO4	3	2	2	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	3	-	-	-	-	-	1	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT - I
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.
Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.
Scales: Plain scales, diagonal scales and vernier scales.

UNIT - II
Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes
Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT - III
Projections of Solids: Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT - IV
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT - V
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

Textbook:
1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:
1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill, 2017.

Web References:
1. http://nptel.ac.in/courses/112103019/
2. https://www.cadtutor.net/tutorials/autocad/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
DATA STRUCTURES
(Common to CSE, IT, CSE (AIML), CSE(AI), CSE(DS) and CSE(CS))

Course Category	Professional Core		Course Code	24CS201T
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	30	
		Semester End Examination	70	
		Total Marks	100	

COURSE OBJECTIVES	
1	To provide the knowledge of basic data structures and their implementations.
2	To understand importance of data structures in context of writing efficient programs.
3	To develop skills to apply appropriate data structures in problem solving.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	K2
CO2	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation	K5
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	K3
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges	K3
CO5	Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees,Graphs	K5

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2	1	1	-	-	-	-	-	-
CO2	2	3	1	1	1	-	-	-	-	-	-	-
CO3	2	3	1	2	1	-	-	-	-	-	-	-
CO4	2	3	1	1	1	-	-	-	-	-	-	-
CO5	3	3	1	1	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT - I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract

data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Quick and Merge sort.

UNIT - II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT - III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT - IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT - V

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Graphs: Introduction, Graph Representation, Traversal techniques

TEXT BOOKS

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.2020
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed, SiliconPress, 2ndEdition ,2014

REFERENCE BOOKS

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders.
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft.
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum.
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, andClifford Stein. 3rd Edition 2009
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and GraphAlgorithms" by Robert Sedge wick.

WEB RESOURCES

1. https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
2. https://www.geeksforgeeks.org/data-structures/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

Course Category	Engineering Science	Course Code	24EE201P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

PART-A: ELECTRICAL ENGINEERING WORKSHOP

COURSE OBJECTIVES

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Know the Electrical circuit design concepts; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.	K2
CO2	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.	K3
CO3	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.	K3
CO4	Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.	K4
CO5	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	1	-	-	-	1	-	-	-
CO2	2	2	2	-	1	-	-	-	1	-	-	-
CO3	2	2	-	-	1	-	-	-	1	-	-	-
CO4	2	2	-	-	1	-	-	-	1	-	-	-
CO5	-	-	-	-	1	1	1	-	1	-	-	-

List of experiments:
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Measurement of Three- phase power in Three-phase induction motor using two wattmeter method
5. Speed control of DC shunt motor
6. Measurement of Power and Power factor using Single-phase wattmeter
7. Measurement of Earth Resistance using Megger
8. Calculation of Electrical Energy for Domestic Premises

Reference Books:
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
Note: Minimum Six Experiments to be performed.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

PART B: ELECTRONICS ENGINEERING LABORATORY

COURSE OBJECTIVES
Toimpartknowledgeontheprinciplesofdigitalelectronicsandfundamentalsofelectrondevices& its applications.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO6	Identify & testing of various electronic components.	K3
CO7	Understand the usage of electronic measuring instruments.	K3
CO8	Plot and discuss the characteristics of various electron devices.	K3
CO9	Explain the operation of a digital circuit.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO6	2	2		2	2							
CO7	2	2		2	2							
CO8	2	2		2	2							
CO9	2	2		2	2							

List of experiments:
1. Introduction to Active and Passive devices must be experiment-1 (includes Resistors, Capacitors, Inductors, Diodes, Transistors, Power supplies, Ammeter(s), Voltmeter(s), necessary devices)
2. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3. Plot V– I characteristics of Zener Diode and its application as voltage Regulator.
4. Determine ripple factor of full wave rectifier.
5. Plot Input & Output characteristics of BJT in CE and CB configurations.
6. Determining CE Amplifier input and output impedance with and without bypass capacitor.
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R,J-K & D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Mult imeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices. Multi sim /PSPICE software for Simulation.

References:
1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation, 2021.
2. R.P.Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill,2009
3. R.T.Paynter,IntroductoryElectronicDevices&Circuits– ConventionalFlowVersion,PearsonEducation,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
DATA STRUCTURES LABORATORY
(Common to CSE, IT, CSE(AIML), CSE(AI), CSE(DS) and CSE(CS))

Course Category	Professional Core	Course Code	24CS201P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES
The course aims to strengthen the ability of the students to identify and apply the suitable datastructure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	K3
CO2	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	K3
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	K3
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.	K3
CO5	Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	-	-	-	-	-
CO2	2	3	1	2	1	-	-	-	-	-	-	-
CO3	2	3	1	1	1	-	-	-	-	-	-	-
CO4	3	3	2	2	1	-	-	-	-	-	-	-
CO5	2	3	1	2	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

Exercise 1: Array Manipulation
i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation
i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations
i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations
i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications
i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree
i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing
i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

TEXT BOOKS
1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.

Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed, Silicon Press, 2008

REFERENCE BOOKS
1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and PeterSanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E.Hopcroft

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
IT WORKSHOP
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Engineering Science	Course Code	24IT201P
Course Type	Laboratory	L-T-P-C	0-0-2-1
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning.
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Perform Hardware trouble shooting.	K3
CO2	Understand Hardware components and inter dependencies.	K3
CO3	Safe guard computer systems from viruses/worms.	K3
CO4	Document/ Presentation preparation.	K3
CO5	Perform calculations using spreadsheets.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	1	-	-	-	-	-	-	-
CO2	3	3	-	-	1	-	-	-	-	-	-	-
CO3	2	2	-	-	2	2	1	2	-	-	-	-
CO4	1	-	-	-	3	1	-	-	-	2	-	-
CO5	2	-	-	-	3	1	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

PC Hardware & Software Installation
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows, Linux / BOSS on the personal computer. This computer should have windows installed. The system should be configured as dual boot (VM Ware) with both Windows and Linux / BOSS Lab instructor should verify the installation and follow it up with a Viva.

Internet & World Wide Web
Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, book marks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task3: Search Engines & Net iquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block popup, lock active x downloads to avoid viruses and/or worms.

WORD
Task 1: Word Orientation: The mentor needs to give an overview of Microsoft (MS) office or equivalent (FOSS) tool word : Importance of MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using word–Accessing, over view of tool bars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Foot note, Hyperlink, Symbols, Spell Check, Track Changes.

Task4: Creating a Newsletter: Features to be covered:-Table of Content, News paper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

EXCEL
Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of tool bars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

POWERPOINT
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power Point.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting– Back ground, textures, Design Templates, Hidden slides.

AI TOOLS –ChatGPT
Task1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.
- Ex: Prompt: "You are acknowledgeable AI. Please answer the following question: What is the capital of France?"

Task2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas
- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.
- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Reference Books:
1. Comdex Information Technology course toolkit, Vikas Gupta, WILEY Dreamtech,2--3.
2. The Complete Computer upgrade and repair book, Chery lAS chmidt, WILEY Dreamtech, 2-13, 3rd edition.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2-12, 2nd edition.
4. PC Hardware- A Handbook, Kate J.Chase, PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education,3rd edition.
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

Web References:
1. PC Hardware & Software Installation: Peripheral Devices: Computer Peripherals - Wikipedia
   Components in a CPU: CPU Components and Their Functions - Guru99
2. Internet & World Wide Web: TCP/IP and Networking Basics: TCP/IP Explained - Lifewire
   Internet Browsing and Configuration: How Web Browsing Works - HowStuffWorks
3. Word: Microsoft Word Tutorials: Microsoft Word Basics - GCFGlobal
4. Excel: Excel Tutorial and Functions: Excel Tutorial - Microsoft
5. AI Tools - ChatGPT: GPT-3.5 and ChatGPT Information: GPT-3.5 Guide - OpenAI

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

I Year II Semester
NSS / NCC / SCOUTS AND GUIDES / COMMUNITY SERVICE
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

Course Category	Humanities		Course Code	24MH202P
Course Type	Theory		L-T-P-C	0-0-1-0.5
Prerequisites			Continuous Evaluation	90
			Viva Voce	10
			Total Marks	100

COURSE OBJECTIVES

Theobjectiveofintroducingthiscourseistoimpartdiscipline,character,fraternity,teamwork, socialconsciousnessamongthestudentsandengagingtheminselflessservice.

COURSE OUTCOMES

	Upon successful completion of the course, the student will be able to:	
CO1	Understand the importance of discipline, character and service motto.	
CO2	Solvesomesocietalissuesbyapplyingacquiredknowledge,facts,andtechniques.	
CO3	Explore human relationships by analyzing social problems.	
CO4	Determine to extend their help for the fellow beings and downtrodden people.	
CO5	Develop leadership skills and civic responsibilities.	

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3		1	1			3
CO2						3		1				3
CO3						3			1	1		3
CO4						3		1				3
CO5						3	3	1	1	1		3

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT – I - Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.
Activities:
  i) Conducting ice breaking sessions-expectations from the course-knowing personal talents and skills
  ii) Conducting orientations programs for the students future plans-activities-releasing road map etc.
  iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
  iv) Conductingtalentshowinsingingpatrioticsongs-paintings-anyothercontribution.

UNIT – II - Nature &Care

Activities:
  i) Best out of waste competition.
  ii) Poster and signs making competition to spread environmental awareness.
  iii) Recycling and environmental pollution article writing competition.
  iv) Organising Zero-waste day.
  v) Digital Environmental awareness activity via various social media platforms.
  vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
  vii) Write a summary on any book related to environmental issues.

UNIT – III - Community Service

Activities:
  i) Conducting One Day Special Camp in a village contacting village- are a leaders-Survey in the village, identification of problems-helping them to solve via media-authorities- experts-etc.
  ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
  iii) Conducting consumer Awareness. Explaining various legal provisions etc.
  iv) Women Empowerment Programmes-Sexual Abuse, Adolescent Health and Population Education.
  v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:
  1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
  2. Red Book - National Cadet Corps Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defense, NewDelhi
  3. Davis M. L. and cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
  4. Masters G. M. Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
  5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:
  1. Institutes must assign slots in the Timetable for the activities.
  2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:
  • Evaluated for a total of 100 marks.
  • A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.Eachactivityshallbeevaluatedbytheconcernedteacherfor15marks, totaling to 90marks.
  • Astudentshallbeevaluatedbytheconcernedteacherfor10marksbyconductingviva voce on the subject.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Discrete Mathematics and Graph Theory
(Common to CSE, CSE-AI&ML, CSE-AI, CSE-DS, CSE-CS and IT)

Course Category	Basic Sciences		Course Code	24BM304T
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	Mathematical Logic, Set Theory.	Continuous Internal Assessment		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES	
1	To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning
2	To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Apply mathematical logic to solve problems	K3
CO2	Understand the concepts and perform the operations related to sets, relations and functions.	K3
CO3	Apply basic counting techniques to solve combinatorial problems and recurrence relations	K3
CO4	Apply Graph Theory in solving computer science problems	K3
CO5	Apply different theorems and algorithms to find BFS and DFS of spanning trees	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I- Mathematical Logic:

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT II - Set Theory:

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

UNIT III -Combinatorics and Recurrence Relations:

Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.

Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving In homogeneous Recurrence Relations

UNIT IV - Graph Theory:

Basic Concepts, Graph Theory and its Applications, Sub graphs, Graph Representations : Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,

UNIT V - Multi Graphs:

Multi graphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

TEXT BOOKS

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and P.Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics – A Computer Oriented Approach, C.L.Liu and D.P.Mohapatra, 3rd Edition,Tata McGraw Hill.
3. Mathematical Foundations of Computer Science, Dr. D.S.C, Prism Books Pvt Ltd.

REFERENCE BOOKS

1. Discrete Mathematics for Computer Scientists and Mathematicians, J.L.Mott, A.Kandel and T.P.Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C.Busby and Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S.K.Chakraborthy and B.K.Sarkar ,Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K.H.Rosen,7th Edition,Tata McGraw Hill.
5. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.

WEB RESOURCES

6. https://onlinecourses.nptel.ac.in/noc24_ma42/preview
7. https://en.wikipedia.org/wiki/Set_theory
8. https://www.geeksforgeeks.org/discrete-mathematics-types-of-recurrence-relations-set-2/
9. https://nptel.ac.in/courses/111106102
10. https://en.wikipedia.org/wiki/Multigraph

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY
and ETHICAL HUMAN CONDUCT
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and
CSE(CYBER SECURITY)

Course Category	HSMC		Course Code	24HM301T
Course Type	Theory		**L-T-P-C**	2-1-0-3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Blooms Taxonomy Level**
CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession	K1
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
CO3	Understand the role of a human being in ensuring harmony in Family And Society.	K1
CO4	Appraise the role of a human being in ensuring harmony in Nature/Existence.	K2
CO5	Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						3						
CO2						3			3	3		3
CO3						3		2				3
CO4						3	3					
CO5						3		3				

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT – I Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.
Practice Sessions: PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

UNIT – II Harmony in Human Being: Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health
Practice Sessions: PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

UNIT – III Harmony in the Family and Society: Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.
Practice Sessions: PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect,
PS9 Exploring Systems to fulfil Human Goal

UNIT – IV Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence
Practice Sessions: PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.
Practice Sessions: PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

Text books and Teachers Manual
1. A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 - R R Gaur, R Asthana, G P Bagaria
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 - R R Gaur, R Asthana, G P Bagaria

Reference Books
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

Web References:
1. https://fdp-si.aicte-india.org
2. https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Artificial Intelligence
Common to CSE (AI) and CSE (AI&ML)

Course Category	Engineering Science	Course Code	24AI301T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	**30**
		Semester End Examination	**70**
		Total Marks	**100**

	COURSE OBJECTIVES
1	The student should be made to study the concepts of Artificial Intelligence.
2	The student should be made to learn the methods of solving problems using Artificial Intelligence.
3	The student should be made to introduce the concepts of Expert Systems.
4	To understand the applications of AI, namely game playing, theorem proving, and machine learning.
5	To learn different knowledge representation techniques

	COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to :		**Cognitive Level**
CO1	Enumerate the history and foundations of Artificial Intelligence	K1
CO2	Apply the basic principles of AI in problem solving	K3
CO3	Choose the appropriate representation of Knowledge	K4
CO4	Solve the problems with uncertainty using probability	K4
CO5	Examine the Scope of AI and its societal implications	K5

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1-	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	-	-	-	-	-	-	-	-	2	2
CO2	1	2	3	3	3	-	-	-	-	-	-	-	1	2	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	3
CO4	1	2	3	3	3	-	-	-	-	-	-	-	2	3	-
CO5	1	2	3	3	3	-	-	-	-	-	-	-	2	2	3

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT I
Introduction: AI problems, foundation of AI, AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.
Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction,

UNIT II
Adversarial Search: Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.
Constraint Satisfaction Problems: Definition, Constraint Propagation, Search for CSPs.

UNIT III
Representation of Knowledge: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Bayes' probabilistic interferences and dempstershafer theory.

UNIT IV
Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Statistical Learning methods, Reinforcement Learning.

UNIT V
Statistical Learning Methods: Statistical Learning, Learning with Complete Data, Learning with Hidden Variables: The EM Algorithm.
Expert Systems: Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.

TEXTBOOKS
1.S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education.
2.Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill

REFERENCE BOOKS
1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logical approach", Oxford University Press
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning.

WEB RESOURCES
1. https://ai.google/
2. https://swayam.gov.in/nd1_noc19_me71/preview

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Advanced Data Structures & Algorithm Analysis
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)

Course Category	Professional Core	Course Code	24CS301T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
	The main objectives of the course is to
1	Provide knowledge on advance data structures frequently used in Computer Science domain
2	Develop skills in algorithm design techniques popularly used
3	Understand the use of various data structures in the algorithm design

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyze algorithms for Height balanced trees such as AVL trees, B-Trees	K1
CO2	Analyze algorithms for Priority queues, Graph Traversals, Sortings	K2
CO3	List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method	K3
CO4	Analyze design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches	K4
CO5	Demonstrate NP-Hard and NP-Complete problems, Cook's theorem	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution Of Course Outcomes Towards Achievement Of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-
CO5	3	3	3	3	1	-	-	-	-	-	-	-

COURSE CONTENT

UNIT – I:
Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications

UNIT – II:
Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications
Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT – III:
Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT – IV:
Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

UNIT – V:
NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP) NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

Textbooks:
1. Fundamentals of Data Structures in C++, Ellis Horowitz; Sartaj Sahni; Dinesh Mehta 2nd Edition, ISBN: 9788173716065 ,Year: 2008, Universities Press.
2. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, 2nd Edition ISBN:9788173716119, University Press.

Reference Books:
1. Data Structures and program design in C, Robert Kruse, Pearson Education, Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill,2nd Edition, Published on 1 July 2017.
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 31 August 2019 First Edition.
5. Algorithms + Data Structures & Programs:, N.Wirth, PHI, January 1988
6. Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub, January 2008
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

Online Learning Resources:
1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. Abdul Bari,Introduction to Algorithms (youtube.com)

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Object Oriented Programming Through Java
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)

Course Category	Professional Core	Course Code	24CS302T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
The learning objectives of this course are to:	
1	Identify Java language components and how they work together in applications
2	Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3	Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4	Understand how to design applications with threads in Java
5	Understand how to use Java APIs for program development

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Apply the fundamentals of Java to solve problems	K3
CO2	Differentiate the application of decision and iteration control structures	K2
CO3	Implement classes and method overloading concepts	K3
CO4	Apply the concepts of inheritance and packages	K3
CO5	Implement Java programs using exceptions and multithreading	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	3	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators,

Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java. Time .Instant),

Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throw able, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

UNIT V
String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.
Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. **Java Database Connectivity:** Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface
Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

Text Books:
1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2) Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:
1) The complete Reference Java, 11thedition, Herbert Schildt,TMH
2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:
1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01288046454761881 6347_shared/overview

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Advanced Data Structures & Algorithm Analysis Laboratory
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (Cyber Security), IT)

Course Category	Professional Core		Course Code	24CS301P
Course Type	Laboratory		**L-T-P-C**	0-0-3-1.5
Prerequisites			**Continuous Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
The objectives of the course is to	
1	Acquire practical skills in constructing and managing Data structures
2	Apply the popular algorithm design methods in problem-solving scenarios

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Describe, implement, analyze, and apply data structures such as self-balancing trees and heaps	K3
CO2	Implement graph traversal algorithms	K3
CO3	Apply Greedy, divide and conquer algorithms.	K3
CO4	Identify and apply strategies such as brute force, greedy, back tracking, divide and conquer, and dynamic programming in algorithm analysis and design	K5

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

Experiments covering the Topics:
- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

Sample Programs:
1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix   b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books:
1. Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

Online Learning Resources:
1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Object Oriented Programming Through Java Laboratory
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (DS), CSE (Cyber Security), IT)

Course Category	Professional Core	Course Code	24CS3029
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
The aim of this course is to	
1	Practice object oriented programming in the Java programming language
2	Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
3	Illustrate inheritance, Exception handling mechanism, JDBC connectivity
4	Construct Threads, Event Handling, implement packages, Java FX GUI

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Implement object oriented concepts using Java	K3
CO2	Apply the concepts of inheritance and packages.	K3
CO3	Implement Java programs using exceptions and multithreading.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

Experiments covering the Topics:
- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Experiments:
Exercise – 1:
a) Write a JAVA program to display default value of all primitive data type of JAVA
b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2
a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
c) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3
   a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
b) Write a JAVA program implement method overloading.
c) Write a JAVA program to implement constructor.
d) Write a JAVA program to implement constructor overloading.

Exercise - 4
a) Write a JAVA program to implement Single Inheritance
b) Write a JAVA program to implement multi level Inheritance
c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5
a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6
a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses
c) Write a JAVA program for creation of Java Built-in Exceptions
d) Write a JAVA program for creation of User Defined Exception

Exercise - 7
a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable)
b) Write a program illustrating **is Alive** and **join ()**
c) Write a Program illustrating Daemon Threads.
d) Write a JAVA program Producer Consumer Problem

Exercise – 8
a) Write a JAVA program that import and use the user defined packages
b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise – 9
a) Write a java program that connects to a database using JDBC
b)Write a java program to connect to a database using JDBC and insert values into it.
c) Write a java program to connect to a database using JDBC and delete values from it

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Python Programming
Common to CSE,IT, CSE (AI&ML),CSE (AI), CSE (DS),CSE(Cyber Security)

Course Category	Skill Enhanced Course	**Course Code**	24AI301S
Course Type		**L-T-P-C**	0-1-2-2
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Introduce core programming concepts of Python programming language
2	Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to :		**Cognitive Level**
CO1	Develop essential programming skills in computer programming concepts like data types, control statements.	K3
CO2	Apply the basics of programming in the Python language.	K3
CO3	Solve coding tasks related Dictionaries, tuples and sets.	K3
CO4	Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming.	K3
CO5	Apply the basics of Numpy and pandas related to the Data Science	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO3	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO4	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2
CO5	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNTI-I:
Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.
Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.
Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:
1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Write a program to add and multiply complex numbers
5. Write a program to print multiplication table of a given number.

UNIT – II
Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:
1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
i. Addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT – III
Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:
1. Write a program to create tuples (name, age, address, college) for at least two
members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

UNIT – IV

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT – V

Introduction to Data Science: Functional Programming, JSON and XML with Python, NumPy with Python, Pandas.

Visual Aids for EDA(Exploratory Data Analysis): Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
a) Apply head () function to the pandas data frame
b) Perform various data selection operations on Data Frame
6. Apply different visualization techniques using sample dataset
a) Line Chart b) Bar Chart c) Scatter Plots d)Bubble Plot
7. Generate Scatter Plot using seaborn library for iris dataset
8. Apply following visualization Techniques for a sample dataset
a) Area Plot b) Stacked Plot c) Pie chart d) Table Chart

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
4. Python : The Complete Reference, by Martin C Brown, McGraw Hill India.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year I Semester
Environmental Science
(Common to all branches)

Course Category	BASIC SCIENCES		Course Code	24BC301T
Course Type prerequisites	Theory		**L-T-P-C**	2 -0-0--0
			Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

S.No.	Course Objectives
1	To make the students to get awareness on environment
2	To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3	To save earth from the inventions by the engineers.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Grasp multi disciplinary nature of environmental studies and various renewable and non-renewable resources.	K2
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	K2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	K2
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	K2
CO5	Illustrate the casus of population explosion, value education and welfare programmes.	K3

Contribution of Course Outcomes towards achievement of Program											
Outcomes (1 – Low, 2 - Medium, 3 – High)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	0	1	0	0	1	2	0	0	0	1	0
CO2	0	1	0	0	0	0	1	0	0	0	0	0
CO3	0	0	0	0	2	0	1	0	0	0	0	0
CO4	0	0	0	0	1	1	3	0	0	0	0	0
CO5	0	0	0	0	0	0	3	1	0	0	0	0

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources- Renewable and non-renewable resources (Biomass).

UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a)Forest ecosystem, b)Grassland ecosystem, c)Desert ecosystem, e)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(Primary Treatment)

Biodiversity and Its Conservation : Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hotspots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of: a)Air Pollution, b)Water pollution, c)Soil pollution, d)Marine pollution, e)Noise pollution, f)Thermal pollution, g)Nuclear hazards (Primarytreatment)

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics (Issues and possible solutions) –Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

UNIT – V

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Viral infections -Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Textbooks:
1. Erach Bharucha,Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:
1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:
- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
- http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf
- https://www.youtube.com/watch?v=5QxxaVfgQ3k

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
OPTIMIZATION TECHNIQUES
(Common to IT, CSE(AIML), CSE(AI), CSE(DS))

Course Category	Management Course – I	Course Code	24ME405T
Course Type	Theory	**L-T-P-C**	2-0-0-2
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2	To state single variable and multi variable optimization problems, without and with constraints.
3	To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4	To state transportation and assignment problem as a linear programming problem to determine Simplex method.
5	To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.	K2
CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.	K3
CO3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method.	K3
CO4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.	K3
CO5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	3	-	-	-	-	-	3	-
CO2	3	3	3	1	3	-	-	-	-	-	3	-
CO3	3	3	3	1	3	-	-	-	-	-	3	-
CO4	3	3	3	2	3	-	-	-	-	-	3	-
CO5	3	3	3	1	3	-	-	-	-	-	3	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT
UNIT I
Introduction: Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of Optimization problems.
Classical Optimization Techniques: Single variable Optimization, multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum, multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers, multivariable Optimization with inequality constraints, Kuhn – Tucker conditions

UNIT II
Linear Programming: Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

UNIT III
Transportation Problem: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems, Special cases in transportation problem.

UNIT IV
Nonlinear Programming: Unconstrained cases, One – dimensional minimization methods: Classification, Fibonacci method, Univariate method, steepest descent method. Constrained cases– Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method, Basic approaches of Interior and Exterior penalty function methods,

UNIT V
Dynamic Programming: Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.

Textbooks:
1. Engineering optimization: Theory and practice, S. S. Rao, New Age International (P) Limited, 3rd edition, 1998.
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt. Ltd.

Reference Books:
1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr. S. D. Sharma, Kedarnath, Ramnath& Co.

Online Learning Resources:
1. http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html
2. https://nptel.ac.in/courses/110106062
3. https://nptel.ac.in/courses/111/105/111105039/
4. https://nptel.ac.in/courses/106/108/106108056/
5. https://nptel.ac.in/courses/112/105/112105235/
6. https://onlinecourses.nptel.ac.in/noc21_me43/preview
7. https://www.nptel.ac.in/content/syllabus_pdf/112103301.pdf

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
Probability and Statistics
(Common to CSE, CSE-AI&ML, CSE-AI and IT)

Course Category	Basic Sciences		Course Code	24BM402T
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	Basic knowledge of Probability, Permutation & Combinations	Continuous Internal Assessment		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES	
1	To familiarize the students with the foundations of probability and statistical methods
2	To impart probability concepts and statistical methods in various applications Engineering

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Classify the concepts of data science and its importance	K3
CO2	Interpret the association of characteristics and through correlation and regression tools	K3
CO3	Apply discrete and continuous probability distributions	K3
CO4	Design the components of a classical hypothesis test	K3
CO5	Infer the statistical inferential methods based on small and large sampling tests	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT I
Descriptive statistics and methods for data science:
Data science – Statistics Introduction –Populations Sample –Collection of data – primary and secondary data–Type of variable: dependent and independent Categorical and Continuous variables –Data visualization – Measures of Central tendency – Measures of Variability–Skewness –Kurtosis.

UNIT II
Correlation and Regression:
Correlation–Correlation coefficient – Rank correlation.
Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties – Curvilinear Regression: Parabola–Exponential–Power curves.

UNIT III
Probability and Distributions:
Probability– Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions– Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT IV
Sampling Theory:
Introduction – Population and samples–Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof)– Estimation using, and F-distributions.
$$\chi^2$$

UNIT V
Tests of Hypothesis:
Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests –Test of significance for large samples and Small Samples : Single and difference means – Single and two proportions – Student's t-test ,F-test-test.
$$\chi^2$$

TEXT BOOKS
1. **Miller and Freund's**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **S.C.Gupta and V.K.Kapoor** ,Fundamentals of Mathematical Statistics, 11/e,S ultan Chand & Sons Publications, 2012.

REFERENCE BOOKS
1. **Shron L.Myers, KeyingYe, RonaldE Walpole,** Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **Jayl.Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M.Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V.Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

WEB RESOURCES
1. https://www.geeksforgeeks.org/descriptive-statistic/
2. https://www.cuemath.com/data/correlation-and-regression/
3. https://en.wikipedia.org/wiki/Probability_distribution
4. https://en.wikipedia.org/wiki/Sampling_(statistics)
5. https://en.wikipedia.org/wiki/Statistical_hypothesis_test

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
Machine Learning
Common to CSE(AI) &CSE(AI&ML)

Course Category	Professional Core		Course Code	24AM401T
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**		30
		Semester End Examination		70
		Total Marks		100

COURSE OBJECTIVES	
1	Define machine learning and its different types (supervised and unsupervised) andunderstand their applications.
2	Apply supervised learning algorithms including decision trees and k-nearestneighbours (k-NN).
3	Implement unsupervised learning techniques, such as K-means clustering

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	**Cognitive Level**
CO1	
CO2	
CO3	
CO4	
CO5	

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)											
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1											
CO2											
CO3											
CO4											
CO5											

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT-I: Introduction to Machine Learning: Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, DataRepresentation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Searchand Learning, Data Sets.

UNIT-II: Nearest Neighbor-Based Models: Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.

UNIT-III: Models Based on Decision Trees: Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression.
The Bayes Classifier: Introduction to the Bayes Classifier, Bayes' Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)

UNIT-IV: Linear Discriminants for Machine Learning: Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons(MLPs), Backpropagation for Training an MLP.

UNIT-V: Clustering : Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering,Spectral Clustering.
Text Books:
1. "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana,Universities Press (India), 2024
Reference Books:
1. *"Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017*
2. "Machine Learning in Action",Peter Harrington, DreamTech "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7thEdition, 2019.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
Database Management Systems
Common to AI, CSE(CS),CSE, DS, IT

Course Category	Professional Core	Course Code	24IT401T
Course Type	Theory	**L-T-P-C**	3–0 –0–3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

	COURSE OBJECTIVES
1	To introduce Data models and Entity Relationship Model Representation
2	To give a good formal foundation on the relational model of data and usage of Relational Algebra
3	To introduce the concepts of basic SQL as a universal Database language
4	To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
5	To provide an overview of concurrent execution ,deadlocks and indexing techniques

	COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Implementing E-R Models on different examples	K3
CO2	Describe a relational database and object-oriented database	K3
CO3	Create, maintain and manipulate a relational database using SQL	K3
CO4	Design a database with understanding on Normalization.	K2
CO5	Determining and describing the concurrent execution ,deadlocks	K3

K1:Remember,K2:Understand,K3:Apply,K4:Analyze,K5:Evaluate,K6: Create

Contribution of Course Outcomes towards achievement of Program Outcomes(1–Low,2-Medium,3–High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	-	-	-	-	-	-	2	3	-
CO2	3	3	3	-	-	-	-	-	1	-	-	-	2	2	2
CO3	3	3	3	2	-	-	-	-	1	-	2	-	2	2	2
CO4	3	3	3	-	-	-	-	-	1	-	3	-	2	2	2
CO5	3	2	1	-	-	-	-	-	1	-	-	-	2	-	2

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(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSECONTENT

UNIT-I
Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database. Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT-II
Relational Model: Introduction to relational model, concepts of domain, attribute, Tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT-III
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT-IV
Schema Refinement (Normalization):Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT-V
Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm. Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing:

TEXT BOOKS

1.   Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2.   Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

REFERENCEBOOKS

1.   Introduction to Database Systems,8/e CJDate, PEA.

2.   Database Management System,6/e Ramez Elmasri, Shamkant B.Navathe, PEA

3.   Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

WEB RESOURCES

1.   https://nptel.ac.in/courses/106/105/106105175/

2.   https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
Digital Logic & Computer Organization

Course Category	Professional Core		Course Code	24EC406T
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Basics of Number Systems	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**		30 70 100

	COURSEOBJECTIVES
	The student will learn:
1	Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
2	Describe memory hierarchy concepts
3	Explain input /output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understanding the data representation of a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions and analyze combinational circuits.	
CO2	Design and analyze sequential circuits and study the basic structure of computers	
CO3	Understand the basic concepts of computer arithmetic, organization.	
CO4	Understand the concepts of memory organization.	
CO5	Understand the concepts of I/O Organization.	

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2						2	2	2	2
CO2	2	2	2	2	2						2	2	2	2
CO3	2	2	2	2	2						2	2	2	2
CO4	2	2	2	2	2						2	2	2	2
CO5	2	2	2	2	2						2	2	2	2

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(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT–I:
Data Representation : Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.
Digital Logic Circuits-I : Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

UNIT–II:
Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters.
Basic Structure of Computers : Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture.

UNIT–III:
Computer Arithmetic : Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed - operand Multiplication, Fast Multiplication, Integer Division, Floating- Point Numbers and Operations.
Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.

UNIT–IV:
The Memory Organization : Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT–V:
Input/ Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces **.**

Textbooks:
1. Computer Organization, Carl Hamacher, ZvonkoVranesic, Safwat Zaky,6th edition, McGraw Hill
2. Digital Design ,6th Edition, M.Morris Mano, Pearson Education.
3. Computer Organization and Architecture,William Stallings, 11th Edition, Pearson.

Reference Books:
1. Computer Systems Architecture, M.Moris Mano, 3rd Edition, Pearson
2. Computer Organization and Design, David A.Paterson, JohnL. Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson

Online Learning Resources:
1. https://nptel.ac.in/courses/106/103/106103068

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
AI & ML Lab
CSE (Artificial Intelligence)

Course Category	Professional Core		Course Code	24AI401T
Course Type	Laboratory		L-T-P-C	0-0-3-1.5
Prerequisites			Continuous Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	The student should be made to study the concepts of Artificial Intelligence.
2	The student should be made to learn the methods of solving problems using Artificial Intelligence.
3	The student should be made to introduce the concepts of Expert Systems and machine learning.
4	To learn about computing central tendency measures and Data preprocessing techniques
5	To learn about classification and regression algorithms
6	To apply different clustering algorithms for a problem.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to :		**Cognitive Level**
CO1	Apply the fundamental data structures of the Pandas library, such as Series and Data Frames.	K3
CO2	Apply Pandas' built-in visualization capabilities to create various types of plots, including bar plots, histograms, line plots, and scatter plots.	K3
CO3	Apply various data preprocessing techniques such as attribute selection, handling missing values, discretization, and outlier elimination to prepare datasets for analysis.	K3
CO4	Apply various machine learning algorithms comprehending its theoretical foundations and practical applications.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO3	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO4	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2
CO5	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

List of Experiments
1. Pandas Library
a) Write a python program to implement Pandas Series with labels.
b) Create a Pandas Series from a dictionary.
c) Creating a Pandas Data Frame.
d) Write a program which makes use of the following Pandas methods
i) describe () ii) head () iii) tail () iv) info ()
2. Apply the following Pre-processing techniques for a given dataset.
a. Attribute selection
b. Handling Missing Values
c. Discretization
d. Elimination of Outliers
3. Pandas Library: Visualization
 a. Write a Python program for creating Maps using Plotly Libraries.
 b. Write a Python program to illustrate Linear Plotting using Matplotlib.
4. Implement any two uninformed search strategies using python.
5. Write a program to implement the Heuristic Search.
6. Implement expert systems with forward chaining and backward chaining.
7. Implement KNN algorithm for classification and regression
8. Implement decision tree algorithm for a classification problem and perform parameter
tuning for better results
9. Implement Random Forest algorithm for classification and regression
10. Implement Naïve Bayes Classification algorithm.
11. Implement Support Vector algorithm for classification
12. Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.

Reference Books:
1."Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Miller and Sarah Guido
2.Pattern Recognition and Machine Learning: Christopher M. Bishop, Springer Publications
Online Learning Resources/Virtual Labs:
1. https://pandas.pydata.org/pandas-docs/stable/
2. https://onlinecourses.nptel.ac.in/noc22_cs32/
3. https://scikit-learn.org/stable/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester

Database Management Systems Laboratory
Common to AI,CSE(CS),CSE, DS ,IT

Course Category	Professional Core	Course Code	24IT401P
Course Type	Laboratory	L-T-P-C	0–0 –3–1.5
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSEOBJECTIVES	
1	Populate and query a data base using SQL DDL/DML Commands
2	Declare and enforce integrity constraints on a database
3	Writing Queries using advanced concepts of SQL
4	Programming PL/SQL including procedures, functions, cursors, triggers and JDBC connection

COURSEOUTCOMES		
Up on successful completion of the course, the student will be able to:		Cognitive Level
CO1	Create data base tables and perform various operations	K3
CO2	Implement PL/SQL programs	K3
CO3	Create stored packages for variables, cursors and JDBC connection	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Out comes to wards achievement of Program: Outcomes (1 – Low, 2 -Medium, 3 –High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	-	-	-	-	-	-	1	2	2	1
CO2	3	2	2	2	2	-	-	-	-	-	-	1	2	2	1
CO3	3	3	3	3	3	-	-	-	-	-	-	1	2	3	2

LISTOFEXPERIMENTS

Note: For performing the experiments consider any case study(ATM/ Banking/Library/Hospital management systems)

1	Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2	Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3	Queries using Aggregate functions(COUNT, SUM, AVG, MAX and MIN),GROUP BY, HAVING and Creation and dropping of Views.
4	Queries using Conversion functions (to_ char, to_ number and to_ date),string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, in it cap, length, substr and instr), date functions (Sys date, next_ day, add_ months, last_ day, months_ between, least, greatest, trunc, round, to_ char, to_ date)
5	i. Create a simple PL/SQL program which includes declaration section, executable section, and exception handling section (Ex. Student mark scan be selected from the table and printed for those who secured first class and an exception can be raised if nore cords were found) ii. Insert data into student table and use COMMIT,ROLL BACK and SAVEPOINT in PL/SQL block.
6	Develop program that includes the features NESTEDIF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7	Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8	Programs development using creation of procedures, passing parameters I N and OUT of PROCEDURES.
9	Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10	Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
11	Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
12	Create a table and perform the search operation on table using indexing and non-indexing techniques.
13	Write a Java program that connects to a database using JDBC
14	Write a Java program to connect to a database using JDBC and insert values into it
15	Write a Java program to connect to a database using JDBC and delete values from it

TEXTBOOKS/SUGGESTEDREADING:

1	Oracle: The Complete Reference by Oracle Press
2	Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3	RickFVanderLans,"IntroductiontoSQL",FourthEdition,PearsonEducation,2007

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
Full Stack Development –I
(Common to CSE, CSE (AI&ML), CSE (AI), CSE (Cyber Security))

Course Category	Skill Enhancement	Course Code	24CS401S
Course Type	Laboratory	L-T-P-C	0-1-2-2
Prerequisites		Continuous Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
The main objectives of the course are to	
1	Make use of HTML elements and their attributes for designing static web pages
2	Build a web page by applying appropriate CSS styles to HTML elements
3	Experiment with JavaScript to develop dynamic web pages and validate forms

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Usage of various front and back end Tools	K3
CO2	They can understand and create applications on their own	K3
CO3	Demonstrate and Designing of Websites can be carried out.	K3
CO4	Develop web based application using suitable client side and server side code.	K5
CO5	Implement web based application using effective database access.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-
CO5	3	3	3	3	1	-	-	-	-	-	-	-

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

Experiments covering the Topics:
- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events
- Node.js

Sample Experiments:
1. Lists, Links and Images
a. Write a HTML program, to explain the working of lists.
   Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.
b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.
c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.
d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames
a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).
c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).
d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame → image, second frame → paragraph, third frame → hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

3. HTML 5 and Cascading Style Sheets, Types of CSS
a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags.
b. Write a HTML program, to embed audio and video into HTML web page.
c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms
a. Write a program to apply different types of selector forms
   i. Simple selector (element, id, class, group, universal)
   ii. Combinator selector (descendant, child, adjacent sibling, general sibling)
   iii. Pseudo-class selector
   iv. Pseudo-element selector
   v. Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model
a. Write a program to demonstrate the various ways you can reference a color in CSS.
b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.
c. Write a program using the following terms related to CSS font and text:
   i. font-size   ii. font-weight   iii. font-style
   iv. text-decoration   v. text-transformation   vi. text-alignment
d. Write a program, to explain the importance of CSS Box model using
   i. Content   ii. Border   iii. Margin   iv. padding

6. Applying JavaScript - internal and external, I/O, Type Conversion
a. Write a program to embed internal and external JavaScript in a web page.
b. Write a program to explain the different ways for displaying output.
c. Write a program to explain the different ways for taking input.
d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. Java Script Pre-defined and User-defined Objects
a. Write a program using document object properties and methods.
b. Write a program using window object properties and methods.
c. Write a program using array object properties and methods.
d. Write a program using math object properties and methods.
e. Write a program using string object properties and methods.
f. Write a program using regex object properties and methods.
g. Write a program using date object properties and methods.
h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. Java Script Conditional Statements and Loops
a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
b. Write a program to display week days using switch case.
c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
d. Write aprogram to print data in object using for-in, for-each and for-of loops
e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]
f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

9. Java Script Functions and Events

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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

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a. Design a appropriate function should be called to display
    i. Factorial of that number
    ii. Fibonacci series up to that number
    iii. Prime numbers up to that number
    iv. Is it palindrome or not
b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
    i. Factorial of that number
    ii. Fibonacci series up to that number
    iii. Prime numbers up to that number
    iv. Is it palindrome or not
c. Write a program to validate the following fields in a registration page
    i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
    ii. Mobile (only numbers and length 10 digits)
    iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

Text Books:
1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Web Links:
1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

II Year II Semester
DESIGN THINKING & INNOVATION
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY)

Course Category	BS&H	Course Code	24HM401P
Course Type	Theory	L-T-P-C	1 -0 -2-2
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Outcomes	Blooms Taxonomy Level
Upon successful completion of the course, the student will be able to	
CO 1 Define the concepts related to design thinking.	K1
CO 2 Explain the fundamentals of Design Thinking and innovation.	K2
CO 3 Apply the design thinking techniques for solving problems in various sectors.	K3
CO 4 Analyze to work in a multidisciplinary environment.	K4
CO 5 Evaluate the value of creativity.	K5

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		1	3					1	1
CO2			3		2	3						
CO3		1	3			3			1			1
CO4			3			3						
CO5			3			3					3	2

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

R23

COURSE CONTENT

UNIT – I   Introduction to Design Thinking
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II   Design Thinking Process
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development
Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III   Innovation
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.
Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV   Product Design
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.
Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V   Design Thinking in Business Processes
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.
Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:
1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:
1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Web Resources:
- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview