YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS
SCHOOL OF INFORMATICS
B. SC. COMPUTER SCIENCE & MACHINE LEARNING
FIRST SEMESTER, ACADEMIC YEAR 2024 – 25 OF 2024 – 27 BATCH (CBCS)

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	EN23101	General English - I **(AECC-1)**	3	3	40	60	100	3
2.	I	VE18101	Value Education and Personality Development **(AECC-2)**	2	3	40	60	100	2
3.	II	CSML23101	Fundamentals of IT & Data Visualization **(SEC-1)**	5	3	40	60	100	4
4.	II	CSML23102	Differential Equations and Matrices **(Core-1)**	5	3	40	60	100	4
5.	II	BS21104	Problem solving and Programming in C **(Core-2)**	5	3	40	60	100	4
6.	II	CSML23103	Basic Electronics & Circuits **(Core-3)**	4	3	40	60	100	4
PRACTICALS									
7.	II	CSML23104	Fundamentals of IT & Data Visualization Practical's **(SEC-1)**	2	3	40	60	100	1
8.	II	CSML23105	Problem solving and Programming in C Practical's **(Core - 2)**	2	3	40	60	100	1
9.	II	CSML23106	Basic Electronics & Circuits Practical's **(Core-3)**	2	3	40	60	100	1
	Total			**30**	**-**	**360**	**540**	**900**	**24**

*Ability Enhancement Compulsory Course (AECC)
*Skill Enhancement Course (SEC)
*Programme of Loyola Academy for Neighborhood Empowerment and Transformation (PLANET)

GENERAL ENGLISH -I

(AECC – 1)

Credits: 3   **Semester: I**

Subject Code: EN23101   **No of Lecture Hours: 45**

OBJECTIVES:

- Through an exposure to contemporary passages, the students would be able to have a grasp on the language of today, with specific emphasis on the Listening, Speaking, Reading and Writing skills.

- Through the components of a passage, vocabulary and grammar section, speaking component and writing segments, there is a holistic development for language proficiency and fluency.

OUTCOMES:

CO1: To distinguish between words which are either spelt or pronounced alike, yet render distinct meanings; imparting a sound clarity on everyday usage of language, and for developing the art of parallel listening and writing.

CO2: To construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building.

CO3: To identify with economical word constructions, paying specific attention in constructing sound writing skills.

CO4: To interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills.

CO5: To develop communication skills to provide a platform for language efficiency for effective language deliver

UNIT- I   **9Hrs**

Fundamentals of Communication-I
Short Story - The Mystery Story (source – teacherluke.co.uk)
- Present Tense   (2)
- Past Tense   (2)
- Future Tense   (2)
- Paragraph Writing   (3)

UNIT- II   **9Hrs**

Language Proficiency for Effective Writing and Speaking Skills-I
Poem- Goodbye Party for Miss Pushpa T.S. by Nissim Ezekiel   (2)
- Subject- Verb Agreement   (3)
- Punctuations   (2)
- Review Writing   (2)

UNIT-III   **9Hrs**
Wit and Humour
From the text Atea Party by Ruth Prawer Jhabvala
- Explanation of the text (2)
- Grammar -------Nouns, Articles (2)
- Vocabulary --- Homonyms, Homophones, Homographs (2)
- Writing Skill ------Note- Making (3)

UNIT-IV   **9Hrs**
Human Values
From the text "India's Contribution to World Unity"
• Explanation of the text (2)
• Grammar----adverbs (2)
• Vocabulary----Adjective and Adverb Suffixes (2)
• Writing Skill------Formal Letters and Curriculum Vitae (3)

UNIT-V   **9Hrs**
From the text "Sachin Tendulkar"
- Explanation of the text (3)
- Grammar----- Adjectives, Comparison of Adjectives (3)
- Vocabulary-----Common Errors, Commonly Misspelt words,
  Commonly Confused Words (3)
- Writing Skill-----References and Bibliographies

ESSENTIAL READING:
- Skills Annexe. Functional English for Success. Orient Black Swan

SUGGESTED READING:
- Balasubramaniam, M. 1985 Business Communication. New Delhi: Vani Educational Books.
- Krishna Mohan and Meera Banerjee, 1990. Developing Communication Skills. New Delhi: Macmillan India Ltd.
- Krishnaswamy.N. and Sriraman, T. 1995. Current English for Colleges. Madras: Macmillan India Ltd.
- Narayanaswamy.V.R. 1979 Strengthen Your Writing. New Delhi: Orient Longman.
- Sharma.R.and Krishna Mohan. Business Correspondence. 1978. New Delhi. Tata McGraw-Hill Publishing Co.

VALUE EDUCATION & PERSONALITY DEVELOPMENT
(AECC – 2)

Credits: 2   **Semester: I**

Subject Code: VE18101   **No. of Lecture Hours: 30**

Objective: To produce intellectually competent, morally upright, socially committed, spiritually inspired citizens in the service of the nation and the world.

Outcomes:
CO1: Students will be able to **Differentiate** Accepted norms and Counter values and be able to identify the various Dimensions of Human Development.
CO2: Students will be able to **Demonstrate** Love and Experience of God and identify the Basic issues of Life and Happiness as a life goal.
CO3: They will able to **Understand** the importance of Concern for others and critique the various problems that deter the growth of the society.
CO4: The students will be able to **Recognize** the traits of a good personality and practice Self-exploration.
CO5: Students will be able to **Interpret** the Purpose of Life and Goal Setting and demonstrate Self-management.

UNIT-I   **6Hrs**
INTRODUCTION TO ETHICS
1.   Why Value Education?
2.   Reasons to have Ethics for Life
3.   Accepted Norms and Counter Values
4.   Dimensions of Human Development: Physical, Intellectual, Emotional, Moral, Spiritual and Social

UNIT-II   **6Hrs**
APPROACH TO LIFE
1.   Conscience and Pseudo-Conscience
2.   Happiness as Life-goal
3.   Values revealed and lived in Religions
4.   Experience of God
5.   Love: The three components of Love
6.   Some of the basic stages and issues of Life: Family, Love, Sex, Marriage

UNIT- III   **6Hrs**
CONCERN FOR OTHERS
1.   Self and Another
2.   Human Context
3.   Moral Problems of a Society / True Society: Social Desire, Social Fear, Social Silence, Social Indifference.

UNIT – IV   **6Hrs**
TRANSFORMATION OF SELF
1.   Definitions of personality
2.   Characteristics of personality

3. Elements of personality
4. Traits of good personality
5. Self-Identity, self-concept
6. Self-Discovery, self-acceptance
7. Self-Esteem WORK SHEET (1): Self Estimation.

UNIT – V   **6Hrs**
LIFE ENRICHMENT SKILLS
1. Purpose of life - Goal setting
2. Characteristics of Goals
3. Building Relationships
4. Time Management
5. Stress Management
6. Emotional Management
7. Conflict Management
8. Team Management (Group Dynamics)

9. **WORK SHEETS (1) & (2)**:
1) Anger Management
2) Team Management

ESSENTIAL READING
1. Human Values - Development Program- AIACHE
2. In Harmony

FUNDAMENTALS OF IT AND DATA VISUALISATION

(SEC – 1)

Credits: 4   **Semester: I**

Subject Code: CSML23101   **No. of Lecture Hours: 75**

Objective: To understand the components and application of computers to store, retrieve, transmit and manipulate data in the context of a business or an enterprise. To understand the importance of data Visualizations in business.

Outcomes: The students would be able to

CO1: **Understand** basic computer terminology and number systems.
CO2: **Learn** about operating systems, and its types.
CO3: **Learn** about the applications of IT and Data Visualizations
CO4: **Use of** Data Visualizations
CO5: Use of modern means of communications, types of networks and topologies

UNIT-I   **15Hrs**

Introduction to Computers

	Definition - Characteristics and limitations of computers	1
1.	Block diagram of a computer, CPU	1
2.	Primary and secondary storage	1
3.	Input and output devices	2

Data Representation and Storage

1.	Data representation in computers, bits and bytes	1
2.	Number systems (Binary, Octal and Hexadecimal)	1
3.	Conversion from decimal to binary, octal, hexadecimal and vice versa	2
4.	Secondary storage	2
5.	Random Vs. Sequential access, Tracks and Sectors	1
6.	Storage characteristics	2
7.	Increasing data storage capacity through compression (disk compression and file compression)	1

UNIT-II   **15Hrs**
Operating Systems

1.	Meaning, Definition, Functions	2
2.	Types of operating systems: Desktop OS, Server OS, Mainframe OS, Embedded OS	1
3.	Multi-Tasking and Multi-threading	1
4.	Multi User Multi-processor support	1
5.	Miscellaneous tasks	1
6.	Batch Processing systems	2
7.	Real time systems, Time sharing systems	1
	User Interfaces	
1.	GUI, Pen based, Touch Screen & Conversational interfaces	3
2.	Common Operating Systems: DOS, Windows 95/98 and UNIX	3

UNIT-III   **15Hrs**
Applications of Information Technology

1. Application programs	2
2. Horizontal Market Applications, Vertical Market Applications	1
3. Customs Applications, Shareware and Public domain software	1

Transaction Processing

1. Centralized transaction processing	1
2. Client Server software, Distributed computing and Replication	2
3. Information tools for management control: DSS, EIS, GIS, OLAP	2
4. Data Warehousing and Data Mining	1

IT in Business and Industry

1. Home and at play, Education and Training, Entertainment and Arts	2
2. Science, Engineering and Math, Computers in hiding	1

IT Enabled Services

1. BPO, KPO & Call centers	2

UNIT-IV 15Hrs

Systems Development

1. The six phases of Systems Analysis & Design	3

The challenges of Digital Age

1. Security issues: Threats to Computers & Communications	2
2. Security: Safeguarding Computers & Communications	2
3. Quality of Life Issues	2
4. The ethics of using databases: concerns about accuracy & privacy	3
5. Five generations of programming languages	3

UNIT-V 15Hrs

DATA VISULAISATIONS-I:

1. Ways of Representing Visual data	2
2. Technologies used for Visual Data Representation	3
3. Types of Data Visualization	2
4. Applications of Data Visualizations,	3
5. Visualizing Big Data	2
6. Tools Used in Data Visualization	3

ESSENTIAL READING

1. Curtin Dennis, P. and Foley, Kim. 2000. Information Technology – The Breaking Wave. 7th edition. Tata McGraw Hill Publications: New Delhi.
2. Williams Brian, K. and Sawyer Stacey, C. 2007. Using Information Technology – A Practical Introduction to Computers and Communications. 6th edition. Tata McGraw Hill Publications: New Delhi.
3. DT Editorial Services, 2016 BIG DATA BLACK BOOK, Dreamtech Press

SUGGESTED READING

1. Sinha Pradeep, K. and Sinha Preeti. 2007. **Computer Fundamentals, Concepts, Systems and Applications.** 4th edition. BPB Publications
2. Raja Raman. 2006. **Fundamentals of Computers.** 4th edition. PHI Publications. Bharihoke Deepak. 2000. **Fundamentals of Information Technology.** 2nd edition. Excel Books.

DIFFERENTIAL EQUATIONS & MATRICES
(CORE COURSE – 1)

Credits : 4   **Semester : I**

Subject Code : CSML23102   **No. of Lecture hours: 75**

Objectives: To impart basics and solving differential equations and applications of differential equations

Outcomes:

CO1: Classify the differential equations with respect to their order and linearity. Solve differential equations of first order using numerical and analytical methods such as Integrating Factors.

CO2: Analyze and Solve basic application problems described by first order differential equations such as orthogonal trajectories.

CO3: Solve second order Homogeneous Equations with Constant Coefficients. Obtain exact and numerical solutions using differential equations technology.

CO4: Understand to find the rank and formulate the solution of set of a system of linear equations.

CO5: Determine the eigen values and eigen vectors.

UNIT - 1:   **15Hrs**
Differential Equations of the first order and first degree

Linear Equations- Bernoulli's equation -Equations reducible to Linear equations	5
Exact differential equations – Integrating factors	6
Orthogonal trajectories - Cartesian coordinates- Polar coordinates.	4

UNIT-II: **15Hrs**
Linear Differential Equations with constant coefficients

Linear Differential Equations with constant coefficients	3
Auxiliary equation, complementary function, particular integral.	5
Working rule for finding P.I. when $X = e^{ax}$, Sin ax, Cos bx, x^m, $e^{ax}V$ and problems thereon	7

UNIT-III: **15Hrs**
Linear Differential Equations with variable coefficients

Complete solutions in terms of one known integral belonging to the complementary function	4
Transformation of the equation by changing the independent variable	5
The Cauchy - Euler equation, Method of variation of parameters	6

UNIT IV   **15Hrs**
System of Linear Equations

Rank of a Matrix Rank - Echelon form -Normal form	7
Solution of Linear Systems - Homogeneous and Non-Homogeneous Equations	8

UNIT V Eigen values - Eigen vectors   **15Hrs**

Eigen values-Eigenvectors	4

Cayley-Hamilton Theorem (Without Proof) -Inverse of a matrix by using Cayley-Hamilton theorem   6
Quadratic forms- Reduction of quadratic form to canonical form   5

ESSENTIAL READING
1.   Zafar Ahsan   2006 **Differential Equations and Their Applications** Second Edition New Delhi: Prentice Hall of India Ltd. (For Units I, II & III)
2.   Shanti Narayan and Mittal 2016 **Differential Calculus S. Chand and Company** New Delhi**.**

Reference Books:

1.   V. Krishna Murthy & others "A text book of Mathematics for B.Sc Vol. I, S.Chand & Company, New Delhi
2.   Rai Singhania, "Ordinary and Partial Differential Equations", S. Chand & Company, New Delhi

PROBLEM SOLVING AND PROGRAMMING IN 'C'
(CORE COURSE – 2)

Credits: 4   **Semester: I**

Course Code: BS21104   **No. of Lecture Hours: 75**

OBJECTIVE:
To understand major programming constructs this serves as the basis for any programming language.

OUTCOME:
CO1: Explain the basic introduction of computer and programming languages.
CO2: Categorize different data types, operators and data input/output functions in "C".
CO3: Develop programs using "C" control structures, arrays and string concepts.
CO4: Analyze larger problems into smaller ones using "C" functions.
CO5: Create programs using the concepts of structures, unions and file handling in "C".

UNIT – I	**15Hrs**
1. Introduction to C programming	3
2. Algorithms and Flow charts	2
3. Structure of C program	2
4. Files used in a C program	2
5. Compiling and executing C program	2
6. C tokens, Constants, Character set in C, Keywords	3
7. Identifiers	1

UNIT – II	**15Hrs**
1. Data Types in C, Enumerated data types, typedef	2
2. Variables and scope of a variables	2
3. Data input and output statements in C	3
4. Operators and expressions	3
5. Type conversion and Typecasting	2
6. Conditional Branching Statement – if, if-else, if-else-if, switch case	3

UNIT – III	**15Hrs**
1. Iterative Statements – while loop, do-while loop, for loop	3
2. Nested loops, break and continue statements, goto statement	3
3. Arrays - Single and double dimensional arrays	3
4. String- string input output functions	3
5. string manipulation functions	3

UNIT-IV	**15Hrs**
1. Function- Declaring, defining and invoking functions	2
2. Categories of functions-Built-in functions	2
3.Passing parameters to functions – call by value & call by reference	2
4.Storage classes	2
5. Recursion.	1
6. Pointers - Declaration, passing pointer to functions	2
7. Pointers and one dimensional arrays	2

8. Dynamic memory allocations.   2

UNIT – V   **15 Hrs**
1.   Structures - Simple structures, nested structure, Array of structures   3
2.   Unions-Differences between Structures and Unions.   3
3.   File handling - Various modes, File operations – fopen(), fclose()   3
4.   File input output functions – fputc(), fgetc(), fputs(), fgets(), getw(), putw(), getc(), putc(), fprintf(), fscanf(), getchar(), putchar()   3
5.   Random accessing file – fseek(), ftell(), rewind()   3

ESSENTIAL READING
1.   Thareja Reema. 2016. Programming in C. 2nd Edition. New Delhi:BPB.
2.   KanetkarYashwanth. 2018Let us C. 16th edition ,NewDelhi:BPB.
3.   Gottfried Byron. 2010. Programming with C (Schaum's Outline Series). 3rd Edition. New Delhi: McGraw Hill Education

BASIC ELECTRONICS & CIRCUITS
(CORE COURSE – 3)

Credits: 4   **Semester: I**

Course Code: CSML23103   **No. of Lecture Hours: 60**

Objectives:
- To introduce the fundamentals of electronics
- To introduce the terminology, laws and applications
- To expose a variety of active and passive components

Outcome: Students will be able to understand and analyze the basics of electronic components and their applications.

CO1: Able to Understand what is electronics and terms related to it?
CO2: Understanding the passive components and their connections, sources & laws
CO3: Understanding the fundamentals of alternating current and terminology
CO4: Analyze semiconductors and understand the working of a diode and its applications.
CO5: Able to understand the construction and working of transistor, power supply.

UNIT-I	**12Hrs**
Introduction to Electronics-I:	
Definition and applications of electronics	2
Electric current, potential difference	2
Conductance and conductivity	2
AC, DC, Ohm's law	3
Types of Test Signals	1
Electronic components (Passive only)	2

UNIT-II	**12Hrs**
Introduction to Electronics-II:	
Electric Resistance, factors affecting the electric resistance	2
Resister and its colour code	1
Resisters in series and parallel	1
Capacitor, Factors affecting capacitance	2
Capacitors in series and parallel	2
Concept of voltage and current sources	2
Kirchhoff's current law & Kirchhoff's voltage law	2

UNIT-III	**12Hrs**
AC Fundamentals:	
Types of Alternating current and voltage	2
Important terms of AC: Cycle, time period, frequency, Amplitude	2
Peak to Peak Value, Instantaneous Value, Root Mean square Value	2
Average Value, Phase, Phase Difference	1
Semiconductors:	
Intrinsic and Extrinsic Semiconductors	2
n-type and p-type semiconductors	2
Effect of temperature on semiconductors	1

UNIT-IV	**12Hrs**
Diodes:	
Semiconductor diode, formation of depletion layer	2
Biasing the PN junction diode (Forward & reverse)	2
VI characteristics of PN Junction diode, Diode applications	3
Zener diode, Reverse characteristics of Zener diode	3
Zener as Voltage Regulator	2

UNIT-V	**12Hrs**
Transistors:	
Junction transistor Structure	1
Working of NPN transistor	1
Transistor circuit configurations	1
Input & Output characteristics of a transistor in CE configuration	2
Basic CE amplifier circuit	2
Thermal run away	1
Voltage Regulator using Transistor	2
Block diagram of DC regulated power supply.	2

SUGGESTED READING:

1. **Basic electronics & linear circuits**. Bhargava, Kulshreshta & Gupta.2006New Delhi: Tata McGraw Hill.
2. **Applied Electronics**. R S Sedha, S Chand Publications.

Note: No Derivations & Problems

FUNDAMENTALS OF IT & DATA VISUALISATIONS PRACTICALS
(SEC -1)

Credit**: 1**   **Semester: I**

Course Code: **CSML23104**   No. of Practical Hours**: 30**

Objectives:
To impart basic computer usage and to introduce you to a suite of productivity tools that will aid in our day to day activities as follows
•   Word is used in documentation
•   Excel is used for accounting, analyzing huge amounts of data and for graphical representation of data
•   Power Point is used to create presentations & visualizations
•   Access is used to create databases

Outcomes:
•   Students will be able to concentrate more on hands on experience.
•   It enables the participants to make the best use of office suite in their day-to-day requirements and make use of it to improve the standards in the educational environment.

1. Preparing Resume, time table   2
2. Newsprint, applying formats   2
3. Documents using bullets and numbering   2
4. Mail Merge   2
5. Creating an Excel worksheet, applying functions   2
6. Marks memorandum, Customer bill   2
7. Creating charts, creating an Excel database   2
8. Sort and filter data   2
9. Preparing a Power point presentation   2
10. Creating an Access database, tables   4
11. Queries on data, designing forms and reports   4
12. Creating Combination of Charts, Creating a Combo Chart with secondary Axis   2
13. Creating Pie Chart, Gantt chart, Thermometer Charts   2

PROBLEM SOLVING AND PROGRAMMING IN C PRACTICALS
(CORE COURSE -2)

Credits: 1   **Semester: I**

Course Code: CSML23105   **No. of Practical Hours: 30**

Objective: To develop applications using structured programming.

Outcome: Students will be able to write, compile and debug programs in C language.

1.   Programs to implement various arithmetic operators
2.   Programs to find areaof circle,area of rectangle,areaof square
3.   Programs to find gross salary of employee
4.   Programs using if,if-else,if-elseif –conditionstatements
5.   Program to stimulate calculator using switch case
6.   Programs using break and continue
7.   Program to print sum of "N" natural numbers
8.   Program to print factorial of given numbers using loops
9.   Program to print multiplication table of a given number
10. Program to LOYOLA five times
11. Program to find sum of digits and reverse of a given number
12. Program to check if the given number is palindrome or not
13. Program to find the Fibonacci series
14. Program to check the year is leap year or not
15. Program to find swap of two numbers
16. Program to print a pattern
17. Program to solve quadratic equation
18. Programs to display array elements, sum of array elements, smallest, greatest array elements
19. Program to check if the given number is Armstrong number
20. Programs using 2-D array
21. Program to find the element in an array
22. Program to perform operations on matrices (addition, subtraction, multiplication, transpose)
23. Programs using strings and functions
24. Program to find call by value and call by reference
25. Program to find factorial using recursion
26. Program to find the sum of array elements using pointers
27. Program to accept and display book details using structures
28. Program to maintain employee details using structures
29. Program to Read a file and display its content using files
30. Program to count number of space, tabs and new lines in a file

BASIC ELECTRONICS AND CIRCUITS PRACTICALS

(CORE COURSE – 3)

Credits: 1   **Semester: I**

Course Code: CSML23106   **No. Of Practical Hours: 30**

Objectives:
- Describe physical models of basic components.
- Design and construct simple electronic circuits to accomplish a specific function.
- Understand their capabilities and limitations.

Outcome: Students will be able to verify the passive components and their working, Measurement of parameters using CRO, working of diodes, transistors.

Course Outcomes	
CO1	Ability to analyze and design efficient synchronous systems from the functional description of computing systems.
CO2	Ability to design tradeoff in the development of modern computing systems.
CO3	Ability to use design tools in a team to simulate and verify logic circuits and computer architecture.

List of Practical's:

1. Study of resistors using colour code
2. Resistances in series and parallel
3. Capacitances in series and parallel
4. Study of Kirchhoff's laws
5. Measurement of frequency using CRO
6. Measurement of amplitude using CRO
7. Measurement of Phase using CRO
8. VI Characteristics of PN junction diode
9. VI Characteristics of Zener diode
10. Input and output characteristics of transistor in CE configuration

YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS

SCHOOL OF INFORMATICS

B. SC. COMPUTER SCIENCE & MACHINE LEARNING

SECOND SEMESTER, ACADEMIC YEAR 2024 – 25 OF 2024 – 27 BATCH (CBCS)

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	EN23201	General English-II **(AECC-3)**	3	3	40	60	100	3
2.	I	IC23201	Indian Heritage and Culture **(AECC-4)**	2	3	40	60	100	2
3.	II	CSML23201	Probability & Statistics for ML **(SEC-2)**	5	3	40	60	100	4
4.	II	CSML23202	Vector Calculus & Number Theory **(Core - 4)**	5	3	40	60	100	4
5.	II	CSML23203	Fundamentals of Data Structures Using 'C' **(Core-5)**	5	3	40	60	100	4
6.	II	CSML23204	Python Programming **(Core-6)**	4	3	40	60	100	4
PRACTICALS									
7.	II	CSML23205	Probability & Statistics for ML Practical's **(SEC-2)**	2	3	40	60	100	1
8.	II	CSML23206	Fundamentals of Data Structures Using 'C' Practical's **(Core-5)**	2	3	40	60	100	1
9.	II	CSML23207	Python Programming Practical's **(Core-6)**	2	3	40	60	100	1
	Total			**30**	**-**	**360**	**540**	**900**	**24**

*Ability Enhancement Compulsory Course (AECC)

*Skill Enhancement Course (SEC)

*Programme of Loyola Academy for Neighborhood Empowerment and Transformation (PLANET)

GENERAL ENGLISH – II
(AECC – 3)

Credits: 3   **Semester: II**

Subject Code: EN23201   **No of Lecture Hours: 45**

Objectives:
To enhance the learners' communication skills by giving adequate exposure in reading, writing, listening and speaking skills and the related sub-skills.
To develop oral and written communicative skills among the students so that their employability enhances and English becomes the medium of their livelihood and personality.

Outcomes:
 CO1: To identify a sound understanding on the formation of words and to demonstrate the functional grammatical component in the sentence.
 CO2: To paraphrase ideas and thoughts in a coherent, neat and organized manner in order to utilize the writing skills for sound writing propagandas.
CO3: To create an understanding on Indian Literature, alongside to develop and chisel their communication skills.
CO4: To recognize the moral element which underlies in the short story; an exposure to informal language.
CO5: To develop listening and speaking skills through effective sentence constructions and efficient delivery.

Unit-I	**9Hrs**
Fundamentals of effective communication- II	
Flash Fiction- The Mice by Lydia Davies	1
Simple, Complex and Compound Sentences	3
Conversion of sentences	3
Information Transfer	2
UNIT-II	**9Hrs**
Language Proficiency for Effective speaking and Writing Skills-II	
Short Story- The Face on the Wall by E V Lucas	2
Active and Passive Voice	3
Conjunctions	2
Essay Writing	2
UNIT-III	**9Hrs**
Health From the text "Three Days to See"	
Explanation of the text	3
Grammar -------Usage of Modal Auxiliary Verbs	2
Vocabulary --- Collective Nouns , Technical Vocabulary	2
Writing Skill ------News Paper Report	2
UNIT-IV	**9Hrs**
Short Story From the text "Leela's Friend" by R.K.Narayan	
Explanation of the text	3
Grammar----Phrasal Verbs, Wh- Questions	2
Vocabulary----Noun and Verb Suffixes	2

Writing Skill------Writing a Narrative	2

UNIT-V   **9Hrs**
Inspiration
From the text "The Last Leaf" by O. Henry

Explanation of the text	3
Grammar----- Prepositions	2
Vocabulary-----Idioms	2
Writing Skill----- Précis Writing	2

ESSENTIAL READING: Epitome of Wisdom, Maruthi Publications.

SUGGESTED READING:

1.   Krishna Mohan and Meera Banerjee. Developing Communication Skills. 1990. New Delhi. Macmillan India Ltd.
2.   Krishnaswamy. N. and Sriraman, T. Current English for Colleges. 1995. Madras Macmillan India Ltd.
3.   Narayanaswamy, V.R. Strengthen Your Writing. 1979. New Delhi. Orient Longman.
4.   Sharma, R.C. and Krishna Mohan. Business Correspondence. 1978. New Delhi. Tata McGraw-Hill Publishing Co.

INDIAN HERITAGE AND CULTURE
(AECC – 4)

Credits: 2   **Semester: II**

Course Code: IC23201   **No. of Lecture Hours: 30**

Objectives:
- To apprise the students with a sound background of Indian culture.
- To equip the students with social & community problems of India.
- To prepare the student for civil service exams where Indian Heritage & Culture paper is compulsory for all the streams.

Outcome:
CO1: Student will have knowledge about Indian Customs and Traditions.
CO2: Student can make use of the subject knowledge to attempt all kinds of competitive especially civil services.
CO3 the Subject helps the student community to have knowledge of historical and contemporary social, religious and political issues of the nation.

UNIT I   **6Hrs**
INTRODUCTION-ANCIENT INDIAN HERITAGE AND CULTURE
Meaning of culture-Characteristics of Indian Culture
Indus Valley Civilization and Vedic/Aryan Culture
Mauryas and Guptas
Ashoka the great and Harshavardana
South Indian Kingdoms-Satavahanas, Pallavas, Cholas
Development of the art and architecture -contributions of Buddhism and Jainism

UNIT II   **6Hrs**
MEDIEVAL INDIA-INFLUENCE OF ISLAM ON INDIAN CULTURE
Cultural Development under the Delhi Sultanate and Mughals
Sufi and Bakti Movement in Medieval period
Cultural Achievements of Kakatiys and Qutubshahis
Development of Art and Architecture during medieval India.

UNIT III   **6Hrs**
IMPACT OF WEST AND REFORM MOVEMENTS
Influence of Western culture on Indian Society
19th century Socio Religious Reform Movement-Raja Ram Mohan Roy, Ishwara ChandraVidyasagar and Veerasalingam
Subaltern Movements in India- Iyothirao Philie - Savitribai Phiile, E.V Ramaswainy Naikar
Narayana Guru-Dr. B. R. Ambedkar
Indian National movement-Moderate, Extremist and Gandhian phases

UNIT IV   **6Hrs**
RELIGIONS AND COSTITUTIONAL INSTITUTIONS
Perceptions of all Major Religions-A critical analysis
Rise of communalism in Indian Society
Democratic system in India and its functions-Evolution of the constitution and organs of democracy.

 UNIT-V   **6Hrs**

SOCIAL GROUPS AND RIGHTS

Fundamental Rights,

Women, Children and LGBTQ

Tribal Culture- their Issues

REFERENCE BOOKS:

1. Jha, Dr K.N. 2006. Studies in ancient & Medieval India. COSMOS Book hive Ltd: Gurgaon.

2. Mahajan, V.D. 2008. Ancient India. S.Chand, New Delhi.

3. Manasseh, Dr P. 2010. An overview of Indian Culture. Gamaleil Publishers, Hyderabad.

4. Malpani, Madanlal & Malpani, Shamsunder. 2014. Indian Heritage and Culture. Kalyani Publishers, Ludhiana.

5. Mhaske, Dr R.H. 2012. Human Rights, Social Justice and Political Challenges. Chandralok Prakashau, Kanpur.

6. Singh, Gurdip & Ahuja, V.K. 2012. Human Rights in 21" Century. Universal Law Publisher, New Delhi.

PROBABILITY & STATISTICS FOR ML
(SEC – 2)

Credits: 4   **Semester: II**

Subject Code: CSML23201   **No. of Lecture hours: 75**

Objective: To prepare students for lifelong learning and successful careers using their statistical skills.

Outcome:
CO1: Understand the importance of descriptive statistics and use the probability theory in case of uncertain situations.
CO2:   Employee the principle of linear regression with an understanding of correlation between two or more than two variables.
CO3: Use discrete and continuous probability distribution, including the requirements and making decisions.
CO4: Knowledge about formulating and testing of hypothesis, using critical values to draw conclusions and determine the probability of making errors in hypothesis test for large sample tests. **CO5: Understand and analyze** various small sample tests.

NOTE: APPLICATION ORIENTED ONLY, NO MATHEMATICAL DERIVATIONS

UNIT I   **15Hrs**
Measures of Central Tendencies: (Excluding derivations – Only Problems)
Mean, Median, mode, Geometric mean, harmonic mean – merits and demerits, properties with simple applications   6
Measures of Dispersion: (Excluding derivations – Only Problems)
Absolute and relative measures of dispersion – Range, Quartile Deviation, Variance and Standard deviation – merits and demerits, properties with simple applications   5
Measures of Skewness & Kurtosis: (Excluding derivations – Only Problems)
Skewness and Kurtosis – based on moments with simple problems   4

UNIT-II   **15Hrs**
Correlation Analysis: (Excluding derivations – Only Problems)
Correlation – definition, types and methods to calculate correlation   2
Karl Pearson's correlation coefficient   3
Spearman's Correlation coefficient – (with and without repeated ranks)   4
Regression Analysis: (Excluding derivations – Only Problems)
Definition and types of regression equations,
methods to calculate the regression coefficients   1
Regression equations x on y and y on x – simple problems   3
Evaluation metrics – mean absolute error, root mean square error,
R^2 value, mean square error – Formula only   2

UNIT-III   **15Hrs**
Probability: (Excluding derivations – Only Problems)
Probability – basic terminology   2
Addition and multiplication theorems of probability - simple problems   3
Bayes' theorem – simple problems   3

Random Variables: (Excluding derivations – Only Problems)
Discrete and continuous random variables, probability mass function and probability density
function   3
Mathematical Expectations: (Excluding derivations – Only Problems)
Definition, addition and multiplications theorems on expectations – simple problems   2
Variance and covariance using mathematical expectations – properties
and simple problems   2

UNIT-IV   **15Hrs**
Probability Distributions: (Excluding derivations – Only Problems)
Discrete Distributions: Binomial distribution – fitting of Binomial distribution and
applications   3
Poisson distribution – fitting of Poisson distribution and applications   2
Normal distribution – Properties, area property and importance of normal distribution   3
Testing of Hypothesis: (Excluding derivations – Only Problems)
Sampling distribution, null and alternative hypothesis, type I and type II errors, critical region
and level of significance   2
Test of Significance for Large Sample Tests (Excluding derivations – Only Problems)
Tests of significance for single and difference of proportion   2
Tests of significance for single and difference of means   2
Tests of significance for difference of standard deviations   1

UNIT-V   **15Hrs**
Tests of Significance for Small Sample Tests (Excluding derivations – Only Problems)
Chi – square tests for single population variance, goodness of fit and independence of attributes
                                                                             6
t – tests for single mean and difference of means (independent and paired)   6
F – tests for difference of variances   3

ESSENTIAL READING
1.   S. C. Gupta, (2011), **Fundamentals of Statistics**, New Delhi India: Himalaya
Publishing House.
2.   Jay L. Devore, **Probability & Statistics for Engineering and Sciences**, Eight Edition,
2012, Cengage Learning.
3.   Michael Baron, **Probability and Statistics for Computer Scientists**, Second Editions,
2014, CRC Press.

SUGGESTED READING
1.   Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye, **Probability
and Statistics for Engineering and Scientists**, Ninth Edition, 2012, Pearson Publication.
2.   V.K. Kapoor and S.C. Gupta 2007. **Fundamentals of Mathematical Statistics.** New
Delhi: Sultan Chand& Sons.
3.   Guptha S. P. (2021), **Statistical Methods**, 46th Edition, Sultan Chand and Sons
Publication.
4.   Goon AM, Gupta MK, Das Gupta B.2007 **Fundamentals of Statistics Vol-I**.
Kolakota: The world press Pvt. Ltd.
5.   M. Jagan Mohan Rao and Papa Rao, 2010 **A Text book of Statistics Paper-I.** Tenali:
Deepti Publications
6.   Willam Feller. 1990 **Introduction to Probability theory and its applications.
Volume –I**, New Delhi: Wiley Publications.

VECTOR CALCULUS & NUMBER THEORY
(CORE COURSE – 4)

Credits: 4   **Semester: II**

Subject Code: CSML23202   **No. of Lecture hours: 75**

Objectives: The objective of the course is to present in user friendly introduction to Vector calculus and its applications. To Study basic structures and properties of Integers.

Outcomes:
 CO1: Understand the derivatives and partial derivatives to apply on vector functions.
 CO2: Use the Gradient operator to find the directional derivative of scalar functions.
CO3: Understand the various integration theorems relating to line, surface, and volume integrals.
 CO4: Enhance the domain knowledge of number theory and acquire the ability to apply number theory algorithms and procedures to basic problems.
 CO5: Get acquainted with the linear Congruences and significant theorems in Number theory.

UNIT- I   **15Hrs**
Introduction of vectors and algebra of vectors. Fundamentals of ordinary and Partial derivatives (No question is to set from this topic)   3
Vector differentiation – problems   3
The necessary and sufficient conditions for a vector function to have a constant magnitude and constant direction -geometrical meaning of the derivative of vector function.   4
Vector Integration-Problems.   5

UNIT – II   **15Hrs**
Gradient – directional derivative of a scalar function – the equations of the tangent plane and normal to a surface.   5
Divergence and Curl and simple problems thereon   4
Vector Identities – simple problem there on.   6

UNIT – III   **15Hrs**
Green's theorem, Gauss' theorem, and Stroke's theorem (proof of these theorems are not required) – simple problems there on.   15

UNIT – IV   **15Hrs**
Divisibility-Division Algorithm - Euclid's Algorithm   5
Greatest Common Divisor-Properties of GCD   4
The Diophantine equation, $ax + by = c$ & problems thereon   3
Primes – The fundamental theorem of Arithmetic   3

UNIT – V   **15Hrs**
Congruences- Properties – Solution of Congruences   5
Fermat's theorem and applications   5
Wilson's Theorem and applications   5

ESSENTIAL READING
1.   Vector calculus – J.N. Sharma & A. R. Vasishta (Units 1, 2 & 3).
2.   David M. Burton 2004: Elementary Number Theory – (Units 4 & 5).

FUNDAMENTALS OF DATA STRUCTURES USING 'C'
(CORE COURSE – 5)

Credits: 4   **Semester: II**

Subject Code: CSML23203   **No. of Lecture Hours:75**

Objective: To focus on different methods of sorting, searching, storing data and understanding time and storage efficiency.

Outcomes: Students will be able to
CO1: Choose appropriate data structures to represent data items in real world problems
CO2: Illustrate non-linear data structures like linked list
CO3: Organize the data using sorting in various linear data structures and determine time complexity
CO4: Construct data with nonlinear data structure using trees.
CO5: Explain the concept of graphs and b trees

UNIT – I	**15hrs**
Introduction to Data Structures	1
Stacks- Definition and various operations performed on stacks	5
Queues - Definition and various operations performed on queues	5
Stack applications	
Notations - Prefix, Postfix, Infix	1
Conversions – Infix to Postfix, Infix to Prefix	3
UNIT – II	**15hrs**
Data Representation, Concept of linked list	2
Advantages of Linked List, Types of linked list	1
Linear Linked list - Various operations performed on singly linked list	4
Doubly Linked List - Various operations performed on singly linked list	4
Circular Linked List	2
Applications of Linked Lists	2
UNIT – III	**15hrs**
Trees	
Definition and properties	2
Binary Trees-Definition and Representation of Binary trees	2
Operations: insertion, deletion, search	2
Tree traversal techniques- in order, pre order, post order	3
AVL trees	
Definition and representation of AVL Trees	3
Operations on AVL trees- insertion, deletion	3
UNIT – IV	**15hrs**
Sorting methods	
Bubble sort	2
Insertion sort	2
Selection sort	2
Merge sort	2
Quick sort	2

Searching methods	
Linear search	2
Binary search	2
Comparison and analysis	1

UNIT – V	**15Hrs**
Graphs	
Terminology & Representations	1
Definition and representation of graph	2
Graph Traversal -BFS, DFS	3
B-Trees	
Definition and representation of B-Trees	2
Operations on B- Tree-insertion, deletion, search	2
File Structures - Physical Storage Media File Organization	2
Sequential Files, Indexing and Hashing, Primary indices, Secondary indices	2
Indexing and Hashing Comparisons.	1

ESSENTIALREADING:
1. Kanetkar, Yashvanth.2008. **Data Structures through C.**India: BPB Publications.
2. Tanenbaum, A.M.Langsam,Y.Augenstein,M.J.Data **Structures Using C.** New Delhi: Pearson Education.

SUGGESTED READING:
1 Balagurusamy, E. **C Programming& Data Structures**. Tata McGrawHill.
2 KrishnaMoorthy,R.IndiraniKumaravel, G. 2008.**Data Structures Using C**. Tata Mc Graw Hill Publishing Company Ltd.

PYTHON PROGRAMMING
(CORE COURSE – 6)

Credits: 4   **Semester: II**

Course Code: CSML23204   **No. of Lecture Hours: 60**

Objectives:
- To help the students understand the fundamentals of object-oriented programming.
- To emphasize on learning important principles of software development and provide practice in developing small-scale programs.

Outcomes:
CO1: Explain the basics of Python Programming constructs.
CO2: Sub divides larger problems into smaller ones using functions.
CO3: Apply various data structures problem-solving.
CO4: Construct Python programs as a set of objects.
CO5: Select an appropriate exception handling depending on application and design file operations and Concurrent programming using Python standard library

UNIT – I   **12Hrs**
Basics of Python Programming: Features, History and future of Python,
writing and executing first Python program,
Flavors of Python, Python Virtual machine,
Memory management, Garbage Collection, comparison among C, Python and Java   2
Literal constants-Numbers, strings, Variables and Identifiers,
Data types, Input Operation and Print Output, comments, reserved words   2
Operators and Expressions in Python, Other Data Types -Tuples, dictionary, list.
Type conversion, type () and Is Operator   2
Decision control statements- if statement, if-else statements, Nested if, if-elif-else   3
Basic Loop structure- while loop, for loop, selecting an appropriate loop, nested loops,
Break Statement, continue statement, pass statement, else statement used with loops   3

UNIT-II   **12Hrs**
Functions and modules-Need for functions, function definition, function call,
variable scope and life time, Return statement,
function definition using required argument, keyword argument, Default argument   3
Lambda functions, Recursive functions   2
Modules—The from...import statement, Name of module, making your own module   2
The dir( ), the Python module, modules and Namespaces   2
Packages in Python, Standard Library modules, Function redefinition   3

UNIT- III   **12Hrs**
Python String: Introduction—concatenating, Appending, multiplying strings,
Strings are Immutable, string formatting operator   2
Built-in String methods and functions, slice operation   2
Ord( ) and chr( ) functions, in and not in operators, comparing and iterating strings   2
The String module   2
Data Structures: Sequence, Lists, Functional programming: filter (), map () and reduce ()
function, Tuple, sets   2

Dictionaries — creating dictionary, adding, modifying, sorting and deleting item in dictionary, looping and nested dictionary Built-in dictionary functions, difference between list and dictionaries   2

UNIT- IV   **12Hrs**
Classes and objects-Introduction, defining classes, creating objects, data abstraction   2
Class method and self-argument, the init () method, class variables and object variables,
The del () method, other special methods, public and private data members,
private methods, Calling a class method from another class method,
built-in functions to check   2
Get, Set and Delete Class Attribute, Built-in class attribute   2
Inheritance: Introduction, inheriting classes in Python, Types of Inheritance   2
Composition or containership or complex objects, abstract classes and interfaces   2
Operator overloading—Introduction, Implementing operator overloading,
reverse Adding Meta class   2

UNIT- V   **12Hrs**
Error and Exception Handling- Introduction to errors and exceptions, handling Exceptions   1
Multiple except blocks, multiple exceptions in a single block,
except block Without exception   1
Raising Exceptions, Instantiating exceptions, handling exceptions in invoked   2
Functions, Built-in and user defined exceptions, the finally block, File Handling-Introduction,
File path, Types of Files-ASCII text file, Binary file, Opening and closing files   2
Reading and writing files-write (), writelines (), append (), readline ()
File positions, renaming and deleting files, Directory methods   2
Threads: single-tasking, multitasking, difference between process and thread, Concurrent programming and GIL, uses of thread   2
Create threads in Python, thread class methods, single and multitasking using Threads, thread synchronization, deadlock of threads, thread communication.   2

ESSENTIAL READING:
1.   Thareja, Reema. 2017. Python Programming. 3rd Edition. New Delhi: Oxford HED
2.   Dr. R. NageshwaraRao. 2018. Core Python Programming. 2nd Edition. DreamTech Press.

SUGGESTED READING:
1.   BalaGuruSwamy, E. 2017. Problem Solving and Python Programming. 1st Edition. McGraw Hill Education
2.   Gowrishankar S, Veena A. 2019. Introduction to Python Programming. CRC Press, Taylor & Francis Group.

PROBABILITY & STATISTICS FOR ML PRACTICALS
(SEC – 2)

Credits   : 1   **Semester: II**

Subject Code :   CSML23205   **No. of Practical Hours: 30**

Objective: To prepare students for lifelong learning and successful careers using their statistical skills.

Outcome: Students will be able to perform basic statistical analysis using R programming.

PRACTICAL ARE PERFORMED USING R PROGRAMMING.

LIST OF PRACTICALS

1.   Calculation of central tendencies
    i.   Mean
    ii. Median
    iii. Mode
    iv. Geometric mean
    v.   Harmonic mean.
2.   Calculation of dispersion
    i.   Range
    ii. Quartile deviation
    iii. Variance and
    iv. Standard deviation.
3.   Calculations of skewness and kurtosis.
4.   Calculation of correlation using Spearman' s method and Karl Pearson's method
5.   Calculation of regression lines x on y and y on x with evaluation metrics.
6.   Generation of random numbers for
    i.   Binomial distribution
    ii. Poisson distribution
    iii. Normal distribution.
7.   Performing test of significance using
    i.   t – tests for single mean
    ii.   t – tests for difference of means (independent samples)
    iii. t – tests for difference of means (paired samples)
    iv.   F – tests for difference of variances
    v.   Chi – square tests for single population variance
    vi.   Chi – square tests for independence of attributes.
    vii. Chi – square tests for goodness of fit.

FUNDAMENTALS OF DATA STRUCTURES USING 'C' PRACTICALS
(CORE COURSE – 5)

Credit: 1   **Semester: II**

Subject Code: CSML23203   **No. of Practical Hours: 30**

Objective: To develop applications using data structure concepts.
Outcome: Students will be able to identify, design, implement, test and debug the appropriate data structure for a given problem.

Programs
1. Program to find transpose of a sparse matrix
2. Program to find the sum of two 2-D arrays of order 2X2
3. Program to find the transpose of a matrix
4. Program to find the upper triangle of an array
5. Program to find the trace of a 2-D array
6. Program to find the lower triangle of an array
7. Program to find the addition of two sparse matrix
8. Program to perform linear search
9. Program to implement binary search
10. Program to implement bubble sort
11. Program to implement insertion sort
12. Program to implement selection sort
13. Program to implement quick sort
14. Program to implement merge sort on 2 sorted lists
15. Program to implement stack operations using array
16. Program to implement queue operations using array
17. Program to implement stack operations using linked list
18. Program to implement queue operations using linked list
19. Program to convert infix expression to postfix
20. Program to evaluate a postfix expression
21. Program to create a linked list
22. Programs to perform insertion and deletion operations on the linked list
23. Program to concatenate two lists
24. Program to copy a list into another list
25. Program to split a list into two linked lists
26. Program to search for a node in the list.
27. Program to find the number of elements in the list
28. Program to illustrate tree traversal techniques.
29. Program to implement graph traversals

PYTHON PROGRAMMING PRACTICALS
(CORE COURSE - 6)

Credits: 1   **Semester: II**

Course Code: CSML23207   **No. of Practical Hours: 30**

Objectives: To strengthen problem-solving ability by applying the characteristics of an object-oriented approach in Python.

Outcome: Students will be able to develop applications using object-oriented concepts of varying complexities.

1. Write a program that takes two integers as command line arguments and prints the sum of two integers.
2. Program to display the information: Your name, Full Address, Mobile Number, College Name, Course Subjects
3. Program to find the largest number among 'n' given numbers.
4. Program to find the sum of all prime numbers between 1 and 1000.
5. Program that reads set of integers and displays first and second largest numbers.
6. Program to check whether the character is digit or alphabet or space.
7. Program to sum of series $1+1/2+1/3+……+1/n$
8. Program to print the sum of first 'n' natural numbers.
9. Program to perform operations on two matrices such as add, product and transpose
10. Program to find the roots of a quadratic equation
11. Write both recursive and non-recursive functions for the following:
12. To find GCD of two integers
13. To find the factorial of positive integer
14. To print Fibonacci sequence up to given number 'n'
15. To convert decimal number to Binary equivalent
16. Program to print calendar of a month given start date and number of Days.
17. Program with a function that accepts two arguments: a list and a number 'n'. It should display all the numbers in the list that are greater than the given number 'n'.
18. Program with a function to find how many numbers are divisible by 2, 3,4,5,6 and 7 between 1 to 1000
19. Program that accept a string as an argument and return the number of vowels and consonants the string contains.
20. Program that accepts two strings S1, S2, and finds whether they are equal are not.
21. Program to count the number of occurrences of characters in a given string.
22. Program to find whether a given string is palindrome or not
23. Program with a function that takes two lists L1 and L2 containing integer numbers as parameters. The return value is a single list containing the pair wise sums of the numbers in L1 and L2.
24. Program to read the lists of numbers as L1, print the lists in reverse order without using reverse function.
25. Program for functional programming – map, reduce, filter.
26. Write a program that combine lists L1 and L2 into a dictionary.
27. Program to find mean, median, mode for the given set of numbers in a list.
28. Program to find all duplicates in the list.
29. Program to find all the unique elements of a list.
30. Program to find max and min of a given tuple of integers.

31. Program to find union, intersection, difference, symmetric difference of given two sets.
32. Program to display a list of all unique words in a text file
33. Program to copy contents of a file.
34. Program to count number of times a character appears in a file.
35. Program to read the content of a text file and display it on the screen line wise with a line number followed by a colon
36. Program to analyze the two text files using set operations
37. Write a program to print each line of a file in reverse order.
38. Program to create class rectangle to print area of the rectangle.
39. Program to implement the inheritance
40. Program to create class polygon and derive rectangle and triangle class to find areas
41. Program to implement on threads
42. Program to demonstrate user defined exception
43. Program to implement the polymorphism
44. Program to overload + operator on complex object

YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS

SCHOOL OF INFORMATICS

B. SC. COMPUTER SCIENCE & MACHINE LEARNING

THIRD SEMESTER, ACADEMIC YEAR 2024 – 25 OF 2023 – 26 BATCH (CBCS)

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	ES23301	Environmental Studies and Gender Sensitization **(AECC – 5)**	3	3	40	60	100	3
2.	II	CSML24301	ML for Everyone **(GE (ID) -1)**	2	3	40	60	100	2
3.	II	CSML24302	DBMS **(Core – 7)**	4	3	40	60	100	4
4.	II	BS18335	Discrete Mathematics **(Core – 8)**	5	3	40	60	100	4
5.	II	CSML24303	Digital Logic and Design **(Core – 9)**	4	3	40	60	100	4
6.	II	CSML24304	Introduction to AI **(Core – 10)**	4	3	40	60	100	4
PRACTICALS									
7.	II	CSML24305	ML for Everyone Practical's **(GE (ID) -1)**	2	3	40	60	100	1
8.	II	CSML24306	DBMS Practical's **(Core – 7)**	2	3	40	60	100	1
9.	II	CSML24307	Digital Logic and Design Practical's **(Core – 9)**	2	3	40	60	100	1
10.	II	CSML24308	Introduction to AI Practical's **(Core – 10)**	2	3	40	60	100	1
Total				**30**	**-**	**400**	**600**	**1000**	**25**

*Ability Enhancement Compulsory Course (AECC)

GENERIC ELECTIVE (A.Y. 2024 – 25)

(INTER – DEPARTMENTAL/ INTER – DISCIPLINARY)

UG COURSES

S. No.	Name of the Department	GE Course Name
1.	B. Sc. Chemical Technology	Solar Processing Techniques
2.	B. Sc. (Hons) Agriculture	Principles of Organic Farming
3.	B. Sc. Computer Science & Engineering	PC Operating Systems
4.	B. Com. Honours	Taxation
5.	B. Sc. Computer Systems & Engineering	PC Hardware and Software installation
6.	B. Com. Marketing	Principles of Marketing
7.	B. Sc. Biotechnology, Chemistry & Genetics	Medical Lab Technology
8.	B. A. Mass Communication	Film Appreciation
		Photography
9.	B. Sc. Food Technology & Management	Food Processing & Quality Control
10.	B. A. Psychology, English & Journalism	Communication Skills
		Career Skills
		Psychology for living
11.	B. Sc. Mathematics, Statistics & Computer Science	Quantitative Aptitude
		Statistics - Data Analysis
12.	B. Sc. Multimedia and Animation	Creative Arts
13.	B. Com. Computer Applications	Accounting
14.	B. B.A. (Bachelor of Business Administration)	Principles of Management
15.	B. Com. International Finance	Project Management
16.	B. Sc. Computer Data Science & Data analytics Engg.	Python Programming
17.	B. Com. (Hons) Strategic Finance	Goods & Service Tax
18.	B. Com. Business Process Management	Financial Markets
19.	B. Sc. Food Science, Nutrition and Dietetics	Principles of Nutrition and Dietetics
20.	B. Co. Business Studies	Banking
21.	B. Sc. Computer Science & Cognitive Systems	Introduction to worksheets
22.	B. Com. Business Analytics	Principles of Insurance
23.	B. Sc. Computer Science & Artificial Intelligence	LISP programming
24.	B. Sc. Computer Science & Cyber Security	Principles of Information Security
25.	B. A. Economics, Public Administration & Computer Science	Human Rights
26.	B. Com. Information Systems	Human Resource Management
27.	B. Sc. Computer Science & Cloud Computing	Web Programming
28.	B. Sc. Computer Science & IOT	Introduction to IOT using Arudino
29.	B.B.A. Entrepreneurship Development	Startup Management
30.	B. B. A. Retail Operations Management	Consumer Behavior
31.	B. Sc. Computer Science & Machine Learning	ML for everyone
32.	B. B.A Tourism	Tourism Management

ENVIRONMENTAL STUDIES AND GENDER SENSITIZATION
(AECC – 5)

Credits   : 3   **Semester: III**

Subject Code: ES23301   **No. of Lecture hours: 45**

Objectives:

• TounderstandtheimportanceofecologicalbalanceforSustainableDevelopment

• Tounderstandtheimpactsofdevelopmentalactivitiesandmitigationmeasures

• To understand the environmental policies and regulations.

• To develop students' sensibility with regard to issues of gender in contemporary India

• To provide a perspective on the socialization of men and women

• To expose the students to debate on the politics and economic works and on gender violence.

Outcome:

• Students will gain knowledge on environmental aspects and involve themselves in acquiring a sustainable environment.

• Students will be sensitized towards gender issues in the society and the laws enforced for their protection.

Course Outcomes:

CO l: Understand the importance of Environmental education, conservation of natural resources & understand the importance of ecosystems and biodiversity.

CO 2: Understand pollution problems and apply environmental science knowledge on solid waste management, disaster management.

CO 3: Apply the environmental science knowledge to improve the resources Evaluate and understand the sustainable environmental conditions and control methods.

CO 4: Identify the interactions and inter sections of identities (e.g., gender, race, ethnicity class, sexuality, and so on) and assess the ways in which they contribute to instances of privilege and power dynamics across cultures, space, and time. And their problems

CO 5: Understand gender problems and ways of addressing them, including interactions across local to global scales in communities and overcome inequalities with legislation.

UNIT – I   **9 Hrs**

NATURAL RESOURCES, ECOSYSTEM AND BIODIVERSITY

Definition, scope, and importance of environmental studies.

Need for public awareness.

Renewable and non – renewable resources, brief account on forests, water, minerals, and energy (solar, wind and geo – thermal and bio – energy).

Definition of Ecosystem, structure, and decomposers. Energy flow and example ecosystems – Forest, Desert, aquatic ecosystems.

Definition of biodiversity, types (Genetic, Species, Ecosystem), India Mega diversity Nation.

Hotspots, threats to biodiversity, conservation of biodiversity (In – Situ and Ex – Situ).

UNIT – II   9 Hrs

ENVIRONMENTAL POLLUTION

- Definition of environmental pollution.
- Brief account on causes, effects, prevention and control measures of
a)   Air pollution
b)   Water pollution
c)   Soil pollution
d)   Noise pollution
e)   Marine pollution
- Solid Waste management: Causes, effects, and control measures of urban industrial wastes.
- Disaster Management: floods, earthquakes, and cyclones.

UNIT – III   9 Hrs

SOCIAL ISSUES AND ENVIRONMENT

- Rainwater harvesting, water shed management, and from unsustainable to sustainable development.
- Global warning, ozone depletion, and acid rain.
- Environmental Legislation: Air Act, Water Act, Environmental Protection Act, Forest Act, Wildlife Act.
- Environmental and human health – HIV/ AIDS
- Welfare Programs – Family, Women & child welfare, population explosion.
- Role of information Technology in environmental studies.

UNIT – IV   9 Hrs

GENDER STUDIES

- Why should we study gender issues?
- Socializing – making women and making men
- Being together as equals – through lens of gender
- Missing women – gender selection and its consequences.
- Health issues of women.

UNIT – V   9 Hrs

GENDER & LABOUR – GENDER VIOLENCE AND LAW

- Housework - The invisible labour – my mother does not work "share the load"

- Women's work: Role in politics and Economics fact and fiction. Unrecognized and unaccounted work. Wages and conditions of work.
- Sexual harassment – say no eve teasing – the caste based violence – Nirbhaya Act.
- Domestic violence – Is home a safe place? Blaming the victim. - Domestic violence Act
- Forums of justice – Hindu Inheritance Act (2005).

SUGGESTED READING:

- A Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasuda Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, 2010. Towards a World of Equals: A Bilingual Text on Gender. Hyderabad: Telugu Akademi.
- Rajagopalan R, 2015, Environmental Studies – From crisis to Cure. Third Edition. Chennai, Oxford University Press.
- Dr. D K Asthana and Dr. Meera Asthana, 2014, A textbook of Environmental Studies Revised Edition. New Delhi: S Chand & Company.
- Anubha Kaushik and C. P. Kaushik Published, 2016, Perspectives in Environmental Studies. Fifth Edition, New Delhi: New Age International.

(For Gender Sensitization)

- Sen Amartya, More than One Million women are Missing, New York Review of Books (20 December 1990) print. We were Making History…..Life stories of Women in the Telangana people's struggle. New Delhi, Kali for Women 1998.
- Tripati Lahiri, By the Numbers: Where Indian Women Work. Women's Studies Journal (14 November 2012).
- K Satyanarayana and Susie Tharu Ed. Steel Nibs are Sprouting: New Dalit Writing from South India Dossier 2: Telugu and Kanada code = 372.
- Vimala Vantillu (The Kitchen). The women writing in India: 600 BC to the present. Volume II, The 20th century. Ed. Suise Tharu and K. Laitha, Delhi: Oxford University Press, 1995.
- Shatrughna, Veena, Women's work and its impact on Child health and Nutrition. Hyderabad. National Institute of Nutrition, Indian Council of Medical Research 1993.

MACHINE LEARNING FOR EVERYONE

(GE (ID) – I)

Credits : 2	**Semester: III**
Subject Code : CSML24301	**No. of Lecture hours: 30**

Objectives: To understand the basic theory underlying Machine Learning. To formulate ML problems corresponding to different applications. To understand the range of ML algorithms along with their strengths and weaknesses.

Course Outcomes:

CO l: Understand the concepts of model selection, model complexity etc.

CO 2: Understand the fundamental issues, challenges, of Machine learning, importance of data preprocessing.

CO 3: Understand subtleties and application scenarios for different supervised classification.

CO 4: Construct various instant based learning and learning set of rules.

CO 5: Understand the concepts of neural networks architecture and various algorithms used.

UNIT I	**6 Hrs**
• Introduction to Machine Learning for Everyone	1
• Machine Learning History	1
• Interesting Applications of Machine Learning	1
• Machine Learning Model Lifecycle	1
• A Day in the life of a Machine Learning Engineer	1
• Tools for Machine Learning	1

UNIT II	**6 Hrs**
• Types of Machine Learning	1
• Well-Posed Learning Problem	
• Applications Of Machine Learning	
• Issues In Machine Learning	1
• Preparing To Model	
• Basic Data Types; Exploring Numerical Data; Exploring Categorical Data	2
• Exploring Relationship Between Variables	
• Steps involved in data preprocessing: handling NULL values and missing values	
• Case study on mtcars dataset with and without missing values.	2

UNIT III	**6 Hrs**
• Supervised learning – Regression: Simple linear regression	
• Multiple linear regression	3
• Classification: k-Nearest neighbour, support vector machine	

- Case study on house rent prediction   3

UNIT IV   6 Hrs

- Unsupervised learning: Basics of unsupervised learning   1
- clustering techniques-association rules- Apriori algorithm, K means, Hierarchical   2
clustering.
- applications of clustering techniques, case study on customer segmentation.   3

UNIT V   6 Hrs

- Basics of Neural Network: Understanding biological neuron and artificial neuron
- types of activation functions   2
- McCulloch Pitt's neural network with AND and OR gates
- architectures of neural network   2
- learning process in ANN and what is back propagation (no algorithm required)   1

ESSENTIAL READING:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, 2018, "Machine Learning", 1st Edition, Pearson Education.

DATABASE MANAGEMENT SYSTEMS (DBMS)
(CORE COURSE - 7)

Credits : 4	**Semester: III**
Subject Code : CSML24302	**No. of Lecture hours: 60**

Objectives:

- To form the basis for the bulk management of data.

- To offer the power to logically present the databases to individual usage as well.

- To provide facilitates for data access, enforcing data integrity, managing concurrency and restoring the data from backups.

Outcome:

CO1: Represent logical database using Entity Relationship and enhanced ER Model.

CO2: Formulate database using relational algebra and organize relation using normalization.

CO3: Design SQL Queries and implement PL/SQL.

CO4: Classify the storage and file structure, storage access, indexing and hashing techniques of the database.

CO5: Explain the concept of transaction, recovery system and concurrency control.

UNIT - I	**12 Hrs**
1. **Introduction:** Introduction to DBMS, System Structure	2
2. DDL, DML	2
3. Data Dictionary, Data base Administrator, DBA	2
4. Database levels, Data Independence	2
5. Data Base Design and E-R model: Entity – Relationship model, properties Constraints and Occurrences	2
6. **Enhanced entity relationship model:** generalization, Specialization Aggregation, Design Considerations	2

UNIT - II	**12 Hrs**
1. **Relational model:** Structure	2
2. Reduction to Relational Schema	2
3. Relational Algebra	2
4. Modification of the Database	2
5. Normalization: First, Second	2
6. Third Normal forms and BCNF	2

UNIT - III   **12 Hrs**

1. **SQL:** Data Definition, Basic Structure of SQL Queries   1

2. Set Operations, Aggregate functions   2

3. Null Values, Nested Sub Queries   2

4. Joins, Modifications of the database, views   2

5. PL/ SQL: Programming, Procedures   1

6. Triggers, Cursors   1

7. Application Design & Development: Authorization in SQL – Granting of privileges   1

8. Granting privileges in SQL, roles, revoking of privileges, authorization on views, functions and procedures   1

9. Application security – Encryption Techniques   1

UNIT - IV   **12 Hrs**

1. File Organization, Organization of records in files   1

2. Indexing and Hashing: Index sequential, B+ tree index   2

3. Static Hash Functions, Dynamic Hash function   1

4. Comparison of Hashing and Indexing   1

5. Database System Architecture: Centralized   1

6. Client – Server & Server System Architectures   1

7. Distributed Databases: Homogeneous & Heterogenous Databases, Cloud – Based Databases   3

8. Concurrency Control in Distributed Databases   2

UNIT – V   **12 Hrs**

1. **Recovery System:** Failure classification   1

2. **Transactions:** Transaction concept, states   1

3. Implementation of atomicity and durability, concurrent executions   1

4. Serializability, testing for serializability   1

5. Concurrency Control: Lock based Protocols   1

6. Locks, granting of locks, two – phase locking protocols   1

7. Dead lock handing   2

8. Vector Databases: Introduction, difference between vector index and vector database, working of vector databases.   2

9. Graph databases: Introduction, graph database types,

working of graphs and graph databases, advantages of graph database   2

ESSENTIAL READING:

1. Korth H.F. Silberschatz, S.Sudharshan, **Database System Concepts**. 5th Edition. New Delhi: Tata McGraw Hill Publishing Company Ltd.

2. Ivan Bayross. 2009, **SQL, PL / SQL (The Programming Language of Oracle)**, 4th Revised Edition. NewDelhi: BPB publications.

3. https://www.pinecone.io/learn/vector-database/

4. https://www.oracle.com/in/autonomous-database/what-is-graph-database/

SUGGESTED READING:

1. Fred R. McFadden, Jeffrey A Hoffer, Mary B.1999. **Modern Database Management**. 5th Edition. Asia: Pearson Education.

DISCRETE MATHEMATICS
(CORE – 8)

Credits   : 4   **Semester: III**

Course Code: BS18335   **No. of Lecture Hours: 75**

Objective:

- To introduce lattices, Graph theory and to familiarize with the basic concepts of Number theory.

Course Outcomes:

CO1: Develop understanding of Logic Sets and Functions

CO2: **Evaluate** and apply the fundamental concepts in graph theory

CO3: **Develop** an understanding of how graph and tree concepts are used to solve problems arising in the computer science.

CO4: Express the concepts and results of Number Theory.

CO5: **Identify** methods and techniques used in number theory.

UNIT- I   **15 Hrs**
LATTICES

1.	Relations and ordering	3
2.	Partial order relations - Partially ordered sets	3
3.	Hasse diagrams	3
4.	Lattices - Properties of lattices	3
5.	Types of Lattices	3

UNIT II   **15 Hrs**
GRAPH THEORY – I

1.	Definition of a graph, Degree of vertex	3
2.	First theorem of graph theory Paths and connection	3
3.	Isomorphism of graphs	3
4.	Some special simple graphs	6

UNIT III   **15 Hrs**
GRAPH THEORY – II

1.	Trees and their properties	9
2.	Binary trees, Binary search trees, Spanning trees, Kruskal's Algorithm,	

Prim's Algorithm, Planar graphs, Euler's formula	6

UNIT IV   15 Hrs

GRAPH THEORY-III

1.	Euler graphs	5
2.	Hamiltonian graphs- Grinberg theorem	5
3.	Chromatic numbers	5

UNIT-V   15 Hrs

ELEMENTS OF NUMBER THEORY

1.	Divisibility- Division algorithm	1
2.	Euclid' algorithm	2
3.	Properties of G.C.D	2
4.	Primes – Fundamental theorem of Arithmetic.	2
5.	Congruence's – Properties	2
6.	Fermat's theorem and its Applications	3
7.	Wilson's theorem and its Applications	3

ESSENTIAL READING:

1. Tremblay Jean, P. and Manohar, R. 2007. **Discrete Mathematical Structures with Applications to Computer Science.** New Delhi: McGraw-Hill. (For Unit I)

2. Mott Joe, L. Kandel Abraham. And Baker Theodore, P. 1999. **Discrete Mathematics for Computer Scientists and Mathematicians.** 2nd Edition. New Delhi: PHI (For Units II, III and IV)

3. Burton David, M. 2010. **Elementary Number Theory**. 7th Edition. New Delhi: McGraw-Hill. (For Unit V)

DIGITAL LOGIC AND DESIGN
(CORE COURSE – 9)

Credits   : 4   **Semester: III**

Subject Code: CSML24303   **No. of Lecture hours: 60**

Objectives:

- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

- To prepare students to perform the analysis and design of various digital electronic circuits.

Course Outcome:

CO1: Convert different type of codes and number systems which are used in digital communication and computer systems.

CO2: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO3: Analyse different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4: Design different types of with memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

CO5: Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.

UNIT-I	**12Hrs**

Number system and Logic gates:

Conversions of Binary, octal, Decimal & hexadecimal number systems	3
Complements (1's and 2's complement methods),	1
Binary addition and subtraction (1's and 2's complement methods).	2
Binary Codes-decimal Codes, Error detection codes, reflected Code	2
Logic gates- OR, AND, NOT, XOR, NAND, NOR gates and their Truth tables	1
Design of basic gates using the Universal gates- NAND and NOR gates.	1
Multilevel NAND circuits (implementation of a function only)	1
Exclusive –OR and equivalence functions(parity generation & checkers)	1

UNIT-II 12Hrs

Logic families and Boolean algebra:

Transistor-Transistor Logic: TTL totem pole output, open collector output 2

Tri-state gate

CMOS (Complementary metal oxide semi-conductor) – NAND, NOR gate 1

Boolean algebra- Laws and identities, DeMorgan's Theorems. 1

Simplification of Boolean expressions using Boolean identities 2

Reduction of Boolean expressions using Karnaugh Maps - Sum of Products (SOP) representation (up to four variables) including don't care conditions. 6

UNIT-III 12Hrs

Combinational Circuits:

Introduction, Design procedure 2

Half adder, Full adder and parallel adder logic circuits 3

Sub tractors 1

Code conversion(BCD to Excess-3 Code) 1

Multiplexer 2

De-Multiplexer 1

Decoder (3 to 8) 1

Encoder (8 to 3). 1

UNIT-IV 12Hrs

Sequential Circuits:

Introduction, Difference between Combinational and sequential 1

Flip-flops - SR, D, JK, T and Master-Slave JK 4

Flip flop excitation tables 2

Shift Registers : Types of Shift Registers (SISO, SIPO, PISO, PIPO) 2

4-bit bidirectional universal shift register 1

Analysis of clocked sequential circuits 2

UNIT -V 12Hrs

Counters:

Design of counters 2

4-bit Asynchronous (Ripple) counter 2

Modulo-N counter 2

synchronous counter.	2
Memory: ROM, PROM, EPROM, EEPROM	2
SRAM &DRAM	2

ESSENTIAL READINGS:

1.   Digital Electronics G. K. Kharate 2013 Oxford University Press.

2.   Mano Morris M. 2008. Digital logic and Computer design. 3rd edition. New Delhi. Prentice Hall

3.   Puri V.K.1997. Digital Electronics: Circuits and Systems.1st edition. New Delhi: Tata McGraw Hill.

4.   Jain R.P. 2009. Modern digital electronics. 4th edition New Delhi: McGraw Hill Education.

5.   Malvino & Leech. 1993. Digital principles and Applications. 8th edition. New Delhi: Tata Mc Graw Hill Education.

INTRODUCTION TO AI
(CORE COURSE – 10)

Credits: 4   **Semester: III**

Course Code: CSML24304   **No. of Lecture Hours: 60**

Objective: To familiarize with basic principles of AI and learn various applications of AI.

Course Outcomes:

CO1: Explain types and AI applications.

CO2: Apply search algorithms to solve AI problems.

CO3: Infer first order logic to represent knowledge.

CO4: Explain various reasoning in AI.

CO5: Develop AI problems using prolog.

UNIT-I   **12Hrs**

1. Introduction, History, types and applications of AI   2

2. Intelligent Agent-types of agents, Intelligent agent, Agent Environment   2

3. Turing Test in AI   1

PROBLEM SOLVING THROUGH AI

4. Introduction, representation of AI problems   2

5. Production system, Algorithm of Problem solving   1

6. Examples of AI problems-Water Jug Problem, Magic Square, TSP   2

7. Missionaries and Cannibals problem, Towers of Hanoi, Nature of AI problems   2

UNIT-II   **12Hrs**

1. Search Algorithms, Uninformed Search Algorithms   4

2. Informed search algorithms-Best-first search, A*, AO* Algorithm   3

3. Constraint satisfaction, Means Ends Analysis   3

4. Min-Max search and alpha-beta pruning   2

UNIT-III   **12Hrs**

1. Knowledge based agent, knowledge representation-types of knowledge   3

2. Knowledge representation techniques, Propositional logic   3

3. Rules of inference, Wumpus world- Knowledge base   3

4. First order logic, Inference in FOL, Unification and resolution in FOL   3

UNIT-IV   **12Hrs**

1. Forward and backward chaining, Forward vs Backward chaining   2

2. Reasoning in AI, Inductive vs Deductive reasoning   3

3. Probabilistic reasoning in AI, Bayes theorem and Bayesian Belief network   4

PLANNING

4. Planning-components, block world planning, identifying solution, Goal stack

Planning   3

UNIT - V   **12Hrs**

1. Introduction to Prolog, Basics, Relations, Prolog Syntax, data objects   3

2. Types of Prolog, Operators, Loop and Decision Making   3

3. Conjunctions and disjunctions, Lists, recursion and structures   3

4. Backtracking, Inputs and outputs, different and not, clauses and predicates   3

ESSENTIAL READING:

1. Kumar, Ela. 2019. "Artificial Intelligence", 1st Edition. I.K International Publishing House Pvt. Ltd. India: New Delhi.

2. RusselJ,Stuart. Norvig, Peter. 2015. Artificial Intelligence, A Modern Approach. 3rd Edition. Pearson Education. New Delhi: India.

SUGGESTED READING:

1. Kaushik, Saroj. 2019. Artificial Intelligence. First Edition. CENGAGE LEARNING. India: New Delhi

2. Rich, Eliane. , Knight, Kevin, Nair. Shiv Shanker. 2008. Artificial Intelligence. 3rd Edition. TMH. India: New Delhi

MACHINE LEARNING FOR EVERYONE PRACTICAL

(GE (ID) – I)

Credits   : 1   **Semester: III**

Subject Code : CSML24305   **No. of Practical hours: 30**

Objectives: To understand the basic theory underlying Machine Learning. To formulate ML problems corresponding to different applications. To understand the range of ML algorithms along with their strengths and weaknesses.

Outcome: To understand the features of machine learning and to apply them on real world problems.

Note: Practical's to be performed using Weka software.

List of Practical Programs:

1.   Read an excel sheet to Weka environment.
2.   Read a csv and Excel files to Weka environment.
3.   Read table into Weka environment.
4.   Data pre-processing – checking null values, data types –changing data types to numerical if needed.
5.   Implement linear regression.
6.   Implement multiple linear regression.
7.   Implement k means algorithm.
8.   Implement SVM.
9.   Implement k nearest neighbor.
10.   Implement apriori algorithm.

CASE STUDIES:

Case Study 1: Movie Recommendation System

Scenario: An online streaming platform wants to enhance user experience by recommending movies based on user preferences.

Objective: Develop a basic recommendation system using user ratings and movie metadata.

Tasks:

  - Explore and preprocess movie ratings data.

  - Implement a simple collaborative filtering algorithm.

  - Evaluate the recommendation system's effectiveness.

Supervised Learning

Case Study 2: Predicting Housing Prices

Scenario: A real estate agency wants to predict housing prices based on various features like square footage, number of bedrooms, and location.

Objective: Build a regression model to predict house prices.

Tasks:

  - Collect and preprocess housing data.

  - Train a linear regression model using scikit-learn.

  - Evaluate the model's performance and interpret coefficients.

Unsupervised Learning

Case Study 3: Customer Segmentation for an E-commerce Platform

Scenario: An online retailer wants to understand its customer base and tailor marketing strategies.

Objective: Apply clustering algorithms to segment customers based on their purchasing behavior.

Tasks:

  - Analyze and preprocess customer transaction data.

  - Apply K-Means clustering to identify customer segments.

  - Visualize and interpret the customer segments.

DBMS PRACTICAL
(CORE COURSE - 7)

Credits: 1   **Semester: III**

Subject Code: CSML24306   **No. of Practical hours: 30**

Objective: To facilitate data access, enforcing data integrity, managing concurrency and restoring the data from backups.

Outcome: Students will be able to design principles for logical design of databases, including the E -R method and normalization approach.

List of Practical Programs

1.   Create Employee Table with the following Fields

Eno, ename, joining date, salary, job, commission, deptno

Eno	Ename	Salary	Job	Commission	Joiningdate	Deptno
1	Sita	5000	Clerk	800	12-jan-90	10
2	Rita	8000	Salesman	600	25-mar-02	20
3	Geetha	54000	HR	700	11-jun-05	30
4	Rahul	8900	Finance	850	15-dec-10	10
5	swetha	15000	Marketing	900	18-sep-09	20

Execute the following Queries.

a)   Insert at least 5 records.

b)   Write a query to display the data in table as follows:

c)   Write a query to eliminate duplicate rows using select statement.

d)   Write a query to sort the data in a table.

e)   Write a query to create a table from another table.

f)   Write a query to creating a table from a table by specifying certain condition.

g)   Write a query to insert data into a table from another table.

h)   Write a query to creating a table from a table by specifying certain condition.

i)   Write a query to modify the structure of the table.

j)   Write a query to drop a column from a table.

k)   Queries using Aggregate Functions, Sub Queries.

2.   Create a department table with the following fields.

Deptno, deptname, Location

Deptno	Department Name	Location
10	Clerk	New York
20	Sales	Sydney
30	Hr	Dallas
10	Finance	Texas
20	marketing	North Carolina

 Execute the following on EMP & Dept database
a)   Orderby clause

b)   Date Functions

c)   Group By Clause

d)   Sub Queries

e)   Group Functions

f)   Joins

g)   Set Operators

h)   Views

3.   Create Table Student with the following Fields sno, sname, group, marks, percentage.

Sno	Group	Sub1	Sub2	Total Marks	percentage
1	BA	53	78	131	54
2	BSC	86	45	131	64
3	BCOM	79	23	102	51
4	BBA	42	98	140	70
5	MSC	56	46	102	51

Execute the Following Queries:
a)   Write a query to find the average of marks of Student table.

b)   Write a query to find the minimum value of marks of student table.

c)   Write a query to find the maximum value of marks of student table.

d)   Write a query to implement count function in student table.

e)   Write a query to implement sum function in student table.

PL/SQL Programs
1.   PL/SQL to add two numbers.

2.   PL/SQL to find factorial of a number.

3.   PL/SQL for demo on for loop

4.   PL/SQL for case structure

5.   PL/SQL/ for simple loop

6.   PL/SQL to increase the value by 10.

7.   PL/SQL for performing arithmetic operations.

8.   PL/SQL to find square, cube, double of a number.

9.   PL/SQL program to swap two numbers.

10.   PL/SQL program to find multiplication tables.

11.   PL/SQL to determine whether a year is leap year or not

12.   PL/SQL to delete an item whose itemnum=4

13.   PL/SQL program for inverting a number.

14.   PL/SQL program to calculate the area for circle for value of radius ranging from 3 to 7

15.   Write a program to print empno, ename, job and salary of an employee given empno

16.   Write a PL/SQL block that will increase the salary by 100 if salary is greater than 1000 for a empno.

17.   Write a PL/SQL block using the cursor to display details of all employees from emp table whose sum of sal and commission is greater than 2000.

18.   PL/SQL to update salary of an employee whose empno and increment mentioned.

19.   Write a PL/SQL block which accepts the empno from the user and display the details of the employee. When the user enters an empno that is not in the emp table then PL/SQL block must display an appropriate message to the user

20.   PL/SQL that creates a trigger that inserts or update values of ename, job as lower-case strings.

21.   PL/SQL to implement standalone procedure in INOUT mode.

22.   PL/SQL to create a function to find out total number of Employees in the emp table.

23.   PL/SQL to handle ZERO_DIVIDE Exception.

DIGITAL LOGIC & DESIGN PRACTICAL
(CORE COURSE – 9)

Credit:1   **Semester: III**

Course Code: CSML24307   **No. of practical hours: 30**

Objectives:

- To implement simple logic operations using combinational logic circuits.

- To design combinational and sequential logic circuits in virtual and real environments.

Outcome: Students will be able to implement and design simple logical operations using combinational and sequential logic circuits.

List of Experiments:

1.   Study of Logic Gates.
2.   Design of Adders and Subtractors (Half, Full and Binary).
3.   Study of Magnitude Comparator.
4.   Code Converter.
5.   Parity Generators and Checkers.
6.   Study and Design of Flip Flops using gates and IC's.
7.   Design of Registers using Flip Flops and ICs.
8.   Design of Counters using Flip Flops and ICs.
9.   Simulation experiments: Adder, subtractors.
10.   RS & JK flipflops.

INTRODUCTION TO AI PRACTICAL
(CORE COURSE – 10)

Credits: 1   **Semester: III**

Course Code: CSML24308   **No. of practical hours: 30**

Objective: To demonstrate problems in AI.

Outcome: Identify the problems where Artificial Intelligence techniques are applicable.

List of Practical Programs:

1.   Write a program in Prolog to implement simple facts and Queries.
2.   Write a program in Prolog to Print the age and name of the person.
3.   Write a program in the prolog to implement the sum of 3 numbers.
4.   Write a program in Prolog to implement simple arithmetic.
5.   Write a program in Prolog to implement temperature conversion.
6.   Write a program in Prolog to implement square root and check even or odd.
7.   Write a program in Prolog to check whether the character is lowercase or uppercase.
8.   Write a program in Prolog to implement a minimum of two numbers.
9.   Write a program in Prolog to implement the length of the string.
10.   Write a program in Prolog to implement the Concatenation of two strings.
11.   Write a program in the prolog to implement the factorial of a number.
12.   Write a program in Prolog to implement the Fibonacci series.
13.   Write a program in Prolog to print numbers from 1 to 10.
14.   Write a program in Prolog to implement GCD and LCM of two numbers.
15.   Write a program in Prolog to find the length of a list.
16.   Write a program in Prolog to find the sum of numbers in the list.
17.   Write a program in Prolog to find the maximum number in the list.
18.   Write a program in Prolog to implement the Reverse of a list.
19.   Write a program in Prolog to Check for membership in a list.
20.   Write a program in Prolog to perform the insertion, deletion, append, and concatenation of a list.
21.   Write a program in Prolog to check for even or odd lengths in the list.
22.   Write a program in Prolog to Perform read and write operations.
23.   Write a program in Prolog to implement simple arithmetic.
24.   Write a program in Prolog to solve the Tower of Hanoi.
25.   Write a program in Prolog to solve 8 Puzzle problems.
26.   Write a program in Prolog to solve the 4 - Queens problem.
27.   Write a program in Prolog to solve the Traveling salesman problem.
28.   Write a program in Prolog for Water jug problem.

YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS

SCHOOL OF INFORMATICS

B. SC. COMPUTER SCIENCE & MACHINE LEARNING

FOURTH SEMESTER, ACADEMIC YEAR 2024 – 25 OF 2023 – 26 BATCH (CBCS)

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	CSML24401	Software Engineering & Agile Methodologies **(Core - 11)**	4	3	40	60	100	4
2.	II	CSML24402	Web Technologies **(Core - 12)**	4	3	40	60	100	4
3.	II	CSML24403	Data Mining **(SEC - 3)**	5	3	40	60	100	4
4.	II	CSML24404	Design and Analysis Algorithms **(GE - 2)**	5	3	40	60	100	4
5.	II	CSML24405	Introduction to Machine Learning **(Core – 13)**	4	3	40	60	100	4
6.	II	CSML24406	Operating Systems **(Core – 14)**	4	3	40	60	100	4
PRACTICALS									
7.	II	CSML24407	Web Technologies Practical's **(Core - 12)**	2	3	40	60	100	1
8.	II	CSML24408	Introduction to Machine Learning Practical's **(Core – 13)**	2	3	40	60	100	1
	Total			**30**		**320**	**480**	**800**	**26**

*Ability Enhancement Compulsory Course (AECC)
* Skill Enhancement Course (SEC)
* Generic Elective (GE)

SOFTWARE ENGINEERING & AGILE METHODOLOGIES
(CORE COURSE - 11)

Credits   : 4   **Semester: IV**

Subject Code: CSML24401   **No. of Lecture hours: 60**

Objectives:

- To enable students to learn software engineering principles
- To learn the theoretical foundation from the view of Object-Oriented Concepts.

Course Outcome:

CO1: Design software through various process models.

CO2: Analyze Object-Oriented concepts and various models.

CO3: Choose different designs and architectures.

CO4: Explain components, golden rules, and design evaluation.

CO5: Select testing techniques and about DevOps.

UNIT - I   **12 Hrs**

1. The evolving role of software, software, changing nature of software   2

2. Legacy Software, Software Myths   2

3. Software engineering-layered technology, Process Framework   2

4. CMMI, Process patterns, Personal and Team Process   2

5. Process Models: waterfall, incremental, evolutionary process models   2

6. Agile Process Models   2

UNIT- II   **12 Hrs**

1.   Requirements Engineering tasks, initiating requirements engineering process   2

2.   Eliciting requirements   1

3.   Developing Use Cases, Building analysis Model   2

4.   Negotiating and validating requirements   2

5.   Requirements analysis, analysis modeling approaches, Data modeling Concepts   2

6.   Object-oriented analysis, Scenario-based modeling, Flow oriented modeling   2

7.   Class-based modeling, creating behavioral model   1

UNIT - III   **12 Hrs**

1.   Design Process and Quality   2

2.   Design concepts and Design model   2

3.	Pattern Based software design	2
4.	Software architecture, Data design, Architectural styles and Patterns	2
5.	Architectural design, Assessing alternative architectural design	2
6.	Managing Data flow into Software architecture	2

UNIT - IV   12 Hrs

1.	Introduction to Components, designing class-based components	2
2.	Conducting component level design, Object constraint language	2
3.	Design conventional components	2
4.	Golden Rules, User Interface Analysis and Design	2
5.	Design Evaluation	2
6.	Software Metrics and its types	2

UNIT - V   12 Hrs

1.	A Single approach to Software Testing, Software Quality	1
2.	Strategic issues, Test strategies for Conventional Software	2
3.	Validation testing, System Testing	1
4.	Testing fundamentals, Black box and White Box Testing	2
5.	Devops: Introduction, cloud as a Platform-Operations.	2
6.	Deployment Pipeline: Architecture-Building and testing.	2
7.	Case Study: Migrating to Microservices	2

ESSENTIAL READING

1. Pressman, Rogers S. 2015. Software Engineering, A Practitioner's Approach. 8th Edition. McGraw Hill Education.

2. Jennifer Davis and Ryn Daniels 2016. Effective Devops, 1st edition O'Reilly publication.

SUGGESTED READING

1. Deepak Jain. 2009. Software Engineering. New Delhi: Oxford University Press.

2. Rajib Mall. 2018. Fundamentals of Software Engineering. 5th Edition. New Delhi: PHI.

3. Sommerville. 2007. Software Engineering. 9th Edition. New Delhi: Pearson Education.

WEB TECHONOLOGIES
(CORE COURSE – 12)

Credits : 4	**Semester: IV**
Subject Code : CSML24402	**No. of Lecture hours: 60**

Objectives:

To design and develop web pages using HTML and CSS.

Course Outcome:

CO1: Illustrate basic HTML scripts to design web pages.

CO2: Explain about cascading style sheets.

CO3: Analyze java script programming using operators, expressions, functions.

CO4: Classify event handling in java script and introduction to XML.

CO5: Develop PHP programs and database connectivity through MySQL.

UNIT – I	**12 Hrs**
Origin and evolution of HMTL and XHTML, basic syntax	3
Document structure	3
Basic text markup, images	2
Hypertext links, lists	2
Tables, forms	2
Frames	2

UNIT – II	**12 Hrs**
CASCADING STYLE SHEETS	
Introduction, level of style sheets, style specification format	3
Selector forms, property value forms	3
Font properties, List properties	2
Color, alignment of text, the box model	2
Background images, the <span> and <div> tags	2

UNIT – III	**12 Hrs**
JAVASCRIPT	
Overview, object orientation and JavaScript	2
General synthetic characteristics	2

Primitives, operations, expressions	2
Control statement, screen output and keyboard input	2
Object creation and modifications, arrays, functions	2
Pattern matching using regular expressions	2

UNIT – IV   **12 Hrs**

EVENT HANDLING JAVA SCRIPT

Document object model, element access in JavaScript	2
Events and event handling	2
Human events from body, button, text box and password elements	2
Moving elements, element visibility, changing color and fonts	2

XML

Introduction, syntax, document structure, DTD	2
Displaying XML documents with CSS, XSLT style sheets	2

UNIT – V   **12 Hrs**

Overview of PHP, General synthetic characteristics	2
Primitives, Operations and Expressions	2
Output, control statements, arrays, functions	2
Pattern matching, Form handling, Files, Cookies, and session tracking	2
Database access through web: Architectures for database access	2
MySQL Database System, Database access with PHP and MySQL	2

ESSENTIAL READING:

1.   Sebesta, Robert W. 2008. **Programming the World Wide Web.** 4th Edition. New Delhi: Pearson Education.

DATA MINING

(SEC - 3)

Credits   : 4   **Semester: IV**

Subject Code: CSML24403   **No. of Lecture hours: 75**

Objective: To get familiar with mathematical foundations of data mining tools and master the techniques in various applications.

Course Outcomes:

CO1: Understand the functionality of various data mining and data warehousing components.

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models.

CO3: Characterize the kinds of patterns that can be discovered by association rule mining.

CO4: Discover interesting patterns from large amounts of data to analyze for predictions and classifications.

CO5: To **organize** unlabeled data into groups based on their similarities.

UNIT – I	**15 Hrs**
Moving toward the Information Age	1
Data Mining as the Evolution of Information Technology	1
Database Data, Data Warehouses, Transactional Data, Other Kinds of Data	2
Class/Concept Description: Characterization and Discrimination	1
Mining Frequent Patterns, Associations, and Correlations	1
Classification and Regression for Predictive Analysis	1
Cluster Analysis	1
Outlier Analysis	1
Statistics, Machine Learning	2
Database Systems and Data Warehouses	1
Information Retrieval	1
Business Intelligence, Web Search Engines	2

UNIT – II	**15 Hrs**
Data Mining overview, Data Warehouse and OLAP Technology	1
Data Warehouse Architecture	1
Steps for the Design and Construction of Data Warehouses	2
A Three-Tier Data Warehouse Architecture	1

OLAP, OLAP queries, metadata repository	2
Data Preprocessing – Data Integration and Transformation	2
Data Reduction	2
Data Mining Primitives: What Defines a Data Mining Task?	1
Task-Relevant Data, The Kind of Knowledge to be Mined.	1
KDD	2

UNIT – III   **15 Hrs**

Mining Association Rules in Large Databases.	1
Association Rule Mining, Market Basket Analysis: Mining A Road Map.	1
The Apriori Algorithm: Finding Frequent Item Sets Using Candidate Generation	2
Generating Association Rules from Frequent Item Sets	2
Improving the Efficiently of Apriori, Mining Frequent Item sets without Candidate Generation	
Multilevel Association Rules.	2
Approaches to Mining Multilevel Association Rules.	2
Mining Multidimensional Association Rules for Relational Database and Data Warehouses	
Multidimensional Association Rules	2
Mining Quantitative Association Rules	1
Mining Distance-Based Association Rules	1
From Association Mining to Correlation Analysis	1

UNIT – IV   **15 Hrs**

Introduction to classification and prediction	1
Issues Regarding Classification and Prediction.	1
Classification by Decision Tree Induction.	2
Bayesian Classification, Bayes Theorem, Naïve Bayesian Classification	2
Classification by Backpropagation	1
A Multilayer Feed-Forward Neural Network	1
Define Network Topology	1
Classification Based on Concepts from Association Rule Mining	1
Other Classification Methods, k-Nearest Neighbor Classifiers	2
Genetic Algorithms, Rough Set Approach, Fuzzy Set Approaches	1
Prediction, Linear and Multiple Regression, Nonlinear Regression	1
Other Regression Models, Classifier Accuracy	1

UNIT – V	15 Hrs
Introduction to clustering, Types of Data in Cluster Analysis	1
A Categorization of Major Clustering Methods	1
Classical Partitioning Methods: k-Means and k-Medoids	2
Partitioning Methods in Large Databases: From k-Medoids to CLARANS	2
Hierarchical Methods, Agglomerative and Divisive Hierarchical Clustering	2
Density-Based Methods	2
Wave Cluster: Clustering Using Wavelet Transformation	2
CLIQUE: Clustering High-Dimensional Space, Model-Based Clustering Methods	2
Statistical Approach, Neural Network Approach.	1

ESSENTIAL READING:

1. Jiawei Han, Jian Pei, HangHang Tong, "Data Mining Concepts and Techniques", fourth Edition, 2022, Morgan Kaufmann Publishers, Elsevier.

2. Charu C. Aggarwal, "Data Mining - The Textbook", 2015, Springer Nature Publisher.

DESIGN AND ANALYSIS ALGORITHMS

(GE - 2)

Credits : 4	**Semester: IV**
Subject Code: CSML24404	**No. of Lecture hours: 75**

Objective: To understand data structures and emphasizes design and analysis of algorithms.

Course Outcomes:

CO1: Define elementary data structures.

CO2: Explain divide and conquer, greedy methods with examples.

CO3: Explain divide and conquer, greedy methods with examples.

CO4: Explain back tracking and branch and bound.

CO5: Analysis of NP – Hard and NP – complete problems.

UNIT – I	15 Hrs
Definition of an algorithm	
Algorithm specifications, Performance analysis	3
Randomized algorithms	4
Elementary Data Structures	
Stacked and queues, trees, Dictionaries	4
Sets and disjoint set union, Graphs	4

UNIT – II	15 Hrs
Divide and Conquer	
Binary search, finding maximum and minimum	3
Merge sort, quick sort	4
The Greedy Method	
Knapsack problem, tree vertex splitting	4
Minimum cost spanning trees, Single source shortest paths.	4

UNIT – III	15 Hrs
Dynamic Programming	
General Method, multistage graphs	3
All – pairs shortest path, single source shortest path	3
The travelling salesperson problem.	3

Basic traversal and search techniques

Techniques for binary trees	3
Techniques for graphs	3

UNIT – IV   **15 Hrs**

Back Tracking

General method, 8 – Queens problem, Knapsack Problem.	7

Branch – Bound

The method, 0/1 knapsack Problem, Travelling salesperson	8

UNIT – V   **15 Hrs**

NP – Hard and NP – complete problems

Basic concepts, Cook's Theorem	7
NP – Hard graph problems, Some simplified NP – Hard Problems	8

ESSENTIAL READING:

1.E. Horowitz, S. Sahni, S. Rajasekaran, 2007, "Fundamentals of Computer Algorithms", 2nd edition, Hyderabad University Press.

SUGGESTED READING:

1.Pannerselvam. R, 2007, "Design Analysis of Algorithms", PHI, New Delhi.
2.Hari, Mohan Pandey, 2009, "Design analysis and Algorithms", University Science Press, India.

3.TH Cormen, CE Leiserson, RL Rlvert, C. Stein, 2010, "Introduction to Algorithms", 3rd Edition, PHI, New Delhi.

4.PH Dave, HB Dave, 2008, "Design and Analysis of Algorithms", Pearson Education, New Delhi.

INTRODUCTION TO MACHINE LEARNING
(CORE - 13)

Credits **: 4**	**Semester: IV**
Subject Code: CSML24405	**No. of Lecture hours: 60**

Objectives:

• To understand the concepts of machine learning

• To understand supervised and unsupervised learning and their applications

• To learn aspects of computational learning theory.

Course Outcomes:

CO1: Understand the fundamental issues and challenges of machine learning and basics of Python for machine learning

CO2: Classify the supervised learning algorithms and apply to the given data set.

CO3: **Identify** the underlying relationships within and across unsupervised Machine Learning algorithms

CO4: Evaluate and interpret the results of Neural Networks

CO5: Design and **implement** advanced machine learning algorithms

UNIT – I: Introduction to Machine Learning	**12 Hrs**
Overview of Machine Learning: Definition, scope and applications	2
Types of learning: Supervised, unsupervised and reinforcement	2
Basic concepts and Python basics for ML	
Understanding datasets, features and labels	2
Exploratory data analysis, data visualization	3
Libraries: NumPy, Pandas, Matplotlib	3

UNIT – II: Supervised Learning	**12 Hrs**
Linear regression: Basic and mathematical representation	3
Introduction to regression: linear and multiple regression	3
Classification algorithms: logistic regression, KNN, decision trees, SVM	3
Evaluation metrics: accuracy, precision, recall	3

UNIT – III: Unsupervised Learning	**12 Hrs**
Clustering: K – Means, Hierarchical clustering	4
Dimensionality reduction: PCA	4

Association rule learning: Apriori algorithm   4

UNIT – IV: Introduction to Neural Networks   **12 Hrs**

Basics of Neural Networks: Neurons, layers, activation functions   4

Feedforward and backpropagation   4

Types of neural networks: MLPs, CNNs, RNNs   4

UNIT – IV: Advanced Topics in Machine Learning   **12 Hrs**

Natural Language Processing (NLP): Basics and applications in text processing   3

Transfer learning: Understanding transfer learning   2

Applications of pre – trained models   2

Artificial Intelligence Integration: Exploring intersections between AI and ML   1

Applications and synergies   1

Reinforcement learning fundamentals: Basics, algorithms, and key concepts   3

ESSENTIAL READING:

1. Ethem Alpaydin , 2020, "An Introduction to Machine Learning" 4th Edition, MIT Press.

2. Sebastian Raschka, Vahid Mirjalili, 2019, "Python Machine Learning", 3rd Edition, Packt Publishing Ltd.

3. Aurelien, 2022, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools and techniques to build Intelligent Systems" 3rd Edition, Shroff/O'Reilly.

SUGGESTED READING:

1. Andrew NG, 2018, "Machine Learning Yearning – Technical Strategy for AI Engineers, in the Era of Deep Learning", 1st Edition.(Web link)

2. Christopher M. Bishop, 2016, "Pattern Recognition and Machine Learning" Softcover reprint of the original 1st ed. 2006, Springer Publication.

OPERATING SYSTEMS
(CORE COURSE - 14)

Credits   : 4   **Semester: IV**

Subject Code: CSML24406   **No. of Lecture hours: 60**

Objective: To learn the core ideas in operating systems, process management, memory processing, CPU Scheduling, concurrent programming, dead locks and file systems.

Course Outcome:

CO1: Describe and compare different structures for operating systems.

CO2: Understand and analyze theory and implementation of process.

CO3: Understand what is deadlock and how it occurs when giving mutually exclusive access to multiple resources.

CO4: Understand the concepts of file system interface.

CO5: Define segmentation of memory management in operating systems.

UNIT – I	**12 Hrs**
Introduction to operating systems, mainframe systems, desktop systems	2
Multiprocessor systems, distributed systems, clustered systems	2
Real time systems, handheld systems	2
Operating system structures – system components	2
Operating systems services, system calls	2
System programs, system structures, virtual machine	2

UNIT – II	**12 Hrs**
Process concept, process scheduling	3
Operation on processes, cooperating processes	3
Inter process communication	3
Process Scheduling – basic concepts, scheduling criteria, scheduling algorithms	3

UNIT – III	**12 Hrs**
Process synchronization – critical selection problem	3
Semaphores, monitors	3
Deadlocks: deadlock characterization, methods for handling deadlocks	3
Deadlock prevention, deadlock avoidance, deadlock detection	3

UNIT – IV   **12 Hrs**

File system: file concept, access methods   3

Directory structure, file system mounting, file system sharing   3

File system implementation – file system structures, file system implementation   3

Directory implementation, allocation methods, free space management   3

UNIT – V   **12 Hrs**

Memory management – swapping, contiguous memory allocation   2

Fragmentation – internal and external fragmentation   2

Paging, segmentation, segmentation with paging   2

Virtual memory management – demand paging   2

Page replacement algorithms, thrashing and working set model   2

workstations: Introductions, types – single CPU, multi – GPU

and optimized modeling with NVIDIA GPU acceleration, Edge XT workstation.   1

features, performance, technologies, configurations of the above-mentioned workstations. 1

ESSENTIAL READING:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 2017, "Operating System Concepts", 8th Edition, Wiley India.

SUGGESTED READING:

1. Andrew S, Tanenbaum, 2009, "Modern Operating Systems", 3nd Edition, Prentice Hall India Learning Private Limited.

WEB TECHNOLOGIES PRACTICAL
(CORE COURSE – 12)

Credits   : 1   **Semester: IV**

Subject Code: CSML24407   **No. of Practical Hours: 30**

Objective:

To develop web applications using HTML, JavaScript, XML.

Outcome:

Students will be able to develop dynamic web pages using Java Script, gain knowledge in server-side scripting with PHP language, and parsing XML.

1-2.   Programs to demonstrate basic HTML tags.

3-4.   Programs to demonstrate on different types of lists.

5-6.   Programs to demonstrate frames, forms, tables creation.

7.   Programs to demonstrate on inline, external, embedded style sheets.

8-9.   Programs to demonstrate control structures.

10.   Programs to demonstrate functions, arrays.

11.   Programs to demonstrate XML document.

12.   Programs to demonstrate on DTD and its XML document.

13.   Programs to demonstrate control structures in PHP.

14-15. Programs to demonstrate arrays and functions in PHP.

INTRODUCTION TO MACHINE LEARNING PRACTICAL

(CORE - 13)

Credits : 1	**Semester: IV**
Subject Code: CSML24408	**No. of Practical Hours: 30**

Objective: To develop a general-purpose algorithm that solves a practical and focused problem.

Outcome: To provide basic grounding in concepts such as training and testing sets, overfitting, and error rates.

List of Practical Programs:

1. Linear Regression

2. Logistic Regression

3. K Nearest Neighbour (KNN)

4. Decision Tree algorithm

5. Support Vector Machine (SVM)

6. K Means algorithm

7. Apriori algorithm

8. Artificial Neural Networks (ANN)

CASE STUDIES:

Case Study 1: Movie Recommendation System

Scenario: An online streaming platform wants to enhance user experience by recommending movies based on user preferences.

Objective: Develop a basic recommendation system using user ratings and movie metadata.

Tasks:

  - Explore and preprocess movie ratings data.

  - Implement a simple collaborative filtering algorithm.

  - Evaluate the recommendation system's effectiveness.

Supervised Learning

Case Study 2: Predicting Housing Prices

Scenario: A real estate agency wants to predict housing prices based on various features like square footage, number of bedrooms, and location.

Objective: Build a regression model to predict house prices.

Tasks:

 - Collect and preprocess housing data.

 - Train a linear regression model using scikit-learn.

 - Evaluate the model's performance and interpret coefficients.

Unsupervised Learning

Case Study 3: Customer Segmentation for an E-commerce Platform

Scenario: An online retailer wants to understand its customer base and tailor marketing strategies.

Objective: Apply clustering algorithms to segment customers based on their purchasing behavior.

Tasks:

 - Analyze and preprocess customer transaction data.

 - Apply K-Means clustering to identify customer segments.

 - Visualize and interpret the customer segments.

Neural Networks

Case Study 4: Image Classification of Animals

Scenario: A zoo wants to automate the classification of animals in images captured by security cameras.

Objective: Build a neural network model to classify images into different animal categories.

Tasks:

 - Collect and preprocess a dataset of animal images.

 - Implement a simple neural network using a deep learning framework.

 - Train the model and assess its accuracy.

BRIDGE COURSE

Title: Basics of Mathematics, Electronics & Computer Science

Semester: I   **Number of Lecture Hours: 15 Hours**

Objective: To assist the students in transitioning smoothly from their previous educational level to the current one.

Outcome: The course enables the students to improve their skill sets and makes them ready with confidence to pursue their current education.

MATHEMATICS   **5 Hrs**

1. Differential Equations- Order and Degree of the Differential Equations

2. Differential equations of first order and First Degree

3. Methods of solving Differential Equations- Variables separable- Homogeneous Equations

4. Non- Homogeneous Equations

ELECTRONICS   **5 Hrs**

Resisters and color-coding

Units and measurements

Measuring instruments – CRO, multi-meter, etc.

Capacitors

Boolean Algebra

COMPUTER SCIENCE   **5 Hrs**

1. Introduction: What is a computer, characteristics of a computer

2. Generations of computers.

3. Classifications of computers.

4. Applications of computers.

5. Input and output devices.

SELF STUDY COURSE

Title: IT ACT

Semester: IV   **No. of Lecture Hours: 30**

Objectives: IT ACT explains the cyber laws that are in place to keep cybercrimes in check. In addition to cyber laws, it elaborates various IT Security measures that can be used to protect sensitive data against potential cyber threats.

Outcome: Students will be able to gain knowledge on cyber laws and IT security.

UNIT – I   6 Hrs
1. Introduction to Cyber Law & IT Act Overview
2. Cyberspace, Cyber security, Cyber security Policy and Cyber Crime
3. Information Technology Act, Mission and Vision Cyber security Program
4. Cyber Law – Objectives, Emerging Trends of Cyber Law
5. Create Awareness, Areas of Development

UNIT – II   6 Hrs
1. Cyber Law - Intellectual Property Right
2. Types of Intellectual Property Rights
3. Advantages of Intellectual Property Rights
4. Intellectual Property Rights in India
5. Intellectual Property in Cyber Space

UNIT – III   6 Hrs
1. Cyber Law - Strategies for Cyber Security
2. Strategy 1 − Creating a Secure Cyber Ecosystem
3. Strategy 2 − Creating an Assurance Framework
4. Strategy 3 − Encouraging Open Standards
5. Strategy 4 − Strengthening the Regulatory Framework
6. Strategy 5 − Creating Mechanisms for IT Security
7. Strategy 6 − Securing E-Governance Services
8. Strategy 7 − Protecting Critical Information Infrastructure

UNIT – IV   6 Hrs
1. Cyber Law - Policies to Mitigate Cyber Risk
2. Mitigate Risks through Human Resource Development
3. Cyber Law - Network Security, Types of Network Security Devices and Firewalls
4. Antivirus, Content Filtering, Intrusion Detection Systems
5. Cyber Law - I.T ACT, Features of I.T Act

UNIT – V   6 Hrs
1. Scheme of I.T Act, Application of the I.T Act and Amendments Brought in the I.T Act
2. Intermediary Liability, Highlights of the Amended Act
3. Cyber Law – Signatures: Digital Signature

4. Electronic Signature and Digital Signature to Electronic Signature
5. Cyber Law - Offence & Penalties, Offences and Compounding of Offences

ESSENTIAL READING:

1.   Brian Craig, **Cyber law: The Law of the Internet and Information Technology** 1st Edition
2.   Heather Harrison Denniss**, Cyber Warfare and the Laws of War (Cambridge Studies in International and Comparative Law)** Reprint Edition

SUGGESTED READING:

1. Saurabh Sharma, **Information Security and Cyber Laws Paperback** November 1, 2010.