Name of the Programme: Bachelor of Computer Applications
Course Code: CSA-100
Title of the Course: Problem Solving and Programming
Number of Credits: 4 (3T + 1P)
Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	1. To understand the concepts and techniques of problems solving. 2. To analyse, understand and build logic to solve basic problems. 3. To design Algorithms and flowcharts for better understanding and documentation for accurate implementation of the problem. 4. To code and implement a well-structured, robust programming logic using a suitable programming language.	
Units	**Content**	**No of hours 75 (45 T + 30 P)**
I.	**Introduction to Problem Solving** 1. Problem Solving Life Cycle – Understanding the Problem Statement, Analyzing the problem, Planning Program design using Hierarchy charts, Expressing Program logic using flowcharts / Pseudocode. 2. Structured Programming concept 3. Modular Programming - Top-Down design, Bottom-up design, Stepwise Refinement	04
II	**Understanding basic problem Solving Tools** 1. Algorithms: Definition & its attributes, algorithm constructs, Statements: Input-Output, Decision-Making, &Looping, Examples 2. Flowchart: Definition & its attributes, symbols, Statements: Input-Output, Decision-Making & Looping, Module representation, Drawing conventions and standards, Examples. 3. Pseudo-code: Definition & its attributes, constructs, and Examples	06
III	**Basic Program Structures** Data & its types (Integer, Floating-point, Character, String), Constants & Variables, scope, Instructions & its types, how computer stores data, Operators (Arithmetic, Assignment, Relational, Logical, etc), Expressions and Equations, Evaluation of expressions, Keywords. Local and Global Variables, Parameters, Return Values, naming conventions & standards, Understanding literals, syntax and semantics, functions and modules.	06

	implemented practically. The broad area of practical problems are mentioned / suggested below.	
Week 1 & 2 [These practicals should be done using pen & paper and using buddy learning strategy]	1. For each of the following tasks, write a set of numbered, step-by-step instructions (a solution) so complete that another person could perform the task without asking questions. Define the knowledge base of this person by listing what you expect the person to know in order to follow your directions. For example, for task "a" (below), make a cup of cocoa, the knowledge base might include such things as knowledge of milk or water, a refrigerator, pan, spoon, cocoa, cup, range top or microwave, and so forth. a. Make a cup of cocoa. b. Sharpen a pencil. c. Walk from the classroom to the student lounge, your dorm, or the cafeteria. d. Start a car (include directions regarding what to do if the car doesn't start). e. Get a glass of water from your kitchen. f. Start your computer. 2. Test your solution in problem 1 by giving your instructions to another person to see whether he or she can accomplish the task without your help. If they can't, modify your solution so that the person can accomplish the task. Check the solution again by giving the instructions to another person.	**04 Hours**
Week 3 & 4	3. Basic Program Structures • At-least 10 basic programming problems related to Unit III to be completed during the practical sessions. • More programs may be given to the learners to complete and practice as part of their Practice Work.	**04 Hours**
Week 5 & 6	4. Basic Sequential Instructions • At-least 08 programming problems related to Unit IV to be completed during the practical sessions. • More programs may be given to the learners to complete and practice as part of their Practice Work.	**04 Hours**
Week 7 & 8	5. Problem Solving with Decisions • At-least 08 programming problems related to Unit V to be completed during the practical sessions. • More programs may be given to the learners to complete and practice as part of their Practice Work.	**04 Hours**

References/ Readings:	1. Maureen Sprankle and Jim Hubbard, Problem Solving and Programming Concepts, Pearson Education India 9th edition (2013) 2. S.Kuppuswamy, S.Malliga, C.S.Kanimozhi Selvi, K.Kousalya. Problem Solving and Programming. 2019, Tata McGraw Hill. 3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India 4. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein Ritchie,ISBN:9788120305960, PHI Learning 5. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, Pearson Education **Article in Online Encyclopedia** 1. https://code.world/ [Accessed: April 15, 2023]. 2. https://raptor.martincarlisle.com/ [Accessed: April 15, 2023].
Course Outcomes:	**On completion of the course, students will be able to –** **1.** Understand the ways and stages of Problem Solving. **2.** Understand basic computing concepts, algorithm design, flowchart design, programming constructs and debugging. **3.** Apply the problem solving & programming concepts in designing solution to simpler problems. **4.** Code and implement a well-structured programming logic using a suitable programming language.

	Concept and computation of gradient, divergence, and curl of a vector field.	
Unit IV	**Ordinary Differential Equations:** Types of differential equations; Order and Degree of a differential equation; Solution of a differential equation; Types of solutions; Formation of a differential equation by eliminating arbitrary constants; Methods of solving first – order and first – degree differential equations.	**10**
Tutorial	**15 hours shall be utilized for solving the following:** 1. Constructing and understanding truth tables. 2. Problems on set theory. 3. Identifying types of relations. 4. Identifying injective/surjective functions. 5. Computing the inverse of a bijective function. 6. Evaluating limits of functions. 7. Testing the continuity/discontinuity of a function and identifying the type of discontinuity. 8. Using the various differentiation rules to find the derivative of a given function. 9. Finding the maximum value of functions. 10. Finding the minimum value of functions. 11. Expressing complex numbers in polar form. 12. Solving problems involving gradient, divergence, and curl. 13. Forming a differential equation. 14. Solving ordinary differential equations – I. 15. Solving ordinary differential equations – II.	**15**
Pedagogy	Lectures/Tutorials/Self-study. Lectures should include theoretical concepts and examples. Tutorial to be exclusively dedicated for problem solving. The record of tutorials may be maintained by students in a separate notebook.	
References/Readings	1) E. Mendelson: *Shaum's Outlines: Beginning Calculus*, 3rd Edition, McGraw Hill Education, 2007. 2) M. R. Spiegel, S. Lipschutz, J. J. Schiller, and D. Spellman: *Shaum's Outlines: Complex Variables*, 2nd Edition, McGraw Hill Education, 2017. 3) M. R. Spiegel, S. Lipschutz, and D. Spellman: *Shaum's Outlines: Vector Analysis*, 2nd Edition, McGraw Hill Education, 2017. 4) R. Bronson: *Shaum's Outlines: Differential Equations*, 3rd Edition, McGraw Hill Education, 2017. 5) S. Lipschutz, and M. L. Lipson: *Shaum's Outlines: Discrete Mathematics*, 3rd Edition, McGraw Hill Education, 2017.	

Name of the Programme: Bachelor of Commerce (Honors)
Course Code: COM-133
Title of the Course: Marketing for Beginners
Number of Credits: 03
Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	Objectives of the Course are: 1. To develop an understanding of various concepts of marketing. 2. To acquaint learners with the knowledge of marketing mix and the skill to develop effective marketing strategy. 3. To acquaint learners with recent trends in marketing and to enable them to understand legal issues in marketing.	
Content:	**Unit 1: Introduction to Marketing** Marketing: Meaning, Nature, Scope of marketing, Need and Importance of Marketing. Selling v/s Marketing. Marketing Philosophies; Marketing Mix (7P's of marketing). Marketing Environment: Concept and importance of marketing environment, Micro and Macro environmental factors. Consumer behaviour: Need for studying consumer behaviour; Stages in Consumer buying decision process; Factors influencing consumer buying decisions.	**15 hours**
	Unit 2: Marketing Mix Decisions Product: Meaning and classification of product. Product life cycle and marketing mix. Branding: concept, functions and qualities of good brand name. Packaging and Labelling- concept and functions; Place; Pricing: Concept, Factors affecting price of a product, Pricing strategies; Promotion: Advertising, Personal selling, sales promotion, Public relation, direct marketing; Distribution channel: Meaning, types and strategies.	**15 hours**
	Unit 3: Recent Trends in Marketing Digital marketing: Meaning, types, Benefits. Traditional marketing v/s Digital marketing. Marketing for services: Meaning, scope and importance. Green marketing, social marketing, Rural marketing, Relationship marketing, Influencer marketing. Legal Issues in marketing- The Consumer Protection Act, 1986; Ethical issues in marketing, Consumerism and need for consumer protection.	**15 hours**
Pedagogy:	Lectures, Group discussions, Seminars, Case studies, Field work	

Name of the Programme : **Bachelor of Arts- English**
Course Code : **ENG-151**
Title of the Course : **Communicative English: Spoken and Written**
Number of Credits : **02**
Effective from AY : **2023-24**

Pre-requisites for the Course:	Interest in improving spoken and written English skills	
Course Objectives:	• To listen, understand and convey information • To listen and respond appropriately to the contributions of others • To understand others and present facts, ideas and opinions • To articulate experience and express what is thought, felt and imagined • To communicate clearly and fluently • To use grammatically correct language • To use a register appropriate to the audience and context	
		No. of Hours
Content:	**UNIT 1** • Verbal and non-verbal Skills: importance of pronunciation, enunciation, diction, articulation, intonation and body language. • Group Discussion: persuasion, negotiation, leading and participating. • Interview Skills: techniques of answering and conducting interviews. • Delivering Speeches: balancing rhetoric and empathy to connect with the audience.	**15**
	UNIT 2 • Communication through Letters: cover letters, letters of goodwill, complaint letters and invitation letters. • Email Correspondence: components, format, attachments, content and language. • Writing Reports: format and steps. • Drafting Speeches: special occasion, motivational, informative, and extemporaneous.	**15**
Pedagogy:	Topics to be taught using interactive teaching and the workshop method.	

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA-142
Title of the Course: Python Programming
Number of Credits: 1T +2P
Effective from AY: 2023-24

Prerequisite for the Course :	Nil
Course Objectives :	1. To understand simple Python programs. 2. To develop Python programs with conditionals and loops. 3. To define Python functions. 4. To use Python data structures -- lists, tuples, dictionaries. 5. To deal with input/ output files in Python. 6. To understand application areas of Python.

#	Title	Content	No of Hours (75)
		THEORY	**15**
I	Introduction to Python	• Data values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments.	**4**
II	Program Flow Control	• Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.	**4**
III	List, Tuple and Dictionary	• Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.	**3**
IV	Files, Modules, Packages	Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages.	**3**

	7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding 9. To promote self-learning give atleast one assignment (equivalent to 50% assignment weightage) where they can complete atleast one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations. 10. One internal practical exam will be conducted as a part of internal evaluation. 11. Practical shall be performed in the laboratory as indicated in the syllabus. 12. A softcopy of e-journal shall be maintained clearly mentioning the name of the experiment and other required information.
References:	1. John V Guttag, Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013 2. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016, 1st Edition 3. Timothy A. Budd, Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015. 4. Kenneth A. Lambert, Fundamentals of Python: First Programs, CENGAGE Learning, 2012, New Edition 5. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/) 6. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
Course Outcomes:	At the end of the course, the students will be able to - 1. Describe the datatypes, various Control Structures used in Python. 2. Decompose a Python program into functions and recursive functions. 3. Represent compound data using Python lists, tuples, and dictionaries. 4. Understanding use of files and packages in Python Programs.

	5. Chatwal G.R. & Sharma H. (2005: A Textbook of Environmental Studies, Mumbai,Himalaya 6. Clark R.S.: Marine Pollution, Oxford, Clanderson 7. Cunningham W.P., Cooper T.H., Gorani E. & Hepworth M.T. (2001): Environmental Encyclopaedia, Mumbai, Jaico. 8. De A.K.: Environmental Chemistry, Wiley 9. Desai R.J. (2003): Environmental Studies, Mumbai, Vipul, Goa University, Taleigao Plateau, Goa 10. Gleick H.P. (1993): Water in Crisis, Stockholm Envt. Institute, OUP 11. Hawkins R.E.: Encyclopedia of Indian Natural History, Mumbai, BNHS 12. Heywood V.H. & Watson R.T. (1995): Environment Protection and Laws, Mumbai, Himalaya 13. Jadhav H. & Bhosale V.M. (1995): Environment Protection and Laws, Mumbai, Himalaya 14. McKiney M.L. & Schoel R.M. (1996): Environment Science, Systems and Solutions, Web Enhanced Edition. 15. Mhaskar A.K.: Matter Hazardous, Techno-Science Publications 16. Miller T.G. Jr.: Environmental Science, Wadsworth 17. Odum E.P. (1971): Fundamentals of Ecology, Philadelphia, W.B. Saunders 18. Rao M.N. & Datta A.K. (1986): Waste Water Treatment, Oxford & IBH 19. Santra S.C. (2004): Environmental Science, Kolkata, Central Book Agency 20. Sharma B.K. (2001): Environmental Chemistry, Meerut, Goel Publishing House 21. Townsend C., Harper J. & Begon M.: Essentials of Ecology, Blackwell Science 22. Trivedi R.K.: Handbook of Environmental Laws, Rules, Guidelines, Compliances and, Standards, Vol.1 & 2, Enviro Media. 23. Trivedi R.K. & P.K. Goel: Introduction to Air Pollution, Techno-Science Publications 24. Wagner K.D. (1998) Environmental Management, Philadelphia, W.B. Saunders Magazines 25. Down to Earth, Centre for Science & Environment, Survey of the Environment published by The Hindu E- resource http://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf
Course Outcomes:	Students will have the ability to 1. Distinguish between renewable and non-renewable resources 2. Understand different ways to manage resources sustainability 3. Appreciate the value of bio-diversity and its management

Name of the Programme	**: B.Sc. Computer Science**
Course Code	**: CSC-100**
Title of the Course	**: Computer Organization**
Number of Credits	**: 4 (3T+1P)**
Effective from AY	**: 2024-25 (Revised version of 2023-24)**

Pre-requisites for the Course:	Nil	
Course Objectives:	1. Conceptualize the basics of Computer Organizational and Architectural issues and classify the computers based on performance and machine instructions. 2. Learn various data transfer techniques and the I/O interfaces 3. Estimate and compare performances of various classes of memory 4. Understand the basics of ALU implementation, hardwired and microprogrammed control units, pipelining and parallel architectures	
Content:		**No of Hours**
	Unit I: Introduction to Logic Gates and Boolean Algebra: Logic Gates, Boolean Algebra, Combinational circuits, Karnaugh Map Data representation: Data Type Representation, Number System, Signed number, fixed, floating point, character representation, Addition, Subtraction, Multiplication - Shift and Add, Booth's Algorithm, DivisionPseudo-code: Definition and its attributes, constructs, and Examples Memory Hierarchy: Hierarchical memory organization, Types of Memory-internal and external, Cache memory, Memory interleaving,	**15**
	Unit II: Introduction to Computer Architecture: Introduction to Computer Architecture, Flynn's Classification of Computers, Performance Metrics (like Latency, throughput), Fundamental Blocks of Computer (like CPU, I/O subsystems, memory, control unit), computer function, interconnection structures, Bus interconnections Peripheral devices: Types of Peripheral Devices, I/O subsystem,programmed I/O, Interrupt-driven I/O, DMA, I/O channels and processors	**15**
	Unit III: Instruction Set Architecture (ISA): Introduction to Instruction Set, Types of ISA; RISC, CISC; Processor Organization, Registers organization, Instruction Execution Cycle, Instruction formats, Addressing Modes; Register Transfer Language (RTL), Assembly Language Programming, X86-Architecture, ARM Architecture	**15**
	Unit IV: Practical Work Writing assembly language programs in 8086 using MASM or compatible assembler either in Windows or Linux.	

Name of the Programme	**: B.Sc. Mathematics**
Course Code	**: MAT-112**
Title of the Course	**: Elementary Statistics**
Number of Credits	**: 4 (3L+1T)**
Effective from AY	**: 2023-24**

Prerequisites for the Course	NIL	
Course Objectives:	This course is intended to familiarize students with organizing, summarizing, analyzing data, and drawing appropriate conclusions from it. The various tools and techniques are also intended to be used in day-to-day real – world problems.	
Content		**No. of Hours**
Unit I	**Introductory concepts**: Definition and scope of Statistics; Concept of population and sample. **Types of data**: Quantitative; Qualitative; Attributes; Variates. **Tabulation of data**: Class intervals; Frequency tables. **Presentation of data**: Diagrams and graphs: Bar diagrams and their types; Pie charts; Frequency polygon; Histogram; Ogives. Consistency and independence of data with special reference to attributes. **Scales of measurement:** Nominal, Ordinal, Interval, Ratio. **Measures of Central Tendency**: Mathematical and Positional – Mean, Median, Mode, Quartiles, Percentiles. **Measures of Dispersion**: Range, Quartile deviation, Standard deviation, Coefficient of variation.	**15**
Unit II	**Bivariate data**: Definition; Scatter diagram. **Correlation and Regression:** Simple, Partial and Multiple Correlation (3 variables only); Rank correlation; Simple linear regression.	**10**
Unit III	**Probability**: Introduction; Random experiments; Sample space; Events and algebra of events; Definitions of Probability – Classical, Statistical, and Axiomatic; Conditional Probability; Addition and Multiplication theorem of probability; Independent events; Theorem of Total probability; Bayes' theorem and its applications.	**10**
Unit IV	**Statistical Quality Control:** Introduction; Causes of variation in quality; Objective, advantages, and techniques of SQC. **Attribute data:** P chart, U chart, C chart. **Numerical data:** X bar chart, R bar chart, S bar chart.	**10**

	1) S. C. Gupta: *Fundamentals of Statistics,* 7th Edition, Himalaya Publishing House, 2018. **Other Texts** 2) A. M. Goon, M. K. Gupta, and B. Dasgupta: *Fundamentals of Statistics, Vol. I,* 8th Edition, The World Press, Kolkata, 2016. 3) S. C. Gupta, and V. K. Kapoor: *Fundamentals of Mathematical Statistics*, 12th Edition, S. Chand and Sons, Delhi, 2020. 4) S. P. Gupta: *Statistical Methods,* S. Chand & Sons, 2017. 5) S. Bernstein, and R. Bernstein: *Schaum's Outlines: Elements of Statistics I – Descriptive Statistics and Probability*, McGraw Hill, 2020.
Course Outcomes	The student will be able to, 1. Interpret data and graphically represent it. 2. Calculate measures of central tendencies and variations. 3. Analyze correlation and regression. 4. Solve problems in Probability theory. 5. Understand different data sampling techniques. 6. Apply statistical quality control.

	institutions, Other agencies, Commercial Bank - Institutional aids for MSME's development – Role of SIDO, MSMEDI, NSIC, GIDC, EDC, DIC, GHRSSIDC, KVIC, EDI-India, NIESBUD, SIDBI, SFC, DRDA, GCCI and commercial banks (objectives, functions/schemes) Meaning, Need and Issues of Incentives. Incentives and Subsidies offered by Government of Goa and incentives and subsidies offered by Central Government. PMRY scheme, CMRY scheme, Seed Capital Assistance Scheme, Horticulture kiosk scheme in brief	
Pedagogy:	Lectures, Group discussions, Seminars, Case studies, Field work.	
Reference/ Readings:	1. Paul, B., & Jim, D. H. (2010). Small Business Entrepreneurship. Palgrave Macmillan publishers. 2. Vasant, D. (2003). Small Scale Industries and Entrepreneurship. Himalayan Publishing House. 3. Suman, K. C. (2013). Micro Small and Medium Enterprises in India Hardcover. Raj Publications. 4. Pednekar, A. P. (2013). Entrepreneurship Management. Himalaya Publishing House. 5. Aneet, M. A. (2009). Small and Medium Enterprises in Transitional Economies, Challenges and Opportunities. DEEP and DEEP Publications. 6. Poornima, M. C. (2019). Entrepreneurship Development Small Business Enterprises. Pearson. 7. Khanka, S.S. (2017). Entrepreneurial Development, S. Chand. Delhi 8. Norman, H, S., & Jeffrey R. C. (2017). Essentials of Entrepreneurship and Small Business Management. Pearson.	
Course Outcomes:	After completion of this course, the learners will be able to: 1. Explain the concept of MSMEs. 2. Elaborate the different stages of starting the MSMEs. 3. Explain various functional areas of managing MSMEs. 4. Identify the Institutional Support and incentives available to MSMEs	

Course Outcomes:	On completion of the course, the student will be able to do the following: 1. Create and deliver individual presentations using a variety of digital software 2. Compose and present a digital story 3. Identify and distinguish between different genres of writing 4. Write a book/ film review 5. Interpret graphic data to arrive at an informed conclusion

	• What-if Analysis: Goal Seek, scenario analysis, data tables using PMT function, Solver tool • Lookup Functions: Vlookup and Hlookup functions, Index and Match, Reverse Lookup using choose function.	
	Unit III • Pivot Tables and Pivot Charts: Creating advanced pivot tables with advanced value field settings, filtering pivot tables, modifying pivot table data, grouping based, Pivot Charts and Slicers. Filter data with slicers, manage primary and secondary axis • Creating Interactive Dashboard: Planning a Dashboard, Adding Tables and charts to dashboard, adding dynamic content to dashboard. • Descriptive statistics using Analysis ToolPak. • Introduction to Excel macros and VBA Basics.	**20**
Pedagogy:	Blended learning: Concept learning through Lab assignments and online video resources followed by application of concept learnt to real life scenario provided. Practical skill development through Lab assignments.	
References/ Readings:	Main Reading: 1. DavidWhigham(2007), *"Business Data Analysis using Excel"*. Oxford University Press Additional Reading: 1. Wayne Winston(2019), *"Microsoft Excel 2019 – Data Analysis and Business Modelling"*, PHI Learning Pvt. Ltd.	
Course Outcomes:	At the end of the course, learner will be able to: 1. Use conditional arithmetic functions to summarize data and use financial functions, given a spreadsheet with data and relevant description of desired output. 2. Perform what-if analysis and data validation on given data for a given scenario. 3. Summarize and analyze data using Pivot Tables and Pivot Charts. 4. Apply and visualize data using Dashboard and descriptive statistics using Analysis ToolPak.	

References/ Readings	1. Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi ,2008 2. Fowler B, Electronic Waste, Elsevier, 2017 3. Bhagat-Ganguly, VarshaE-Waste Management: Challenges and Opportunities in India,Routledge, New Delhi, 2021 4. Nautiyal, Navtika Singh and ShuchitaAgarwal (ed) Future of e-Waste Management: Challenges and Opportunities, Thomson Reuters, 2021. ISBN 13: 978-9390529858
Course Outcomes	Students will, be able to • Understand the environmental impacts of e-waste. • Describe the process recycling of e-waste. • Distinguish the role of various national and internal act and laws applicable for e-waste management and handling. • Analyse the e – waste management measures proposed under national and global legislations.

Second Year - Semester III

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA - 200**
Title of the Course : **Data Structures**
Number of Credits : **4 (3T + 1P)**
Effective from AY : **2024-25**

Prerequisites for the Course:	Knowledge of C programming language	
Course Objectives:	1. To understand the concept of Algorithms. 2. To discuss linear and non-linear data structure 3. To implement data structure concepts	
Units	**Content**	**No of hours**
I	**Algorithm Basics** – Algorithms and Data Structures, Pseudocode, Algorithm Features. **Data Structures:** Basic concepts, concepts of Linear and Non-Linear data structures, Array as data structure. Concept of ADT. **Searching and Sorting using array:** Searching (Linear & Binary) Sorting (Bubble Sort, Selection Sort & Insertion Sort).	**15**
II	**Stacks and Queues** (Using Arrays) Definition, Structure, Examples, Applications, and Basic Operations. **Linked Lists** (Linear and Doubly) Definition, Structure, Examples, Applications, and Basic Operations. Stacks and Queues using Linked List	**15**
III	**Trees:** Basic, Binary Tree and Binary Search Tree. **Graphs** – Graph Terminology, Representation, Traversals,	**15**
IV	**Practical Work** Using C programming language, data structure concepts to be covered in practicals are mentioned below.	**Practical Hours (30)**
Week 1 and 2	**Implement programs :** Array implementation - Creation, insertion, deletion	**04**
Week 3 to 5	**Searching and Sorting:** Searching (Linear & Binary) Sorting (Bubble Sort, Selection Sort & Insertion Sort).	**06**
Week 6 to 8	Stack & Queue data structure using arrays.	**06**
Week 9 to 12	Linked List data structure, Stack & Queue using linked list.	**08**
Week 13 to 15	Binary Search Tree.	**06**

Name of the Programme	**: Bachelor of Computer Applications**
Course Code	**: CSA-201**
Title of the Course	**: Database Management Systems**
Number of Credits	**: 4 (3T + 1P)**
Effective from AY	**: 2023-24**

Prerequisites for the Course:	None	
Course Objectives:	1. To understand the basic concepts of database management systems and the process of database design using ERD, Schema design, and relational / table design. 2. To learn normalization concepts, basic relational operations and transaction processing and concurrency control concepts. 3. To learn to define and manipulate the relational databases in SQL using a suitable RDBMS system.	
Units	**Content**	**No of hours**
I	**Introduction to DBMS** Data, Database, Database system, Database Management System, File oriented systems and its limitations; Three schema, levels of Data Abstraction, Database Architecture (Internal, Conceptual, View) and Data Independence Database Languages: Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL), Transaction Control Language (TCL) Database Users, DBMS functions, Advantages and Disadvantages Database Administration and Control: Functions Brief overview of Hierarchical, Network, Relational, Object-relational and Object-oriented data models **E-R Model** Data Modelling using Entity-Relationship Model • ER Diagram Concepts & Terminologies • Concept and Types of Entities, attributes, and relationship sets • Key attribute, and domain of an attribute. • Degree of a relationship set, cardinalities, • Total and partial participation • Generalization, specialization, aggregation • integrity constraint, Referential integrity constraint and Key constraint. **Activity:***Apply the concepts learned to design the ERD of at least 3 to 4 basic and different types of applications.*	**15**
II	**Relational Data Model** Relational model concepts. Characteristics of relations;	**15**

	• Concept and state Diagram of Transactions • ACID Properties • Serializability: Conflict & View • Schedule: Serial & Non- Serial • Lock-based concurrency control • Two-Phase Locking Protocol • Transaction Recovery (log based)	
IV	**List of Practicals** To be done using any suitable RDBMS software like MYSQL	**Practical Hours (30)**
Week 1 & 2	1. Introduction and installation of DBMS Software 2. Database creation, alteration and deletion 3. Table creation, alteration, and Deletion 4. Identify and add appropriate data types to the fields 5. Add primary key and domain constraints to the table 6. Inserting data in the created tables 7. Data Manipulation language: Simple select query, Select with where clause	**04**
Week 3 to 7	8. Add Foreign key constraints to the table 9. Creating tables along with the primary key, foreign key, check, and other column constraints 10. To add rows in created tables, updating column(s) and performing deletions using truncate and delete should be done. 11. Group function and having clause 12. Operators 13. Aggregate Functions 14. Set operations 15. Sorting data	**10**
Week 8 to 10	16. Write SQL statements to perform operations using sub-queries for the following: • Returning single-row • Returning multiple rows • Returning more than one column • Correlated subquery	**06**
Week 11 to 13	17. Write SQL statements to implement the following types of SQL joins • INNER JOIN • LEFT OUTER JOIN • RIGHT OUTER JOIN • FULL OUTER JOIN Complex Queries using Joins, Aggregate Function and Correlated subqueries using set sub-queries & exist clause. 18. Write an SQL statement to show how VIEW can	**06**

Course Outcomes:	On completion of the course, students will be able to: 1. Remember the basic concepts and terminologies of DBMS, ERD, Normalization, and Transaction Processing. 2. Understand ER diagrams, Normalization, relational schema design, Relational Operations, Transaction Processing, and SQL concepts. 3. Apply & discuss the concepts of ER Diagram, Relational Model and Normalization. 4. Design relational database and formulate queries on the database and data using different SQL constructs mentioned in the syllabus.

	and Weak arguments. (Statement and Argument) • Problems to assess a given statement and decide which of the given assumptions is implicit in the statement. (Statement and Assumptions) • Problems to find out which of the conclusions definitely follow from a given statement. (Statement and Conclusions) • Problem to analyse the statement and decide course of action. (Statement and Course of Action) • Problem to analyse relation and decipher the relationship. (Blood Relations) • Problems to ascertain the final direction or distance between two points (Direction Sense Test) • Problems to analyse a given situation and choose the best response. (Situation Reaction Test) • Problems to relate a given group of items and illustrate it diagrammatically. (Logical Venn Diagram) • Problems on Data Interpretation, Data Sufficiency. (Data Interpretation) • Problems based on fragmentation of a figure into sample parts, pattern rearrangement. (Data Interpretation) • Problems on Induction, Deduction, Constructing and Understanding Truth Tables. (Mathematical Logic)	
Pedagogy:	1. Lecture methods need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning etc. 2. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding 7. To promote self-learning, give atleast one assignment where they can complete at least one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.	
References/ Readings:	**Main Reading** 1. A.K. Gupta,. Logical and Analytical Reasoning. Ramesh Publishing House. 34th edition 2. Arun Sharma. How to Prepare for Logical Reasoning for the CAT.	

Name of the Programme: Bachelor of Commerce (Cost Accounting)
Course Code: COM-233
Title of the Course: Business Ethics and Governance
Number of Credits: 03
Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	Objectives of the Course are: 5. To acquaint learners with concepts of business ethics and governance 6. To impart knowledge of ethical issues in different areas of business 7. To familiarize learners with Corporate Governance 8. To familiarize learners about ethics involved in global scenario	
		No. of Hours
Content:	**Unit 1: Introduction to Business Ethics** Definition, Meaning, Nature of Ethics, Meaning of Moral & Ethics. Types of Ethics, Importance of Ethics, Business Ethics -Meaning and Nature. Importance of Ethics in Business, Areas of Business Ethics, Meaning of Functional Ethics, Types of Ethics According to Functions of Business- Marketing Ethics, Foreign Trade Ethics and Ethics Relating to Copyright. Ethics relating to Free and Perfect Competitive Market.	**15**
	Unit 2: Ethical Issues in functional areas of Business Ethical issues in Marketing- understanding positive and negative roles in marketing, Exploring exploitative role of advertising. Ethical issues in human resources-examining HR related ethical issues, discrimination in workplace: its causes and Remedies, Ensuring safety and health in the workplace, ethical considerations in performance appraisal. Ethical issues in finance-Maintenance of proper books of accounts-promoting transparency and accountability-understanding ethical responsibility in financial decision making	**15**
	Unit 3: Business Ethics in Global Economy Ethics in the Context of Global Economy, Relationship Between Business Ethics & Business Development, Role of Business Ethics in Building a Civilized Society. Corporate Governance and Issues Related to Scams: Corruption- Meaning, Causes, Effects. Frauds and Scams in Banks, Insurance Companies, Financial Institutions, Measures to Overcome Fraud and Corruption, Zero Tolerance of Corruption.	**15**
Pedagogy:	Lectures, Group discussions, Seminars, Case studies, Field work	
Reference/ Readings:	12. Achrekar, D. (2009). *Corporate Governance (with Case Studies)*. Surendra Publications, New Delhi.	

Name of the Programme	**: Bachelor of Computer Applications**
Course Code	**: CSA-241**
Title of the Course	**: Multimedia Applications**
Number of Credits	**: 3 (1T + 2P)**
Effective from AY	**: 2024-25**

Pre-requisites for the Course:	None	
Course Objectives:	1. Introducing terminologies and technologies in multimedia. 2. Learning different types and forms of multimedia. 3. Learn storage and access mechanisms of each multimedia file type.	
Units	**Content**	**No of hours**
I	**Introduction to Multimedia & Graphic Design Fundamentals** • Definition and Characteristics of Multimedia • Evolution of Multimedia Technologies • Multimedia Elements: Text, Images, Audio, Video, Animation • Multimedia Hardware and Software • Principles of Graphic Design • Image Editing Techniques • Creating and Manipulating Vector Graphics **Audio ,Video Production and Animation Principles** • Basics of Sound and Audio Editing • Video Production Process • Editing Techniques using Software • Incorporating Sound and Music in Multimedia • Basics of Animation • 2D and 3D Animation Techniques **Virtual and Augmented Reality (VR/AR) & Multimedia in Social Media.** • Basics of VR and AR Technologies • Developing Multimedia Content for VR and AR • Social Media Platforms and Trends • Creating Multimedia-rich Content for Social Media • Social Media Campaign Planning and Execution	15
II	**Practical Work**	**Practical Hours (60)**
Week 1 & 2	**Graphic Design** :- Practical exercises using graphic design software to create posters, banners, and digital artwork (task: designing a Banner for an event)	8
Week 3 to 5	**Audio Editing**:- Audio recording ,Audio storage and conversion , Audio mixing and rendering.	12
Week 6 to 9	**VideoEditing** :- Video Capturing and Editing, Effects and transitions,color correction, Video composition and rendering.	16
Week 10 to 12	**Animation** :- introduction to animation software and practical animation exercises (task: short animation sequence using a 2D	12

कार्यक्रम : **स्नातक हिंदी** Ability Enhancement Course (AEC)

पाठ्यक्रम : **HIN- 251**

पाठ्यक्रम का शीर्षक : **सम्प्रेषण कौशल**(Communication Skill)

श्रेयांक : **02**

शैक्षणिक वर्ष : **2024-2025**

पाठ्यक्रम के लिए पूर्वापेक्षित	हिंदी भाषा का ज्ञान होना अपेक्षित है|	
उद्देश्य	1. संप्रेषण कौशल विकसित करना| 2. प्रभावशाली संप्रेषण कौशल विकसित करना| 3. भाषागत आत्मविश्वास बढ़ाना| 4. व्यक्तित्व का विकास करना|	
विषयवस्तु		**घंटे**
	1. भाषिक संप्रेषण :स्वरूप और सिद्धांत • संप्रेषण: अवधारणा एवं महत्व • संप्रेषण की प्रक्रिया • संप्रेषण के विभिन्न प्रकार एवं साधन • संप्रेषण की चुनौतियां	**15**
	2. संप्रेषण के माध्यम :व्यावहारिक प्रयोग • **संप्रेषण कौशल** : श्रवण कौशल,पठन कौशल,आंगिक एवं वाचिक भाषा कौशल • एकालाप,संवाद,बातचीत,सामूहिक चर्चा , बैठक , साक्षात्कार ,मीडिया कवरेज • नाट्यवाचन,कविता वाचन,कहानी वाचन, सिनेमा - संवाद प्रस्तुति • संवाद कौशल के जरिए व्यक्तित्व विकास	**15**
अध्यापन विधि	व्याख्यान,सामूहिक चर्चा,दृश्य-श्रव्य प्रस्तुतिकरण,शैक्षिक भ्रमण ,कार्यशाला , व्यावहारिक प्रयोग	
सन्दर्भ- ग्रंथ	1. डॉ.अवनीश कुमार मिश्रा , डॉ.प्रवीन कुमार अग्रवाल, संप्रेषण कौशल, साहित्य भवन पब्लिकेशन्स ,२०२२ 2. डॉ. मंजु मुकुल, संप्रेषण:चिंतन और दक्षता शिवालिकप्रकाशन ,दिल्ली ,२०१७ 3. रमेश सनवाल , बोलचाल की कौशल कला: किंडलएडिशन, २०१९ 4. डॉ. विनोद मिश्र , डॉ. नरेंद्र शुक्ल मिश्र ,व्यावसायिक सम्प्रेषण, संजय साहित्य भवन 5. सुरेश कुमार , संप्रेषण व्याकरण :सिद्धांत और स्वरूप ,२०१९	

Name of the Programme	: B. A. Konkani
Course code	: KON-252
Title of the Course	: **संभाशण कौशल्य** (Communication Skills)
Number of Credits	: 02
Effective from AY	: 2025 - 26

Pre-requisites for the Course:	1. विद्यार्थ्यांक संभाशण करपाची आवड आसची. 2. विद्यार्थ्यांक कोंकणी भाशेचें गिन्यान आसचें.	
Course Objectives:	1. विद्यार्थ्यांक संभाशण कौशल्यांचो सिध्दांतीक परिचय करून दिवप. 2. विद्यार्थ्यां भितरलीं संभाशण कौशल्यां विकसीत करप. 3. भौशीक सुवातेर उलोवपा खातीर विद्यार्थ्यां भितरलो आत्मविश्वास वाडोवप. 4. परिणामकारण संभाशण करपाक विद्यार्थ्यांक तयार करप.	
Content:	1 credit theory and 1 credit practical	**वरां**
	अ. संभाशण कौशल्य : अर्थ, व्याख्या, स्वरूप	03
	आ. संभाशण कौशल्याचें म्हत्व आनी गरज	03
	इ. संभाशाणाचे प्रकार : **1.** शाब्दीक संभाशण (verbal communication) **2.** अशाब्दीक (non – verbal communication) **3.** लिखीत संभाशण (written communication), **4.** प्रत्यक्ष (एकामेका मुखार उलोवपाक) **5.** अप्रत्यक्ष (फोन, इमेल, आदी) **6.** उपचारीक (अनवळखी मनशा कडेन) **7.** अनुपचारीक (वळखीच्या मनशा कडेन)	03
	ई. संभाशण कौशल्य जोडपाचीं साधनां : वाचन, भाशेचर प्रभुत्व, प्रसार माध्यामांतल्यान माहिती मेळोवप, अणभव लागीं करप, एकाग्रता, पुर्वतयारी, केन्ना कितें उलोवप हाची जाणीव, आदी..	03
	उ. प्रभावी आनी परिणामकारक संभाशणा खातीर ह्यो गजाली गरजेच्यो : शब्दभंडार, शब्दांचें सामर्थ्य कळप, वाचन, भाशेचेर प्रभुत्व, विचार स्पश्टपणान मांडप, केन्ना, कितें, कशें उलोवप हाची जाणीव, पुर्वतयारी, व्यक्तीमत्व, एकाग्रता, न्युनगंड काडून उडोवप, बऱ्या सुरांत उलोवप, आदी.	03
	ऊ. हे उपक्रम विद्यार्थी कडच्यान वर्गांत करून घेवचे: 1. वक्तृत्व / पब्लीक स्पिकींग – विशय दिवन उलोवंक लावन संभाशणांत येवपी आडखळी पयस करून आत्मविश्वास वाडोवप. 2. एकपात्री – प्रसंग दिवन नाट्यात्मक रितीन सादरीकरण करुंक लावचें.	15

Issued on: 20/05/2025

Second Year - Semester IV

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA-202**
Title of the Course : **Web App Development**
Number of Credits : **4 (3P + 1 Tutorial)**
Effective from AY : **2024-25**

Pre-requisites for the Course:	Basic Programming, Object-Oriented Concepts and DBMS Courses	
Course Objectives:	1. To understand the Fundamentals of client-side and server-side technologies 2. To understand dynamic and interactive web experiences using JavaScript and client-side frameworks. 3. To design web applications using server-side technologies and databases. 4. To apply secure web application deployment and maintenance.	
Units & Weeks	**Content**	**No of hours**
Tutorial Session Instructions	**Tutorial lecture of 1 hour duration to be conducted each week.** 1. Concepts needed for the conduct of Practical Sessions to be discussed. 2. These sessions may also be utilized for the doubt clearance 3. Suggestive client-side scripting language: JavaScript 4. Suggestive server-side scripting language: PHP 5. Suggestive frameworks for client-side scripting: Bootstrap, Zurb Foundation. 6. Suggestive frameworks for server-side scripting: Laravel, Code Igniter 7. Suggestive Database: MYSQL or MariaDB 8. Suggestive FTP Tool: FileZilla, cyberduck 9. Suggestive Control Panels: Plesk, CPanel 10. Suggestive Web server: Xampp, Wamp, EASYPHP	
I	**Client-side scripting language**	**35 (30 + 05)**
Week 1	• Introduction to client-side scripting language • Naming convention for variables • Operators • Conditional statements	**7**
Week 2	• Loops • Functions- named functions, anonymous functions, and arrow functions	**7**
Week 3	• DOM (Document Object Model) • DOM Tree • DOM Manipulation • Accessing elements using DOM	**7**
Week 4	• Event Handling - Attaching events to HTML elements, Common events	**7**

Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. Lecture methods need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning etc. 2. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 6. Discuss how various concepts can be applied to the real world - and when that's possible, it helps improve the students' understanding 7. To promote self-learning give atleast one assignment (equivalent to 50% assignment weightage) where they can complete atleast one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations. 8. One internal practical exam will be conducted as a part of internal evaluation. 9. Practical shall be performed in the laboratory as indicated in the syllabus. 10. A Hand written Hard Copy (or digital copy) of the journal shall be maintained clearly mentioning the name of the experiment and other required information.
References:	**Main Reading :** 1. Harold, E. R., & Means, W. S. (2004). XML In A Nutshell (3rd ed.). O'Reilly. 2. Haverbeke, M. (2018). Eloquent JavaScript: A Modern Introduction to Programming (3rd ed.). No Starch Press. 3. Welling, L., & Thomson, L. (2016). PHP and MySQL Web Development (5th ed.). Pearson Education. **Additional Reading :** 1. Fielding, J. (2014). Beginning Responsive Web Design with HTML5 and CSS3. Apress. 2. Stauffer, M. (2023). Laravel: Up & Running: A Framework for Building Modern PHP Apps (3rd ed.). O'Reilly. 3. Sullivan, B., & Lui, V. (2012). Web Application Security, A Beginner's Guide. McGraw-Hill Education. 4. Deitel, P. (2018). Internet and World Wide Web-How to Program (5th ed.). Pearson Education.

Name of the Programme	**: Bachelor of Computer Applications**
Course Code	**: CSA-203**
Title of the Course	**: Agile Methodologies**
Number of Credits	**: 4(3T+1P)**
Effective from AY	**: 2024-25**

Prerequisites for the Course:	None	
Course Objectives:	1. To remember the practices and philosophies of Agile methodologies. 2. To understand agile development and testing techniques. 3. To apply best practices of agile methodologies for software development and testing.	
Units	**Content**	**No of hours 75 (45T + 30P)**
I	**Introduction to Agile and Scrum** **Agile Methodology** Agile Software Development, Traditional Model vs. Agile Model, Classification of Agile Methods, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agility in Design, Agile Documentations, Agile Drivers, Capabilities and Values. **Agile Processes:** Work Products, Roles, and Practices - SCRUM, SCRUM Meetings, SCRUM Artifacts, SCRUM Events, Scrum Ceremonies, Crystal, Feature Driven Development, Adaptive Software Development,Kanban, Extreme Programming, Lean Production.	**15**
II	**Agility and Knowledge Management:** Agile Information Systems, Agile Decision Making, KM in Software Engineering, Managing Software Knowledge, Challenges of Migrating to Agile Methodologies, Agile Knowledge Sharing, Role of Story-Cards, Story-Card Maturity Model (SMM). **Agility and Requirement Engineering:** Impact of Agile Processes in RE, Current Agile Practices, Variance, Overview of RE Using Agile, Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Prioritization. Agile Product Development, Agile Metrics, feature-driven development (FDD).	**15**
III	**Extreme Programming :** Introduction, Values, Principles, Practices (Customer Testing, Refactoring, Pair Programming, Collective Ownership, TDD, Continuous Integration) **Agile Testing:** Testing - Aim and objectives, verification - validation: Testing	**15**

Pedagogy:	Suggested strategies for use to accelerate the attainment of the various course outcomes. 1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning etc. 2. Ask at least three HOT(Higher-Order Thinking) questions in the class that promote critical thinking. 3. Adopt problem-based learning(PBL), which fosters students' Analytical skills, and develops design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with creative ways to solve them. 6. Discuss how every concept can be applied to the real world and when that's possible, it helps improve the students' understanding. 7. To promote self-learning, give at least one assignment where they can complete at least one MOOC (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.
References/ Readings:	**Main Reading** 1. Anderson, D. J., & Schragenheim, E. (2003). Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results. Prentice Hall. 2. Hazza, & Dubinsky. (2009). Agile Software Engineering, Series: Undergraduate Topics in Computer Science. Springer. **Additional Reading** 1. Desouza,K.C.,(2007). Agile Information Systems: Conceptualization, Construction, and Management. Butterworth-Heinemann. 2. Larman, C. (2004). Agile and Iterative Development: A Manager's Guide. Addison-Wesley.
Course Outcomes:	**At the end of the course the students will be able to :** 1. Remember the practices and philosophies of Agile methodologies. 2. Understand agile development and testing techniques. 3. Apply best practices of agile methodologies for software development and testing.

	iii. Multiple Inheritance iv. Hierarchical Inheritance v. Hybrid Inheritance	
III	**Method overriding** Virtual base classes (concept only) Abstract classes and Interfaces **Exception Handling** Introduction Types of errors Exception types-checked and unchecked Exception Handling Mechanism: Using try catch and multiple catch Nested try, throw, throws, and finally Creating user-defined Exceptions	**15**
IV	**Practical Work** The use of an object-oriented programming language for the concepts learned in the units from I to III is required to be implemented practically. The broad area of practical problems is mentioned below.	**Practical Hours (30)**
Week 1 to 3	**Introduction to Java** Application/Use of language, Simple Programs, arithmetic, logical and relational operators, Data types, Control statements, and Java Packages (Scanner, math), break and continue in loops. Predefined Java String and math functions Examples of programs: Create a simple program to print "Hello World" For if structure: -Using user input from the user check if an individual can vote or not For loop structure : -for, while, and do-while display the series 2,4,6,8,10 -Display Good Morning five times using a loop -Fibonacci series and Factorial of a number For menu-driven program : -display the area of squares, triangles, circles, and rectangles. -display appropriate object if a user selects a vowel (eg. A-apple, E-elephant). Use switch case and do-while loop. More programs may be given to the learners to complete and practice as part of their Practice Work.	**06**

	• For multilevel inheritance: Create a class wristwatch with data members as the base class. Create a class custom_belt_wristwatch as the intermediary class. Create a class custom_bracelet_wristwatch as the derived class. More programs may be given to the learners to complete and practice as part of their Practice Work.	
Week 13 to 15	**Exception Handling in Java** • Syntax for Exception Handling, Throwing and Catching mechanism, rethrowing exceptions, multiple catch, Nested try, throw, throws, and finally • User-defined Exceptions Examples of programs: Execute exceptions for arithmetic- division by zero, array index out of bounds, null pointer, string index out of bounds, etc. More programs may be given to the learners to complete and practice as part of their Practice Work	**06**
Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning, etc. 2. Ask at least three HOT (Higher-Order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, and develops design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding 7. To promote self-learning, give at least one assignment (equivalent to 50% assignment weightage) where they can complete one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.	
References/ Readings:	**Main Reading:** 1. Bhave, M., & Patekar, S. (2008). Programming with Java (1st ed.). Pearson. 2. Balagurusamy, E. (2010). Object-oriented programming with Java (4th ed.). Tata Mc Graw Hill Publishing House.	

Name of the Programme	**: Bachelor of Computer Applications**
Course Code	**: CSA-205**
Title of the Course	**: Web Technology**
Number of Credits	**: 2T**
Effective from AY	**: 2024-25**

Prerequisites for the Course:	Basic understanding of using the internet and web browsers.	
Course Objectives:	1. To introduce the fundamentals of web technology, scripting languages, and web publication. 2. To create dynamic and interactive web experiences using JavaScript and client-side frameworks. 3. To apply client and server-side programming language that can be used to create websites and web applications. 4. To explore MVC Architecture for dynamic and interactive user interfaces using views and templates.	
Units	**Content**	**No of hours 30**
I	**Introduction to web technology** • Internet, world wide web, web 2.0 • Client/Server paradigm • Protocols (TCP, IP, UDP, HTTP, HTTPS, FTP, TFTP, SMTP, MIME in brief) • Functions and features of web servers and web browsers **Introduction to client-side scripting** • Basics of JavaScript- syntax and data types • DOM • Accessing and modifying HTML elements with JavaScript • Control structures (Conditional Statement, loops) • Functions and events	**15**
II	**Introduction to server-side scripting** • Overview of PHP, features • PHP syntax and variables • Input/Output statements • Decision Statements • Looping Statements • Server-side validations Database Connectivity • CRUD (Create, Update, Read and Update) operations • Report Generation • Session and cookies **MVC Architecture** • Understanding the Model-View-Controller (MVC)	**15**

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA 223**
Title of the Course : **Advanced JavaScript**
Number of Credits : **4 (3T+1P)**
Effective from AY : **2024-25**

Prerequisites for the Course	Basic Programming	
Course Objectives	1. To understand and execute JavaScript code in both browser and command-line environments. 2. To perform numerical operations, handle string manipulations, and apply Boolean logic. 3. To analyze nested objects, object methods and property deletion. 4. To Apply ES5 and beyond features of JavaScript.	
Units	**Content**	**No of Hours 75 (45T+30P)**
I	**Overview of JavaScript:** Brief history. Common use-cases (Eg: data validations, notifications etc). Runtime environments. ECMAScript standards. Overview of language features. Running JavaScript in the browser and at the command line. Debugging JavaScript in the browser. The console and REPL. **Basic syntax:** Values and literals. Primitive types. Numbers. Integer and floating point as a single type. Special floating point numbers. Rounding errors. The Math library. Strings. Immutability of strings. + and [] operators. toString. Common string utilities. Booleans. Ternary operator. Truth-y and False-y values. null and undefined. Regular expressions. Dynamic typing. Weak typing. The typeof operator. The === and !== operators. Control statements	**15**
II	**Arrays and Objects: Arrays**. Array insertion and deletion. Array length. Sparse arrays. Multidimensional arrays. Object as maps. Object creation, modification and lookup syntax. Nested objects. Object methods. The delete keyword. The for... in statement, and the hasOwnProperty method. The global window object. Object references. Aliasing. Pass-by-reference-copy semantics. **Functions:** Function declaration and invocation syntax. Anonymous functions. Functions as data. The arguments object. Variadic functions. Optional parameters. Named parameters. Function overloading. Duck typing.	**15**

	which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, & analyse information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 6. Discuss how every concept can be applied to the real world 7. To promote self-learning, give atleast one assignment where they can complete at least one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.
References/ Readings:	**Main Reading** 1. David Flanagan (2020). JavaScript: The Definitive Guide. O.Reily. 2. Minnick (2023). JavaScript All-in-One For Dummies. John Wiley & Sons Inc **Additional Reading** 1. Zachary Shute (2019). Advanced JavaScript. Packt Publishing. 2. Laurence Lars Svekis, Maaike Van Putten, Rob Percival (2021). JavaScript from Beginner to Professional. Packt Publishing.
Course Outcomes	**On completion of the course, students will be able to:** 1. Recall basic and advanced concepts and features of JavaScript. 2. Understand the concepts and features of JavaScript. 3. Apply JavaScript concepts to create and validate interactive web pages. 4. Analyze the use and working of JavaScript to meet industry standards.

	4. संभाषण कला संवर्धन करेंगे।

	5. भावे, भूषण. *साहित्य विमर्श,* सत्तरी गोंय:शाल्मली क्रिएशन्स, 2016. 6. *भावे, भूषण.अनु. कोंकणी भाशा : प्रकृती आनी परंपरा* पणजी गोंय: गोवा कोंकणी अकादेमी. 2013. 7. लवंदे वसंत. कोंकणी भाशेचें अध्यापन, पणजी, गोंय: गोवा कोंकणी अकादेमी, 1995. 8. *वेरेंकार, श्याम. (संपा.) कोंकणी भास, साहित्य आनी संस्कृताय,* मडगांव गोंय: कोंकणी भाशा मंडळ, 2003.
Course Outcomes	1. विद्यार्थ्यांक कोंकणी भाशेचें मुळावें गिन्यान मेळटा. 2. कोंकणी भाशेची मौखीक आनी लिखीत कौशल्यां आत्मसात जाता. 3. दिसपट्टे जिणेंत कोंकणी भाशेचो प्रभावी वापर करपाक कळटा. 4. कोंकणी भाशेच्या व्याकरणा विशीं म्हायती मेळटा.

	• User Context, Responsive Design-Wireframing-Creating Wireflows- building a Prototype- building high-fidelity mockups, Sharing and Exporting Design, Conducting Usability tests, Other Evaluative User Research Methods in brief.	
Unit IV Practical	**The practical exercises can be implemented utilizing any of the tools listed below.** • Figma, Adobe XD, Penpot, Pencil, GIMP, Inkscape, etc.	**Practical Hours (30)**
Week 1 & 2	• Develop proficiency in iterative user-centered design for graphical user interfaces. • Construct user interfaces for diverse applications.	**04**
Week 3 & 4	• Assess the user experience design of products or applications effectively. • Exhibit user experience skills in the process of product development	**04**
Week 5 to 7	• Generate wireframes and prototypes as integral components of the design process. • Implement responsive design techniques for seamless user experiences across devices. • Employ A/B testing to evaluate and optimize different design variations.	**06**
Week 8 & 9	• Create detailed personas and scenarios to inform the UI/UX design process. • Visualize user interactions and navigation through the development of flow diagrams and wireflows.	**04**
Week 10 & 11	• Develop an effective information architecture for a given project, focusing on content organization and structure. • Translate wireframes into high-fidelity mockups, incorporating visual design elements.	**04**
Week 12 & 13	• Develop an interactive prototype that simulates user interactions with the finalized UI design. • Create and implement a comprehensive user testing plan for a UI/UX design project.	**04**
Week 14 & 15	• Assess the accessibility of a given UI design to ensure it meets inclusive design standards.	**04**

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA 301
Title of the Course: Full Stack Development
Number of Credits: 4 (3P + 1 Tutorial)
Effective from AY: 2024-25

Pre-requisites for the Course:	Basics of Web Technology & Web App Development	
Course Objectives:	1. To Learn JavaScript Fundamentals for Full-Stack Development 2. To Write Robust Backend APIs with Node.js 3. To Design Dynamic User Interfaces with React.js 4. To Integrate Data Flow between Frontend application and Backend Application	
Units & Weeks	**The broad area of practical concepts are mentioned / suggested below.**	**No of hours 105 (90P + 15 Tutorials)**
Tutorial Session Instructions	1. Tutorial lecture of 1 hour duration to be conducted each week. 2. Concepts needed for the conduct of Practical Sessions to be discussed. 3. These sessions may also be utilized for the doubt clearance	
I	**Introduction to Node.js**	**42 (36 + 06)**
Week 1	• Installation of Node.js • Learn Node.js REPL • Understanding Node js folder Structure • Configuration of Package.JSON file in a new web application. • Install Express • Create a server using Express	7
Week 2	• Node Modules • Module Dependencies • Module Functionality	7
Week 3	• The Event Loop, Concurrency, Asynchronous Coding • Callback Functions, Calling Conventions, Exception Handling • Event Emitters, Listening for Events	7
Week 4	• Promises, Promise Chaining • Modules, Command Line Arguments • Working with the File System, Reading Files,	7

Pedagogy:	1. Course delivery pattern, evaluation scheme, prerequisite shall be discussed at the beginning. 2. Tutorials preferably to be conducted with the aid of multimedia projector, black board, LMS, mini projects etc. 3. One live project based on the course content may be given to the students to evaluate how learning of objectives was achieved. 4. The course has a separate laboratory, where students gain hands on experience of working with the various frameworks
References/ Readings:	**Text Book** 1. Ethan Brown (2014). *Web Development with Node and Express: Leveraging the JavaScript Stack (Second edition).* O'Reilly. 2. Frank W. Zammetti (2020). *Modern Full-Stack Development*. Apress 3. Greg Lim. (July 2021). *Beginning MERN Stack Development. ISBN-10 9811815526.* Greg Lim.
Course Outcomes	**On completion of the course, students will be able to** 1. Understand JavaScript fundamentals 2. Write Robust Backend APIs with Node.js 3. Design Dynamic User Interfaces with React.js: 4. Integrate Data Flow between Frontend and Backend applications

III	**PaaS & SaaS** **Platform as a Service** • Introduction: Introduction to PaaS, Characteristics, Service Oriented Architecture (SOA), Applications, Issues and challenges. • Cloud Platform and Management: Computation, Storage, Case studies, Examples: Google App Engine, Microsoft Azure, SalesForce.com, Amazon AWS **Software as a Service** • Introduction to SaaS, Characteristics, Web Services, Web 2.0, Web OS, APIs, Service management, SaaS Implementation, Security, Case studies, Cloud Issues and Challenges: Cloud provider Lock-in, Security	**15**
IV	**List of Practicals:** The broad area of practical problems is mentioned/ suggested below:	**30**
Week 1 & 2	• Understanding Computer Network fundamentals and Designing LANs	**05**
Week 3 to 10	• Working on tools used in cloud computing online a) Storage b) Sharing of data c) Manage your calendar, to-do lists (e.g. Office365) d) A document editing tool • Leveraging any cloud service to work on document, spreadsheet, presentation, task management and collaborative tools in real time; chat with other collaborators. (e.g. Google sheet, docs & Google Meet, Google Keep)	**15**
Week 11 to 15	• Enlisting various companies in cloud business and the corresponding services provided by them and tag them under SaaS, PaaS & IaaS. • Exploring public cloud service providers' tools for exploring the usage of IaaS, PaaS and SaaS cloud services. a. AWS EC2 / Azure Compute b. AWS S3 / Azure Storage c. AWS VPC / Azure Vnets d. AWS Security / Azure Security	**10**
Pedagogy	1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning, etc. 2. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 3. Explore the cloud platforms to solve real life problems.	

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA-303**
Title of the Course : **Internet Technologies**
Number of Credits : **2 (2T)**
Effective from AY : **2024-25**

Pre-requisites for the course:	None	
Course Objectives:	1. To understand the anatomy of the internet and the internet addressing Scheme. 2. Identify common security threats and attacks. 3. Utilize crawling and bots for efficient search engine performance.	
Units	**Content**	**No of hours**
I	**TCP/IP – Internet Technology and Protocol** • Network Definition • Network Components & Hardware • Types of Networks: Peer to Peer, Client Server • TCP/IP Structure **Network Communication:** • Internet Layer Logical Addresses (IPv4): Classful and Classless Addressing, sub-netting, IPv4 vs IPv6. • Network Address Translation (NAT), basics of ISPs • Process-to-Process Delivery, Connectionless vs Connection Oriented and Reliable vs Unreliable; TCP and UDP • DHCP, HTTP and HTTPS, DNS, TLDs	**15**
II	**Network Security** • Overview of Network Security • Importance of Firewalls in Network Security • Common Security Threats and Attacks • Basics of Firewalls - Definition and Purpose of Firewalls • Aspects of security **Search Engines** • Introduction • Components of Search Engine • Working of Search Engine in details **Internet Applications** • FTP, Telnet, Email, Chat • World Wide Web • E-Commerce and Security Issues • Emerging Trends	**15**

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA - 321
Title of the Course: Internship
Number of Credits: 4
Effective from AY: 2024-25

Pre-requisites for the Course:	None	
Course Objectives:	1. To carry out work-based vocational education and training to enhance substantial skill for employability at Semester-V. 2. To promote Analyze knowledge-gap, and plan & skill upgrade through training and self-development mode. 3. To develop decision-making and teamwork skills. 4. To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.	
Units	**Content**	**No of hours**
I	1. The internship is to be carried-out by the student individually (or in a group of 5) and to be completed during the duration of semester-V in the field of Computer Applications. 2. The internship may be taken in any IT or IT enabled services Industry (in part time mode if permitted) or at the College (home institution). 3. The internship course shall include set of the following activities (but not limited to) in order to develop confidence, aptitude and skills during the course of internship: a. Orientation on the Internship process, conduct and expected course outcomes. b. Internship topic Identification: A list of topics (social/ organizational/ academic/ any other area) may be prepared by the College. c. Identification of tools & technologies needed. d. Gap Analysis of knowledge / skills needed to upgrade upon through training, workshop, and self-learning mode. e. Study journals / entrepreneurs of related & relevant area. f. Getting trained in the area of gaps identified as mentioned below i. Self-enroll in the training in online/offline mode at any institution of his/her choice. ii. Participation in the hands-on training/ workshop in the area of Application Development Tools & Technologies such as Software Quality Assurance, IoT, Drone Technology, Machine	**120**

	Applications Internships and Project Guide" prescribed by University for all necessary guidelines, instructions and formats.	
Pedagogy:	• As per the specification of Institution where student is seeking internship. • As per the specification mentioned in the "Computer Applications Internships and Project Guide".	
References/ Readings:	1. Computer Applications Internships and Project Guide. 2. References as per the need of internship	
Course Outcomes:	**On completion of the course, students will be able to:** 1. Understand the amount of complexity, effort and planningneeded in solving real-world problems. 2. Appreciate the need of training, gap analysis, and self-development. 3. Demonstrate professional and ethical responsibility. 4. Design and develop solutions of the internship problem throughimplementation of the skills developed during the course of study.	

	7) Upon completion of the internship program, the industry supervisor shall certify the intern, in a prescribed proforma, based on the conduct of the intern under her/his supervision. 8) A student shall submit their Internship (or training & project) report to the College through the Industry supervisor (or training & project supervisor) not later than one week after the start of fifth semester, or when intimated by the Faculty coordinator. 9) Ordinarily, no student shall be permitted to submit the Internship report after the due date specified by the College. 10) The student is expected to present his/her work at the end of the Internship and should submit the internship report in the format as prescribed by the University. 11) Internship Report, Presentation and Viva shall be the integral component of evaluation. 12) Students are instructed to refer the **"Computer Applications Internships and Project Guide"** prescribed by University for all necessary guidelines, instructions and formats in details.	
Pedagogy:	1. As per the specification of Institution/organization where student is seeking internship. 2. As per the specification mentioned in the "Computer Applications Internships and Project Guide".	
References/ Readings:	1. Computer Applications Internships and Project Guide. 2. As per the directives of the Industry/Organization.	
Course Outcomes:	**On completion of the internship program, students will be able to:** 1. Understand the industrial environmental. 2. Apply the concepts and skills learnt during employment and life-long learning. 3. Inculcate discipline and work ethics.	

II	**a. Ethical Hacking and Information Security Practices** • Ethical Hacking Concepts and Scopes • Threats and Attack Vectors • Information Assurance • Threat Modeling • Enterprise Information Security Architecture • Vulnerability Assessment and Penetration Testing **b. Investigation** • Investigation Tools • eDiscovery • Digital Evidence Collection • Evidence Preservation • E-Mail Investigation • E-Mail Tracking • IP Tracking • E-Mail Recovery • Hands on Case Studies • Recovering Deleted Evidences • Password Cracking	15
III	**a. Social Engineering and Insider Threats** • Types of Social Engineering • Insider Attack • Preventing Insider Threats • Social engineering Targets and Defence Strategies • Securing data transit **b. Legal Framework and Countermeasures in Cyber Security** • IT Act • Hackers-Attack-Countermeasures • Web Application Security • Counter Cyber Security Initiatives in India • Cyber Security Incident Handling • Cyber Security Assurance	15
IV	**Practicals Works** The concepts learned in the units from I to III are required to be implemented practically. The broad area of practical problems is mentioned below.	(30 Hours)
Week 1 to week 5	• Implementation to gather information from any PCs connected to the LAN using whois, port scanners, network scanning, Angry IP scanners etc. • Implementation of MITM-attack using wireshark or any network sniffers.	10

Name of the Programme	**: Bachelor of Computer Applications**
Course Code	**: CSA-305**
Title of the Course	**: Mobile Application Development**
Number of Credits	**: 4 (3P + 1 Tutorial)**
Effective from AY	**: 2024-25**

Pre-requisites for the Course:	None	
Course Objectives:	1. To understand the features and installation of Flutter 2. To get understanding of basic constructs of Dart programming. 3. To develop simple mobile applications in Flutter using dart and firebase.	
Units & Weeks	**Content**	**Noof hours 105 (90P + 15 Tutorials)**
Tutorial Session Instructions	1. Tutorial lecture of 1 hour duration to be conducted each week. 2. Concepts needed for the conduct of Practical Sessions to be discussed. 3. These sessions may also be utilized for the doubt clearance	
I	**Introduction**	**07**
Week 01	Getting Started with Android – Installing the Development Environment, Configuring Android Stack, Configuring and Installing Flutter SDK, Creating a New Flutter Project and Understanding Folder Structure.	07
II	**Dart Programming**	**35**
Week 02	Introduction to Dart Programming: Using dart pad, data types, variables, Dart Programming: loops, decision making, functions	7
Week 03 & week 04	OOP concept in dart, getters and setters Exception handling and debugging	14
Week 05 & week 06	Asynchronous and synchronous operations async, await, streams, listening to streams, broadcast streams, manipulating streams	14
III	**Flutter**	**42**
Week 07 to week 09	Introduction to Flutter Widgets: Scaffold Widget. Image Widget, Container Widget, Column and Row Widgets, Icon Widget Layouts in Flutter, Card Widget, Stateful and Stateless Widgets Hot Reload and Hot Restart Styles and assets: Custom fonts, assets in flutter, media query, Null safety *Create a Restaurant Menu using Flutter Widgets* Button Widget: FloatingActionButton, RaisedButton,	21

	7. To promote self-learning give atleast one assignment where they can complete atleast one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations. 8. One internal practical exam will be conducted as a part of internal evaluation. 9. Practical shall be performed in the laboratory as indicated in the syllabus. 10. A Hand written Hard Copy (or digital copy) of the journal shall be maintained clearly mentioning the name of the experiment and other required information.
References/ Readings:	**Main Reading** 1. Marco L. Napoli. (September 2019). *Beginning Flutter: A Hands On Guide to App Development (First Edition).* Wiley publication. 2. Nathan Metzler. (April 2022). *Dart Programming for Beginners: An Introduction to Learn Dart Programming with Tutorials and Hands-On Examples.* Kindle **Additional Reading** 1. Simone Alessandria, Brian Kayfitz. (2021). Flutter Cookbook.Packt Publishing. 2. Thomas Bailey, Alessandro Biessek. (2023). Flutter for Beginners (Third Edition). Packt Publishing.
Course Outcomes:	**On completion of the course, students will be able to:** 1. Recall the installation process of Flutter, Dart and Firebase. 2. Understand the various concepts and constructs of Mobile Application Development using Flutter, Dart and Firebase. 3. Design and Develop animation & application using Flutter,Dart and Firebase. 4. Debug and Analyze the programming logic.

	• Linear Discriminant Analysis • Logistic Regression • Naive Bayes • K-Nearest Neighbours • Artificial Neural Networks	
III	**Tree Based Model, Unsupervised Learning, Association** **Basics of Decision tree** • Bagging and Boosting • Random Forest • Gradient Boosting Machines **Overview of Clustering** • K-means Clustering • K-medoid **Overview of Association Rule Mining** • Market Basket Analysis	15
IV	**PRACTICAL** **Tools to be used** **Programming Languages** : Python / R **Packages required** : numpy, pandas, scikit-learn **List of Practicals :**	30
Week 1 & week 2	• Merging several data sources into one data-set for analysis • Identifying gaps or empty cells in data and either filling or removing them and deleting irrelevant or unnecessary data • Identifying severe outliers in data and either explaining the inconsistencies or deleting them to facilitate analysis	04
Week 3 to week 5	Data Wrangling and Data Analysis • Feature selection and Data reduction • Covariance-based • Feature Selection using ANOVA F-Score	06
Week 6	Introduction to Machine Algorithms	02
Week 7 to Week 12	Regression And Classification Models and Tree Based Models • Experiments using Linear and Multiple Regression • Experiments using Decision Tree • Experiments using Random Forest	12
Week 13 to Week 15	Unsupervised Machine Learning and Association • Experiments using K-Means Clustering • Experiments using Dendrogram	06

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA - 307**
Title of the Course : **Project**
Number of Credits : **4**
Effective from AY : **2024-25**

Pre-requisites for the Course:	None	
Course Objectives:	1. To provide students with knowledge of practical skills for various technological applications. 2. To enable the student to develop an application with their respective domain. 3. Ensuring the formation of research thinking of students, forming a clear idea of the main task and ways to solve them. 4. Developing the basic skills for problem-solving that arise in the course of research/development activities.	
Units	**Content**	**Noof hours**
I	1. The Project is to be carried out in a group of students (as mentioned in ordinance OA38) and is to be completed during the duration of semester VI in the field Study. 2. The Project shall include a set of the following activities (but not limited to) to develop confidence, aptitude, and skills during the course of the project a) Orientation on the process, conduct, and expected course outcomes. b) Topic Identification: A list of topics (social/ organizational/ academic/ any other area) may be prepared by the students. c) Identification of tools and technologies needed. d) Conduct a literature review and understand gap analysis. e) Getting trained in the area of gaps identified. 3. The Project Guide in every college may decide to what extent to include and schedule the activities listed at point number 2 in the academic year as per the need. More activities may be conducted according to the need. This is to be done well in advance, in consultation with the Project Guide and the institute/organization where students are undergoing training. 4. The topic of the project shall be finalized by the student in consultation with the Project Guide. 5. The background work, group formation, assignment of guide, selection of project titles, problem definition formulation, decision on technology stack, and planning	**120**

III	**Business to Business E-Commerce , Electronic Payment System and Security Issues in E-Commerce** • Need and Models of B2B e-commerce, Using public and private computer networks for B2B trading; EDI and paperless trading, Characteristic features of EDI service arrangement, EDI architecture and standards, Reasons for slow acceptability of EDI , Value Added Networks • Types of payment systems, credit cards, debit cards, mobile wallets, Electronic Fund Transfer (EFT), Operational credit and legal risk of e-payment, Risk management options for e-payment systems • Risks of e-commerce, Types and sources of threats to e-commerce ; Protecting electronic commerce assets and intellectual property, Firewalls, Client server network security, Security tools, Digital identity and electronic signature; Risk management approach to e-commerce security	15
IV	**Practical Work.**	30 Hours
Week 1 & Week 2	• Case study to understand e commerce model • Practical on understanding the process of registering a business on the marketplace, listing your catalog.	4
Week 3 & Week 4	• Implement retargeting techniques.	4
Week 5 to Week 7	• Understanding implementing email advertising. • Understanding and implementing video advertisement, reels, story creation and other visual advertisement strategies.	6
Week 8 & Week 9	• Use different Tools for SEO (on page and off page) • Case study on different tools	4
Week 10 & Week 11	• Implement different types of Content marketing strategies.	4
Week 12 & Week 13	• Use Social media marketing platforms to market the products e.g. : facebook, LinkedIn, Instagram	4
Week 14 & Week 15	• Practical to use Web analytics tools e.g. Google Analytics, crazy egg • Implementing online payment for a website. • Case study on EDI model and understand various EDI message passing.	4