SAMARTH EDUCATIONAL TRUST
ARVIND GAVALI COLLEGE OF ENGINEERING
• ENGINEERING (B.Tech & M.Tech) • BCA • MCA • B.VOC
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First Year B.Voc Data Science 2025-26

SEMESTER – I

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing	
1	PCC	25BVD1101	Basics of Computing	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
2	BSC/ESC	25BVD1102	Statistics for Data Science - I	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
3	PCC	25BVD1103	Programming in C	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
4	BSC/ESC	25BVD1104	Mathematics for Data Science	3	--	--	3	3	CA1	10		40
									MSE	20		
									CA2	10		
									ESE	50	20	
5	IKS	25BVD1105	Constitution of India	2	--	--	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									ESE	--	--	
6	AEC	25BVD1106	Communication Skills	2	--	--	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									ESE	--	--	
7	PCC	25BVD1101L	Basics of Computing Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
8	BSC/ESC	25BVD1102L	Statistics for Data Science - I Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
9	PCC	25BVD1103L	Programming in C Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
10	AEC	25BVD11105L	Communication Skills Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
11	OJT	25BVD1107	SSC/Q0508 Junior Software Developer	--	--	--	--	12	CA1	50		80
									CA2	50		
									OE	100	40	
			Total	**16**	**--**	**08**	**24**	**32**		**1100**		
Total Contact Hours – 24 Total Credits - 32												

First Year B.Voc Data Science 2025-26
SEMESTER – II

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./Week	Cr	Components	Max	Min for Passing	
1	PCC	25BVD1201	Introduction to Data Science	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
2	PCC	25BVD1202	Data Structures	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
3	PCC	25BVD1203	Object Oriented Programming Using C++	3	--	--	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
4	BSC/ESC	25BVD1204	Statistics for Data Science - II	3	--	--	3	3	CA1	10		40
									MSE	20		
									CA2	10		
									ESE	50	20	
5	AEC	25BVD1205	Development of Life Skills	2	--	--	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									ESE	--	--	
6	PCC	25BVD1202L	Data Structures Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
7	PCC	25BVD1203L	Object Oriented Programming Using C ++ Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
8	BSC/ESC	25BVD1204L	Statistics for Data Science – II Laboratory	--	--	2	2	1	CA1	25		40
									CA2	25		
									POE	50	20	
10	AEC	25BVD1205L	Development of Life Skills Laboratory	--	--	2	2	1	CA1	25		20
									CA2	25		
									POE	--	--	
11	OJT	25BVD1206	NIE/ITS/Q15008 Data Analysis Assistant	--	--	--	--	12	CA1	50		80
									CA2	50		
									OE	100	40	
			Total	**14**	**--**	**08**	**22**	**30**		**1000**		
Total Contact Hours – 22 Total Credits - 30												

Title of the Course: Basics of Computing Course Code: 25BVD1101	L	T	P	Credit
	3	--	--	3

Course Prerequisite: NIL

Course Description:
"Basics of Computing" is an introductory engineering course designed to provide students with a foundational understanding of computer systems and their applications. The course covers fundamental concepts in hardware, software, preparing students for more advanced studies in computer science and technology. In this course students will learn various software and hardware components of computer.

Course Objectives:
By the end of this course, students will be able to:
1. The Knowledge regarding the basic components of computer.
2. The various number system used in digital electronics.
3. The different types of memory used in computer.
4. The knowledge regarding the various peripheral's devises.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Explain various components of computer.
CO2	Convert the given number in various number system.
CO3	Classify types of computer memory.
CO4	Draw interconnections between various hardware components of computers
CO5	List applications of various types of software.

CO-PO Mapping:

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

Assessment Scheme:
Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
MSE is based on 50% of course content (first three units).
ESE is based on 100% course content with 60-80% weightage for course content (last three units) covered after MSE.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Basics of Computer** Computer: definition, characteristics, advantages and disadvantages Generations of computer, Block diagram of computer Types of computers: Based on technology: analog, digital and hybrid, Based on physical size: micro, mini, mainframe and super computer	**08**
2	**Numbering System** Number Systems Introduction and types - Decimal, Binary, Octal and Hexadecimal, Conversion of Number Systems: Decimal to Binary, Decimal to Octal and Decimal to Hexadecimal; Concept of Bit, Byte, Kilobyte, Megabyte, Gigabyte and Terabyte, ASCII, EBCDIC and Unicode	**08**
3	**Memory** Overview of Memory Types of Memory a. Primary Memory: RAM and ROM b. Secondary Memory: Hard disk, CD, DVD, USB flash memory & Solid-state memory	**08**
4	**Hardware** Concept of hardware, components of computer: motherboard, SMPS, ports and graphics card, Input devices - keyboard, mouse, scanner, Output devices - monitor: CRT, flat panel & touch screen, printer: dot matrix, ink-jet & laser and plotter	**08**
5	**Software** Concept of software, types: system software and application software Application software: word processing, spreadsheet and presentation program Relationship between hardware and software.	**08**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Computers And Commonsense	R. Hunt and Shell Y.	BPB Publications
2	Computer Fundamentals	V. Rajaraman	PHI Learning
3	Computer Fundamentals and Applications	Ashok Arora	Vikas Publishing House
4	Foundations of Computing	Pradeep Sinha & Priti Sinha	BPB Publications
5	Computer Fundamentals	Anita Goel	Pearson Education

Useful Links:
1. https://artoftesting.com/computer-fundamentals-tutorial
2. https://www.javatpoint.com/computer-fundamentals-tutorial
3. https://www.tutorialspoint.com/computer_fundamentals/index.htm
4. https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Title of the Course: Statistics for Data Science - I Course Code: 25BVD1102	L	T	P	Credit
	3	--	--	3

Course Prerequisite: Basic Mathematics: Familiarity with mathematical concepts, including algebra and calculus.

Course Description:
Statistics for Data Science is a core subject in the B.Voc program that provides students with a comprehensive understanding of statistical concepts and methods for data analysis. Students learn to collect, analyze, and interpret data, and develop skills in statistical modeling, data visualization, and data-driven decision-making.

Course Objectives:
By the end of this course, students will be able to:
1. Student should be familiar with different domains in statistics and actuarial science.
2. To train the students regarding the various statistical concepts like data collection, measure of central tendency and dispersion.
3. To provide the knowledge of skewness and kurtosis.
4. Students should understand the concept of probability.
5. To describe the various mathematical expectations.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Understand basic statistical concepts like types of data, graphical representation techniques etc.
CO2	summarize and analyse data and to solve simple problems related with central tendency and dispersion.
CO3	understand the shape of data distribution curve using skewness and kurtosis techniques.
CO4	solve problems using basic probability, conditional probability and baye's theorem.
CO5	Compute and interpret the mathematical expectation and variance of random variable.

CO-PO Mapping:

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

Assessment Scheme:
Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
MSE is based on 50% of course content (first three units).
ESE is based on 100% course content with 60-80% weightage for course content (last three units) covered after MSE.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Introduction to Statistics and Data** Definition, Scope and Importance of Statistics, Role of Statistics in Data Science, Limitations and Misuse of Statistics, Data: Types of Data: Primary and Secondary Data, Classification of data: Structured vs. Unstructured Data Scale of Measurement: Nominal, Ordinal, Interval, Ratio	**08**
2	**Data Visualization and Summarization** Frequency Distribution and Tabulation, Graphical Representation of Data: Bar Charts, Pie Charts, Histograms, Frequency Polygons, Ogives, Descriptive Statistics: Measures of Central Tendency: Mean, Median, Mode, geometric mean and harmonic mean, Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation and Coefficient of Variation, Box Plot and Outlier Detection, Partition values: Quartiles, Deciles and Percentiles	**08**
3	**Skewness, Kurtosis** Concept of Skewness: Positive, Negative, and Zero Skewness, Moments and Relationship between Raw Moments and Central moments, Types of Skewness - Pearson's Coefficients of skewness, Bowley's Coefficients of skewness and Coefficient of Skewness based on moments, Co-efficient of Kurtosis, Correlation Analysis: Pearson, Spearman	**08**
4	**Basic Probability** Basic Probability Concept: Random Experiments, Sample Spaces Events, Concept of Probability, Axioms and Rules of Probability, Conditional Probability and Bayes' Theorem, Counting Rules: Permutations and Combinations, Probability Distributions: Binomial, Poisson, and Normal Distribution	**08**
5	**Mathematical Expectation**	**08**

	Mathematical Expectation, Definition of Mathematical Expectation, Functions of Random Variables, Properties and theorems on Expectations: Linearity of Expectation, Expectation of sum of random variables, Exception of constant, Expectation of function of random variables, Variance & Standard Deviation Theorems on Variance and Standardized Random Variables.	

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Basic Statistics	B. L. Agarwal	New Age International
2	Statistical Methods	S. P. Gupta	Sultan Chand & sons
3	Fundamentals of Mathematical Statistics	S. C. Gupta and V. K. Kapoor	Sultan Chand & sons
4	Statistics (Theory & Practice)	R S N Pillai	S. Chand Limited

Useful Links:
1. https://www.youtube.com/watch?v=xxpc-HPKN28
2. https://www.statology.org/tutorials/
3. https://www.tutorialspoint.com/statistics/index.htm

Title of the Course: Programming in C Course Code: 25BVD1103	L	T	P	Credit
	3	--	--	3

Course Prerequisite: The prerequisites for learning C programming is:
1) Logical Thinking and Problem-Solving Skills

Course Description:
This course is designed to introduce students about the fundamentals of programming, c programming as a platform. Students learn to design, develop, and test structured programs using C.

Course Objectives:
By the end of this course, students will be able to:
1. the basic concepts of programming.
2. the importance of variables, data types, operators.
3. the use of control structures.
4. the implementation of Arrays and Pointers in C.
5. Structure and file management.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Write and execute simple c program.
CO2	Use various operators in C to perform arithmetic, relational, logical, and assignment operations
CO3	Use decision making constructs (if, if-else, nested if-else, switch, etc.) to control the flow of a program
CO4	Use two-dimensional arrays to represent matrices and tables, and use of functions in c.
CO5	Understand the concept of file management in C.

CO-PO Mapping:

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

Assessment Scheme:
Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
MSE is based on 50% of course content (first three units).
ESE is based on 100% course content with 60-80% weightage for course content (last three units) covered after MSE.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Fundamental of the Computer and Computing Concepts** Software: Instruction, Program, software, interpreter, compiler., Process of programming: Editing, Compiling, Error Checking, executing, testing and debugging of programs. Flowcharts and Algorithms for various program logics.	**08**
2	**Types, Operators and Expressions** Features of C language. C Tokens, Data types, sizes, initialization and declarations Arithmetic operators, relational and logical operators, increment and decrement operators, bitwise operators, assignment operators, Expressions, conditional expressions precedence and order of evaluation, type conversions.	**08**
3	**Control Flow** Statements and Blocks: If-else, if-else ladder, nested if-else, switch-case, Loops: while, for, do while, break, continue, go to and Labels. Functions and Program Structure: Basic of functions, in build functions, user defined functions, function returning various data types, external variables scope rules.	**08**
4	**Arrays and Pointers in C** Initializing arrays, initializing character arrays, multidimensional arrays. Pointer: Definition and uses of pointers, Pointers to integers, characters, floats, arrays	**08**
5	**Structures in C and File Management:** Union in C , Basics of structures, structures and functions arrays of structures, Pointers in structures. Introduction to File Management: Defining and Opening File, Closing File, Input/output Operations on File. Variance & Standard Deviation, Theorems on Variance and Standardized Random Variables.	**08**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	How to Solve it by Computer	R G Dromey	Pearson Education.
2	Let Us C	Yashwant Kanitkar	PHI

Useful Links:
1. http://www.cprogramming.com/tutorial/c-tutorial.html
2. http://nptel.ac.in/courses/106104128/
3. http://nptel.ac.in/courses/106105085/1

Title of the Course: Mathematics for Data Science Course Code: 25BVD1104	L	T	P	Credit
	3	--	--	3

Course Prerequisite: For B.Voc courses, students are expected to have a foundational understanding of mathematics.

Course Description:
Mathematics for Data Science is a foundational subject for B.Voc courses that equips students with the mathematical skills and knowledge necessary to tackle data-driven problems. This subject covers essential mathematical concepts with a focus on their applications in data science.

Course Objectives:
By the end of this course, students will be able to:
1. To provide the knowledge regarding Propositional and Predicate logic for reasoning and circuit design.
2. To train the students to perform various matrix operations, determinants, eigen values and eigen vectors.
3. To explore graph concepts, types, representation, and application in problem solving.
4. To explain algebraic expression and practice problems.
5. To demonstrate various types of functions and their graphical representation.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	construct and analyses logical statements, Truth tables and apply logic to switching circuits.
CO2	to perform various matrix operations, determinants and to solve problems on eigen values and eigen vectors.
CO3	Model problems using graphs, analyses graph properties and use graph coloring and connectivity.
CO4	Simplify given algebraic expressions, solve equations and interpret slope and intercepts.
CO5	Identify the type of function and represent them graphically.

CO-PO Mapping:

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

Assessment Scheme:
Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
MSE is based on 50% of course content (first three units).
ESE is based on 100% course content with 60-80% weightage for course content (last three units) covered after MSE.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Logic** Propositional Logic: Statements, truth values, logical operators, Truth tables, Tautologies, Contradictions, Predicate Logic: Quantifiers, statements with variables, Set Theory: Types of sets, union, intersection, complement, Venn diagrams, The Universe of Discourse, Examples, Valid Formulas & Equivalences, Examples	**08**
2	**Matrix** Concept of matrix, Types of matrices, matrix operation, Transpose of a matrix, Inverse of a matrix, Determinant of a matrix, Trace of a matrix, Dot product, Matrix example, Matrix addition, multiplication, matrix power & QR factorization, Concept of Eigenvalues, eigenvector & orthogonalization	**08**
3	**Graph Theory** Graph and its applications, graph terminologies: vertex, edge, loop, path, circuit, degree of vertex, degree of graph, Types of graphs - null graph, directed and undirected graph, connected and disconnected graph, weighted graph, complete graph, cycle graph, star graph, planar graph, Euler graph and Hamilton graph, Graph isomorphism, graph connectivity, Representation of Graphs: Adjacency Matrix and Adjacency List, Graph coloring.	**08**
4	**Algebraic Expression** Concept of Algebraic Expression, Algebraic Expressions terminologies: Expression, Terms, Factors, Variables, Coefficient & Constant in Algebraic Expressions, Types of Algebraic expression - Monomial Expression, Binomial Expression, Polynomial Expression and Multinomial Expression, Solving various types of algebraic equations, Slope-intercept form, terminologies: slope, x-intercept, and y-intercept, Examples of finding slope and y-intercept	**08**

5	**Function** Function: Concept of function, input, and output, Types of function: linear function, quadratic function, cubic function, polynomial function, exponential function, and logarithmic function, Representing function in a graph form	**08**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Business Mathematics	Qazi Zameer Uddin, Vijay K Khanna & S K Bhambri	Vikas Publishing
2	Business Mathematics	D C Sancheti and V K Kapoor	Sultan Chand & Sons
3	Discrete Mathematics	Richard Johnsonbaugh	Pearson
4	Discrete Mathematics and Its Applications	Kenneth H. Rosen	McGraw Hill Education
5	Journey Into Discrete Mathematics	Deirdre Smeltzer, Kenneth L. Wantz, and Owen Byer	American Mathematical Soc

Useful Links:
1. https://discrete.openmathbooks.org/dmoi3/dmoi.html
2. https://open.umn.edu/opentextbooks/textbooks/basic-algebra-with-applications
3. https://open.umn.edu/opentextbooks/textbooks/elementary-algebra-2019
4. https://open.umn.edu/opentextbooks/textbooks/fundamentals-of-matrix-algebra

Title of the Course: Constitution of India Course Code: 25BVD1105	L	T	P	Credit
	2	--	--	2

Course Prerequisite: The students should be aware of human values.

Course Description:
The Constitution of India is a foundational subject that introduces students to the supreme law of the land, outlining the framework, principles, and values of Indian democracy. It covers the history, philosophy, and structure of the Constitution, including fundamental rights, directive principles, and duties of citizens. Students learn about the roles of the legislature, executive, and judiciary, as well as the federal structure and distribution of powers. The course emphasizes the significance of constitutional values in promoting social justice, equality, and good governance, preparing students to engage with constitutional issues and contribute to the development of a just and equitable society.

Course Objectives:
By the end of this course, students will be able to:
1. To familiarize students with the key elements of the Indian Constitution
2. To create awareness about constitutional values and objectives

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Describe historical background of the Indian Constitution
CO2	Identify fundamental rights and duties of Indian citizens
CO3	Understand the working of Indian Democracy
CO4	Describe the decentralization of power between central, state, and local self-government
CO5	Describe historical background of the Indian Constitution

CO-PO Mapping:

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

Assessment Scheme:

Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
ESE	--

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**The Constitution – Introduction** The History of the Making of the Indian Constitution, Preamble and the Basic Structure, and its interpretation, Fundamental Rights and Duties and their interpretation, State Policy Principles, Citizenship	**06**
2	**Union Government** Structure of the Indian Union, President – Role and Power	**06**
3	**Central Government** Prime Minister and Council of Ministers, Lok Sabha and Rajya Sabha	**06**
4	**State Government** Governor – Role and Power, Chief Minister and Council of Ministers	**06**
5	**Local Administration** District Administration, Municipal Corporation	**06**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2	The Constitution of India	B.L. Fadia Sahitya Bhawan	New edition (2017)
3	Introduction to the Constitution of India	D.D. Basu	Lexis Nexis; Twenty-Third, 2018 edition
4	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008

Useful Links:
1.https://www.constitution.org/cons/india/const.html
2.http://www.legislative.gov.in/constitution-of-india

Title of the Course: Communication Skills Course Code: 25BVD1106	L	T	P	Credit
	2	--	--	2

Course Prerequisite: English subject at HSC.

Course Description:
The course intends to make learners understand and develop various communication skills required in day-to-day life as well as in professional contexts. As domain knowledge and skills have become equally important in today's technology-driven world, the current course and the one being offered in the Third Year will provide the learners a great opportunity to strengthen their English communication and soft skills. Keeping in mind the current competence of the learners, the course aims to provide them with revision and ample practice in the skills essential for their professional life. It includes four modules that cover basic concepts and theory of communication, business communication, verbal aptitude (English grammar), language learning skills, letter writing, and comprehension. In addition to Listening, Speaking, Reading, and Writing (LSRW) the course sees Thinking as an essential language learning skill.

Course Objectives:
By the end of this course, students will be able to:
1. To understand the fundamentals of communication theory and its relevance in a professional context.
2. To apply the listening and reading comprehension skills.
3. To summarize the techniques to improve spoken English and to provide the students with a platform for practicing these skills.
4. To prepare the students to write correct and effective business letters, official letters, and covering letters with resume, and to participate in Group Discussion (GD)and face the interviews.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Demonstrate the communication process, methods of communication, and flow of Communication in a business context
CO2	Apply acquired LSRW skills in real-life situations and in a professional context
CO3	Compose effective business and cover letters using standard language, style, and structure
CO4	Apply the techniques for effective participation in GD and tips to face interviews successfully.

CO-PO Mapping:

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

Assessment Scheme:
Two components of 'In Semester Evaluation' (ISE), One 'Mid Semester Examination' (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
ESE	--

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Communication Theory** Communication basics: Importance, process, levels, forms, methods: verbal and non-verbal, Barriers and solutions, Flow/channels of business, communication (Internal, External, Vertical, Horizontal, Diagonal, Grapevine), Problems and Solutions	**07**
2	**Enhancing Language Learning Skills (LSRW)** Effective listening: Process and advantages of listening, poor listening habits, types of listening, strategies for effective listening, listening barriers Effective speaking: Importance of telephonic conversation, various oral business contexts/situations, group communication, Preparing effective public communications, Effective reading: Importance, types, overcoming common obstacles, tips and strategies, Effective Writing: Mastering English Essentials and Fundamentals, paragraph and essay writing techniques, diary/blog writing Art of précis writing, Techniques to comprehend and summarize a given technical, scientific, or industry-oriented text, Thinking is intricately with the LSRW skills	**07**
3	**Formal Business Correspondence** Principles, structure (elements), Layout (complete block, modified block, semi-block), Types (enquiry and replies, claim and adjustment)	**07**
4	**Employability Skills** Covering letter and resume, Group Discussion, Interviews (Online / Offline) Introduction to soft skills (Etiquettes, Team Work, Empathy, Problem Solving etc.)	**07**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Developing Communication Skills	Krishna Mohan Meera Banerji	Macmillan Publishers India Ltd.
2	Communication Skills for Engineers and Scientists	Sangeeta Sharma Binod Mishra	PHI Learning Private Limited.
3	Professional Communication Skills	Er. A.K.Jain Dr.Pravin S.R. Bhatia Dr. A.M.Shaikh	S.Chand
4	Personality Development and Soft skills	Barun K.Mitra	Oxford University Press

Useful Links:
1.https://www.bbc.co.uk/learningenglish
2.https://www.grammarly.com/blog/handbook/
3.https://learnenglish.britishcouncil.org/grammar

Title of the Course: Basics of Computing Laboratory Course Code: 25BVD1101L	L	T	P	Credit
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Course Prerequisite: Nil.

Course Description:
"Basics of Computing" is an introductory engineering course designed to provide students with a foundational understanding of computer systems and their applications. The course covers fundamental concepts in hardware, software, preparing students for more advanced studies in computer science and technology. In this course students will learn various software and hardware components of computer.

Course Objectives:
By the end of this course, students will be able to:
1. The Knowledge regarding the basic components of computer.
2. The various number system used in digital electronics.
3. The different types of memory used in computer.
4. The knowledge regarding the various peripherals devises.
5. The understanding of various types of software.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Identify various components and peripherals of computer.
CO2	handle hardware and software of computer.
CO3	Demonstrate various processes like start, restart, sleep, hibernate and shutdown.
CO4	perform installation of various software.
CO5	Perform remote desktop software such as Quick Assist or Any Desk or TeamViewer.

CO-PO Mapping:

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

Assessment Scheme:
Two components of In- Semester Evaluation (ISE), CA1 and CA2 having weightage of 25% each, Practical Examination at the end of semester will carry 50% weightage.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
OE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
OE is based on the practical examination carried out at the end of the semester.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	Identification and understanding working of external components of computer system - keyboard, mouse, monitor, printer, scanner, projector, CD, DVD, DVD-ROM, pen drive, webcam, graphics tablet, light pen, microphone, speaker, headphone, and headset.	**02**
2	Identification and understanding working of Internal components of computer system - SMPS, motherboard, CPU, hard disk, RAM, ROM, CMOS, NIC, graphics card and ports.	**02**
3	Acquirement of computer hardware.	**02**
4	Acquirement of computer software.	**02**
5	Installation of computer peripherals like mouse, keyboard and monitor.	**02**
6	Learn computer start, restart, sleep, hibernate and shutdown processes.	**02**
7	Learn files and folder management (create, cut, copy, paste, delete, etc) in windows environment.	**02**
8	Installation of application software – MS Office or OpenOffice.	**02**
9	Installation the IDE / Editors / Compilers for VS Code for C and C++, JDK and Python on the computer.	**02**
10	Learn remote desktop software such as Quick Assist or Any Desk or TeamViewer.	**02**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Computers And Commonsense	R. Hunt and Shell Y.	BPB Publications
2	Computer Fundamentals and Applications	Ashok Arora	Vikas Publishing House
3	Computer Fundamentals	Anita Goel	Pearson Education
4	Computers And Commonsense	R. Hunt and Shell Y.	BPB Publications

Useful Links:
1. https://artoftesting.com/computer-fundamentals-tutorial
2. https://www.javatpoint.com/computer-fundamentals-tutorial
3. https://www.tutorialspoint.com/computer_fundamentals/index.htm

Title of the Course: Statistics for Data Science - I Laboratory Course Code: 25BVD1102L	L	T	P	Credit
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Course Prerequisite: Knowing the basic concepts in mathematics and statistics like average.

Course Description:
Statistics for Data Science Laboratory is a hands-on course that provides students with practical experience in applying statistical concepts and methods to real-world data. The lab focuses on practical applications, enabling students to work with datasets, interpret results, and communicate insights effectively.

Course Objectives:
By the end of this course, students will be able to:
1. To train the students about fundamental statistical concept including probability.
2. To the provide the knowledge regarding data visualization and summarization.
3. To intrudes various software tools used in statistics.
4. To motivate the students to work with real-world data.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Understand basic statistical concepts like types of data, graphical representation techniques etc.
CO2	Summarize and analyse data and to solve simple problems related with central tendency and dispersion
CO3	Understand the shape of data distribution curve using skewness and kurtosis techniques.
CO4	Solve problems using basic probability, conditional probability and baye's theorem.
CO5	Computer and interpret the mathematical expectation and variance of random variable.

CO-PO Mapping:

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

Assessment Scheme:
Two components of In- Semester Evaluation (ISE), CA1 and CA2 having weightage of 25% each, Practical Examination at the end of semester will carry 50% weightage.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
OE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
OE is based on the practical examination carried out at the end of the semester.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	**Graphical Representation of Categorical Data:** Create a small dataset in MS Excel with at least 15 entries for a categorical variable (e.g., "Favorite Color" with categories like Red, Blue, Green; or "Product Type" with categories A, B, C). Use Excel's charting tools to create both a Bar Chart and a Pie Diagram to visually represent the frequency distribution of this data.	**02**
2	**Graphical Representation of Numerical Data:** Enter a generic dataset of at least 20 continuous numerical values (e.g., "Daily Temperature", "Customer Transaction Amount", "Student Scores") into MS Excel. Use Excel's built-in tools to generate a histogram for your dataset. Clearly label the axes (e.g., "Intervals/Bins" for x-axis, "Frequency" for y-axis). Also, create a Frequency Polygon by plotting midpoints of intervals against frequencies.	**02**
3	**Calculating Measures of Central Tendency:** Enter a generic dataset of at least 15 numerical values into MS Excel. Using Excel's built-in functions, calculate the Mean (AVERAGE), Median (MEDIAN) and Mode (MODE.SNGL) of this dataset. Briefly interpret what each measure tells you about the data's center.	**02**
4	**Determining Partition Values:** Enter a generic dataset of at least 15 numerical values into MS Excel, calculate the First Quartile (Q1), Second Quartile (Q2) and Third Quartile (Q3) using Excel's QUARTILE.INC or QUARTILE.EXC function. Also, find the 10^{th} and 90^{th} percentiles using the PERCENTILE.INC or PERCENTILE.EXC function.	**02**
5	**Computing Measures of Dispersion:** Enter a generic dataset of at least 15 numerical values into MS Excel, calculate the Range, Standard Deviation (STDEV.S or STDEV.P) and Coefficient of Variation (Standard Deviation / Mean) in MS Excel. Explain what these values indicate about the spread of your data.	**02**

6	**Calculating Skewness and Kurtosis:** Enter a generic dataset of at least 20 numerical values into MS Excel. Use Excel's SKEW function to calculate the Skewness and the KURT function to calculate the Kurtosis of the data. Interpret these values to describe the shape (symmetry and peakedness) of the data's distribution.	**02**
7	**Empirical Probability Simulation:** Simulate 50 trials of a simple random experiment (e.g., flipping a coin, rolling a die) in MS Excel using the RANDBETWEEN function. Based on your simulated outcomes, calculate the empirical probability of a specific event (e.g., getting "Heads", rolling an "Even number"). Compare this empirical probability to the theoretical probability of the event.	**02**
8	**Conditional Probability from a Contingency Table:** Create a simple 2x2 contingency table in MS Excel representing generic survey data (e.g., "Gender" vs. "Preference for Product A/B"). Using the frequencies in your table, calculate two different conditional probabilities (e.g., P(Prefer Product A | Male), P(Female | Prefer Product B)).	**02**
9	**Calculating Expected Value:** For a given discrete probability distribution (list of outcomes and their corresponding probabilities, e.g., possible profits and their probabilities), set up the data in MS Excel. Calculate the Mathematical Expectation (Expected Value) of this random variable using Excel's SUMPRODUCT function.	**02**
10	**Calculating Expected Value:** For a given discrete probability distribution (list of outcomes and their corresponding probabilities, e.g., possible profits and their probabilities), set up the data in MS Excel. Calculate the Mathematical Expectation (Expected Value) of this random variable using Excel's SUMPRODUCT function.	**02**

Learning Resources

Sr. No.	Title of Book	Name of Author	Publisher
1	Basic Statistics	B. L. Agarwal	New Age International
2	Statistical Methods	S. P. Gupta	Sultan Chand & sons
3	Fundamentals of Mathematical Statistics	S. C. Gupta and V. K. Kapoor	Sultan Chand & sons
4	Statistics for Business and Marketing Research	Kishore K. Das, Dibyojyoti Bhattacharjee	PHI Learning

Useful Links:

1. https://www.youtube.com/watch?v=xxpc-HPKN28
2. https://www.statology.org/tutorials/
3. https://www.tutorialspoint.com/statistics/index.htm
4. https://www.khanacademy.org/math/statistics-probability
5. https://w3schools.com/statistics/

Title of the Course: Programming in C Laboratory Course Code: 25BVD1103L	L	T	P	Credit
	--	--	2	1

Course Prerequisite: The prerequisites for an engineering subject C Programming Lab typically include:
1. Basic computer.
2. literacy Mathematical.
3. maturity Basic problem-solving ability.

Course Description:
This course introduces students to the fundamentals of programming using the C programming language. Students learn to design and develop structured programs using C.

Course Objectives:
By the end of this course, students will be able to:
1. the basic concepts of programming.
2. the importance of variables, data types, operators.
3. the use of control structures.
4. the implementation of Arrays and Pointers in C.
5. Structure and file management.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Draw flow chart and algorithm for given problem
CO2	Use variables and data types
CO3	Implements controls structures
CO4	Work with arrays and pointers
CO5	Demonstrate file handling

CO-PO Mapping:

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

Assessment Scheme:
Two components of In- Semester Evaluation (ISE), CA1 and CA2 having weightage of 25% each, Practical Examination at the end of semester will carry 50% weightage.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
OE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
OE is based on the practical examination carried out at the end of the semester.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	Preparation of flow chart and algorithm for given program (e. g, program to find maximum of three numbers, program to from table of given number etc)	**02**
2	Implement arithmetic, relational, and logical operations in C programs and display the results.	**02**
3	Write a C program to implement various control flow statements such as if-else, and loops, to solve a given problem.	**02**
4	Write a C program to implement switch case statements	**02**
5	Develop a C program to print the Fibonacci series using a loop	**02**
6	Implement a program to find the largest and smallest elements in an array.	**02**
7	Create a C program to transpose a matrix using a two-dimensional array.	**02**
8	Define a structure to represent a student record with attributes like name, roll number, and marks, and write a program to display the student details.	**02**
9	Develop a C program to swap two numbers using pointers.	**02**
10	Implement file handling operations in C to copy the contents of one file to another.	**02**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Let us C	Yashavant Kanetkar	PHI
2	How to Solve it by Computer	R G Dromey	Pearson Education

Useful Links:
1. https://open.umn.edu/opentextbooks/textbooks/programming-fundamentals-a-modular- structured-approach-using-c
2. https://open.umn.edu/opentextbooks/textbooks/how-to-think-like-a-computer-scientist-c- version
3. http://nptel.ac.in/courses/106/105/106105225
4. https://www.programiz.com/cpp-programming
5. https://www.tpointtech.com/cpp-tutorial

Title of the Course: Communication Skills Laboratory Course Code: 25BVD11105L	L	T	P	Credit
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Course Prerequisite: English subject at HSC, Communication Skills Theory.

Course Description:
This is a practice-oriented course, laying importance on application of various skills being learnt in the Communication Skills theory course such as grammar, techniques and strategies for improving English sub-skills and vocabulary, etc. In addition, this course focuses on English speaking, reading, writing skills, effective presentation and build confidence.

Course Objectives:
By the end of this course, students will be able to:
1. To exhibit confident and effective communication skills in presentations, group discussions, and role-plays.
2. To design clear, concise, and persuasive messages in written and oral formats, applying principles of effective communication.
3. To analyze the students' own communication strengths and weaknesses, identifying areas for improvement.
4. To deliver engaging presentations, incorporating visual aids and effective delivery techniques.
5. To assess the effectiveness of communication strategies, providing constructive feedback and suggestions for improvement.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Demonstrate confidence in public speaking, group discussions, and other communication settings.
CO2	Create engaging and informative content for presentations, reports, and other written assignments.
CO3	Use nonverbal communication effectively, including body language, tone of voice, and facial expressions.
CO4	Practice active listening skills, including paraphrasing, summarizing, and asking clarifying questions.
CO5	Adapt their communication style to different audiences, purposes, and contexts, demonstrating flexibility and effectiveness.

CO-PO Mapping:

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

Assessment Scheme:
Two components of In- Semester Evaluation (ISE), CA1 and CA2 having weightage of 25% each, Practical Examination at the end of semester will carry 50% weightage.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
OE	50

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
OE is based on the practical examination carried out at the end of the semester.

Course Contents:

Unit No.	Unit Name and Contents	Hours
1	Icebreaking: Introducing yourself and others Adjectives, phrases, and clauses to describe yourself and others Introducing yourself and others demonstration	**02**
2	Introduction to English Building Blocks -1 Grammar fundamentals: parts of speech, tenses, prepositions, articles, modals, Vocabulary building: synonyms, antonyms, prefixes/suffixes, idioms, phrases	**02**
3	Verbal Aptitude1(Discussion on applications of grammar) Using proper tenses, correct use of articles, conjunctions and prepositions	**02**
4	Verbal Aptitude 2(Watching videos and solving grammar exercises) Using proper tenses, correct use of articles, conjunctions and prepositions	**02**
5	Listening practice Listening comprehension, Strategies for effective listening with audio/video samples	**02**
6	Speaking practice-1 Video samples of effective and ineffective public speeches, Extempore (JAM), prepared speeches	**02**
7	Speaking practice-2 Prepared speeches	**02**
8	Group Discussion-1 Group discussion tips, Dos and Don’ts, video samples Mock GD-1, analysis and comments on individual performances	**02**
9	Group Discussion-2	**02**

	Final GD participation	
10	Interview1 Discussing interview FAQs in detail, video samples Mock interviews (prepared and formal)	**02**

Learning Resources			
Sr. No.	**Title of Book**	**Name of Author**	**Publisher**
1	Better English Pronunciation	J.D. O'Connor	Nira Konar
2	A Practical Course in Spoken English	J.K. Gangaj	PHI Learning Pvt. Ltd
3	A Practical Course in Spoken English	Nira Konar	PHI Learning

Useful Links:
1.https://www.bbc.co.uk/learningenglish
2.https://www.grammarly.com/blog/handbook/
3.https://learnenglish.britishcouncil.org/grammar
4.https://www.bbc.co.uk/learningenglish
5.https://www.youtube.com/user/TEDxTalks
6.https://www.geeksforgeeks.org/group-discussion/

Title of the Course: SSC/Q0508 Junior Software Developer Course Code: 25BVD1107	L	T	P	Credit
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Course Prerequisite: 1) Basic I.T. Skills
2) Communication skills.

Course Description:
Junior Software Developer course offers students, the opportunity to explore and develop their careers through professional practice. The structured plan of education impacts student work readiness through several professional development skill-building activities, including goal setting; analysis and reflection; feedback from employer; informational interviewing and briefing their experience.

Course Objectives:
By the end of this course, students will be able to:
1. To provide practical exposure to the students.
2. To bridge the gap between theory and practical.
3. To foster professional development.
4. To provides hands-on experience and practices.
5. To prepare students for employability.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Apply theoretical knowledge while working practically
CO2	Acquire industry-specific skills
CO3	Enhance problem-solving and critical thinking skill
CO4	Develop a deeper understanding of the industry
CO5	Gain industry insights and networking opportunities

CO-PO Mapping:

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

Assessment Scheme:
Two components of In- Semester Evaluation (ISE), CA1 and CA2 having weightage of 25% each, Practical Examination at the end of semester will carry 50% weightage.

Assessment Component	Marks
CA1	50
MSE	--
CA2	50
OE	100

CA1 and **CA2** are based on Assignment/Declared test/Quiz/ Seminar/Group discussions/ presentation, etc.
OE is based on the practical examination carried out at the end of the semester.

Useful Links:
1 https://www.sscnasscom.com/qp-qpservices