



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (Computer Science and Business Systems –TCS)

SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTC SBS101	BSC	Discrete Mathematics	Max	60	20	20	0	0	3	0	0	3
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To introduce the formal principles of Boolean algebra and propositional calculus for functional minimization, digital tracking frameworks, and axiom validations.
2. To impart a comprehensive structural understanding of algebraic frameworks (groups, rings, fields) and core combinatorial mechanics necessary for advanced algorithmic operations.
3. To expose students to graph theoretic structures, network planarity parameters, and natural deduction rules used to model network configurations and verify software environments.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply laws of Boolean algebra, combinatorial counting rules, and logical truth assignments to minimize canonical expressions and resolve mathematical constraints.
- CO2** Analyze structured relations, abstract algebraic structures (groups, fields), and combinatorial sequences using generating functions and recurrence formulations.
- CO3** Design and formulate system models using network representations, tree optimization properties, graph planarity constants, and formal deductive validation protocols.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
- ATL3** Midterm Exams
- ATL4** Flip Class

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 SEMESTER-I (2026-30)

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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- ATL5** Seminar Presentation
ATL6 Assignments
ATL7 Poster
ATL8 Oral Viva-voce examination
ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Boolean algebra: Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.	6	ATL1 ATL3 ATL6
II	Abstract algebra: Set, relation, group, ring, field.	6	ATL1 ATL3 ATL6
III	Combinatorics: Basic counting, balls and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, pigeonhole principle.	6	ATL1 ATL3 ATL6
IV	Graph Theory: Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, trees; Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four-color theorem.	6	ATL1 ATL3 ATL6
V	Logic: Propositional calculus - propositions and connectives, syntax; Semantics - truth assignments and truth tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility - natural deduction system	6	ATL1 ATL3 ATL6

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	and axiom system; Soundness and completeness.		
	Total Hours	30	

ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. *Topics in Algebra*, I. N. Herstein, John Wiley and Sons.
2. *Digital Logic & Computer Design*, M. Morris Mano, Pearson.

Reference Books

1. *Elements of Discrete Mathematics, (Second Edition)* C. L. Liu McGraw Hill, New Delhi.
2. *Graph Theory with Applications*, J. A. Bondy and U. S. R. Murty, Macmillan Press, London.
3. *Mathematical Logic for Computer Science*, L. Zhongwan, World Scientific, Singapore.
4. *Introduction to linear algebra*. Gilbert Strang.
5. *Introductory Combinatorics*, R. A. Brualdi, North-Holland, New York.
6. *Graph Theory with Applications to Engineering and Computer Science*, N. Deo, Prentice Hall, Englewood Cliffs.
7. *Introduction to Mathematical Logic, (Second Edition)*, E. Mendelsohn, Van-Nostrand, London.

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BTC SBS101	BSC	Discrete Mathematics	Max	60	20	20	0	0	3	0	0	3
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Suggested e- resources (Websites/e-books)

Link: <https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-fall-2010/>

Link: <https://nptel.ac.in/courses/106106183>

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1	1	1	1	1	1	1	3	2	2	2
CO2	3	3	2	2	2	1	1	1	2	1	1	3	3	3	3
CO3	3	3	3	2	2	1	1	1	2	2	1	3	3	2	3

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTC SBS102	BSC	Introduction to Statistics, Probability and Calculus	Max	60	20	20	0	0	3	0	0	3
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To introduce the fundamental principles of data collection, descriptive statistics, and univariate/bivariate data summarization for engineering analysis.
2. To impart core knowledge of mathematical calculus, combinatorial probability rules, conditional events, and foundational theorem derivations like Bayes' Theorem.
3. To expose students to discrete and continuous probability distributions, mathematical expectations, structural moments, and statistical distribution parameters utilized in system modeling.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply techniques of data collection, basic differential/integral calculus, and combinatorial probability laws to evaluate scientific data sets.
- CO2** Analyze univariate and bivariate distributions using descriptive measures, frequency curves, marginal/conditional summaries, and moment-generating functions..
- CO3** Formulate and design computational models using discrete, continuous, and sampling distributions combined with double/triple integration methods to resolve complex engineering uncertainties.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning

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ATL3 Midterm Exams

ATL4 Flip Class

ATL5 Seminar Presentation

ATL6 Assignments

ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Statistics: Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample.	6	ATL1 ATL3 ATL6
II	Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution.	6	ATL1 ATL3 ATL6
III	Probability: Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem. Probability distributions: discrete & continuous distributions, Binomial, Poisson and Geometric distributions, Uniform, Exponential, Normal, Chi-square, t, F distributions.	6	ATL1 ATL3 ATL6
IV	Expected values and moments: mathematical expectation and its properties, Moments (including variance) and their properties, interpretation, Moment generating function.	6	ATL1 ATL3 ATL6
V	Calculus: Basic concepts of Differential and integral calculus, application of	6	ATL1

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	double and triple integral.		ATL3 ATL6
	Total Hours	30	

ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. *Introduction of Probability Models*, S. M. Ross, Academic Press, N. Y.
2. *Fundamentals of Statistics*, vol. I & II, A. Goon, M. Gupta and B. Dasgupta, WorldPress.

Reference Books

1. *Higher Engineering Mathematics*, B. S. Grewal, Khanna Publication, Delhi.
2. *A first course in Probability*, S. M. Ross, Prentice Hall.
3. *Probability and Statistics for Engineers*, (Fourth Edition), I. R. Miller, J. E. Freund and R. Johnson, PHI.
4. *Introduction to the Theory of Statistics*, A. M. Mood, F.A. Graybill and D.C. Boes, McGraw Hill Education.
5. *Advanced Engineering Mathematics*, (Seventh Edition), Peter V. O'Neil, Thomson Learning.
6. *Advanced Engineering Mathematics*, (Second Edition) M. D. Greenberg, Pearson Education.
7. *Applied Mathematics, Vol. I & II*, P. N. Wartikar and J. N. Wartikar, Vidyarthi Prakashan.

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Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	1	-	-	-	1	1	-	3	2	2	1
CO2	3	3	2	3	2	1	-	-	1	1	-	3	2	3	1
CO3	3	3	3	3	3	1	1	1	2	2	1	3	3	3	2

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSBS103	ESC	Fundamentals of Computer Science	Max	60	20	20	30	20	2	1	2	4
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To introduce foundational problem-solving frameworks through algorithms, flowcharts, and structured programming syntax using ANSI C.
2. To impart a comprehensive knowledge of modular development, scope dynamics, and data structures using multi-dimensional arrays, pointers, and structures.
3. To expose students to low-level systems execution, file handling stream interactions, and Unix system interface programming utilities..

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply structural control flow loops, bitwise logic, and precise variable-type conversions in ANSI C to solve mathematical and procedural engineering constraints.
- CO2** Analyze structural data layouts, recursive environments, parameter-passing memory address bounds, and row/column major multidimensional alignments.
- CO3** Design and formulate integrated application solutions utilizing robust file operations, low-level Unix system descriptors, error-handling procedures, and automated makefile modules.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
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ATL5 Seminar Presentation

ATL6 Assignments

ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	General problem Solving concepts: Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C) Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation.	6	ATL1 ATL3 ATL6 ATL8
II	Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, goto labels, structured and un- structured programming.	6	ATL1 ATL3 ATL6 ATL8
III	Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Pre-processor, Standard Library	6	ATL1 ATL3 ATL6 ATL8

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	Functions and return types.		
IV	Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialisation of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated. Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table look up, typedef, unions, Bit-fields.	6	ATL1 ATL2 ATL3 ATL6 ATL8
V	Input and Output: Standard I/O, Formatted Output – printf, Formatted Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, stdout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions. Unix system Interface: File Descriptor, Low level I/O – read and write, open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator. Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility.	6	ATL1 ATL2 ATL6 ATL8
	Total Hours	30	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

NPTEL Course on Problem Solving through Programming in C: <https://nptel.ac.in/courses/106104128>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

- The C Programming Language, (Second Edition) B. W. Kernighan and D. M. Ritchi, PHI.
- Programming in C, (Second Edition) B. Gottfried, Schaum Outline Series.

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Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (Computer Science and Business Systems –TCS)

SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCBSBS103	ESC	Fundamentals of Computer Science	Max	60	20	20	30	20	2	1	2	4
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Reference Books

1. C: The Complete Reference, (Fourth Edition), Herbert Schildt, McGraw Hill.
2. Let Us C, Yashavant Kanetkar, BPB Publications.

Suggested- resources (Websites/e-books)

1

LIST OF PRACTICAL

	Title	CO Mapping
1.	Algorithm and flowcharts of small problems like GCD	CO1
2.	Structured code writing with: - Small but tricky codes - Proper parameter passing - Command line Arguments - Variable parameter - Pointer to functions - User defined header - Make file utility - Multi file program and user defined libraries - Interesting substring matching/searching programs - Parsing related assignments	CO1, CO2, CO3

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			Marks	THEORY			PRACTICAL					
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BTCBSBS103	ESC	Fundamentals of Computer Science	Max	60	20	20	30	20	2	1	2	4
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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1	1	1	1	2	1	1	3	2	1	1
CO2	3	3	2	2	2	1	1	1	2	2	1	3	3	2	1
CO3	3	2	3	2	3	1	1	1	2	2	1	3	3	1	2

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 SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTC SBS104	ESC	Principles of Electrical Engineering	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To introduce the fundamental operational laws, network solution methodologies (Mesh/Nodal analysis), and linear network theorems for both DC and AC circuit topologies.
2. To impart a core understanding of electromagnetic fields, electromechanical energy conversion principles, and the transient behaviors of reactive elements
3. To expose students to the functional working of electrical transducers/sensors, elementary metering instrumentation, distribution system wiring layouts, grounding protocols, and consumer safety protection frameworks.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply basic network laws (KVL/KCL), star-delta reductions, and circuit theorems to compute branch currents, node voltages, and electrical power in complex DC and AC systems.
- CO2** Analyze the phase relationships, impedance vectors, resonance, dynamic charge/discharge characteristics, and B-H loops in electromagnetic and electromechanical conversion systems.
- CO3** Formulate layouts for electrical distribution, specify parameters for sensory measurement devices (piezoelectric/thermocouple), and design safe installation networks incorporating appropriate earthing and protection safety accessories.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSBS104	ESC	Principles of Electrical Engineering	Max	60	20	20	30	20	2	0	2	3
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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

ATL2 Activity Based Learning

ATL3 Midterm Exams

ATL4 Flip Class

ATL5 Seminar Presentation

ATL6 Assignments

ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction: Fundamental linear passive and active elements to their functional current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff's laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy. Basic network: Current-voltage relations of the electric network by mathematical equations to analyze the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem) Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.	6	ATL1 ATL2 ATL3 ATL6
II	Concept of AC: AC waveform definitions, form factor, peak factor, phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, single phase and three phase concept.	6	ATL1 ATL2 ATL3 ATL6
III	Electrostatics and Electro-Mechanics: Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors,	6	ATL1 ATL2

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			Marks	THEORY			PRACTICAL					
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			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	charging and discharging of capacitors. Electro Magnetism, magnetic field and Faraday's law. Magnetic materials and B-H curve. Self and mutual inductance, Ampere's law, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit. Electromechanical energy conversion.		ATL3 ATL6
IV	Measurements and Sensors: Measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Concept of indicating and integrating instruments.	6	ATL1 ATL2 ATL3 ATL6
V	Practical considerations: Electrical Wiring types and accessories, Illumination system, Basic layout of the distribution system, Types of earthing, Safety devices & systems. Battery principles and types.	6	ATL1 ATL2 ATL6
Total Hours		30	

ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. *Electric Machinery*, (Sixth Edition) A.E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill.
2. *A Textbook of Electrical Technology*, (vol. I), B. L. Theraja, Chand and Company Ltd., NewDelhi.

Reference Books

1. *Basic Electrical Engineering*, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
2. *Theory and problems of Basic Electrical Engineering*, (Second Edition), J. Nagrathand Kothari, Prentice Hall of India Pvt. Ltd.
3. *Basic of Electrical Engineering*, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
4. *Introduction to Electrodynamics*, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
5. *Engineering Circuit Analysis*, William H. Hayt & Jack E. Kemmerly, McGraw-HillBook Company Inc.
6. *Fundamentals of Electrical and Electronics Engineering*, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSBS104	ESC	Principles of Electrical Engineering	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Familiarization of electrical circuits: sources, measuring devices and transducers	CO3
2.	Determination of resistance temperature coefficient	CO2
3.	Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem)	CO1
4.	Simulation of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$	CO2
5.	Simulation of Time response of RC circuit	CO2
6.	Demonstration of measurement of electrical quantities in DC and AC systems.	CO1

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	1	1	-	-	-	1	1	-	3	2	2	-
CO2	3	3	2	2	2	1	1	-	1	1	-	3	2	2	1
CO3	3	2	3	2	3	3	2	2	2	2	2	3	3	1	2

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SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCBSBS105	BSC	Fundamentals of Physics	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To establish a thorough understanding of mechanical/electrical oscillations, wave mechanics (interference, diffraction, polarization), and Maxwell's electromagnetic field equations.
2. To impart essential knowledge on solid-state semiconductor band structures, atomic laser configurations, and structural light propagation variables inside optical fibers.
3. To expose students to foundational thermodynamic laws, energy transformation conditions, entropy variations, and thermal cycle limitations.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply harmonic principles, wave equations, physical optics laws, and fundamental thermodynamic formulas to solve computational problems in engineering physics.
- CO2** Analyze structural behavior in damped/forced systems, interference patterns, polarized light vectors, semiconductor energy bands, and entropy changes in thermodynamic cycles.
- CO3** Design and formulate physics models utilizing electrodynamics frameworks, architectural parameters for laser systems, optical fiber pathways, and optimized heat engines to meet operational engineering demands.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
- ATL3** Midterm Exams
- ATL4** Flip Class

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BTCSBS105	BSC	Fundamentals of Physics	Max	60	20	20	30	20	3	0	2	4
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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- ATL5** Seminar Presentation
ATL6 Assignments
ATL7 Poster
ATL8 Oral Viva-voce examination
ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Oscillation: Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple spring mass system. Resonance-definition., damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators.	6	ATL1 ATL3 ATL6
II	Interference-principle of superposition-young's experiment: Theory of interference fringes-types of interference-Fresnel's prism-Newton's rings, Diffraction-Two kinds of diffraction-Difference between interference and diffraction-Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence.	6	ATL1 ATL3 ATL6
III	Polarization of light: Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction. Basic Idea of Electromagnetisms: Continuity equation for current densities, Maxwell's equation in vacuum and non-conducting medium. Semiconductor Physics: Conductor, Semiconductor and Insulator; Basic concept of Band theory.	6	ATL1 ATL3 ATL6
IV	Laser and Fiber optics: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion,	6	ATL1 ATL3

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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	different types of lasers: Ruby Laser, CO ₂ and Neodymium lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.		ATL2 ATL6
V	Thermodynamics: Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes.	6	ATL2
	Total Hours	30	

ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

- Concepts of Modern Physics, (Fifth Edition) A Beiser, McGraw Hill International.
- Fundamentals of Physics, David Halliday, Robert Resnick and Jearl Walker, Wileyplus.

Reference Books

- Optics, (Fifth Edition) Ajoy Ghatak, Tata McGraw Hill.*
- Sears & Zemansky University Physics, Addison-Wesley.*
- Fundamentals of Optics, (Third Edition) Jenkins and White, McGraw-Hill.*

Suggested- resources (Websites/e-books)

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LIST OF PRACTICAL

	Title	CO Mapping
1.	Magnetic field along the axis of current carrying coil – Stewart and Gee.	CO1

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BTCSBS105	BSC	Fundamentals of Physics	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

2.	Determination of Hall coefficient of semi-conductor.	CO2
3.	Determination of Plank constant.	CO1
4.	Determination of wave length of light by Laser diffraction method.	CO3
5.	Determination of wave length of light by Newton's Ring method.	CO2
6.	Determination of laser and optical fiber parameters.	CO3
7.	Determination of Stefan's Constant.	CO2

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	2	1	1	-	1	1	-	3	1	1	1
CO2	3	3	2	2	2	1	2	-	2	1	-	3	2	2	1
CO3	3	3	3	3	3	2	2	1	2	2	1	3	3	2	2

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCBSBS106	PCC	Business Communication & Value Science - I	0	0	0	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

<u>TEACHING SCHEME:</u>	<u>EXAMINATION SCHEME:</u>	<u>CREDITS ALLOTTED:</u>
Lectures: 3 Hr./Week	Semester Examination: 50 marks	4
Tutorials: 0 Hr. / Week	Continuous Assessment: Yes	
Lab: 2-4 Hrs. / Week	Term Work: 50 marks	

Course ID:

1.6 (Year 1 Semester 1)

	Leadership Oriented Learning (LOL)		
Nature of Course		Behavioral	
Pre requisites		Basic Knowledge of high school English	
Course Objectives:			
1	Understand what life skills are and their importance in leading a happy and well-adjusted life		
2	Motivate students to look within and create a better version of self		
3	Introduce them to key concepts of values, life skills and business communication		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
C1.6.1	Recognize the need for life skills and values		[U]
C1.6.2	Recognize own strengths and opportunities		[U]
C1.6.3	Apply the life skills to different situations		[AP]
C1.6.4	Understand the basic tenets of communication		[U]
C1.6.5	Apply the basic communication practices in different types of communication		[AP]

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Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (Computer Science and Business Systems –TCS)

SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCBSBS106	PCC	Business Communication & Value Science - I	0	0	0	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Contents:	
- Overview of the course with immersion activity - Overview of biz communication - Self-awareness, confidence and communication - Essentials of Business communication - Application of communication skills - Application of Life Skills - Assignment	
Total Hours:	
65	
Text Books:	
There are no prescribed texts for Semester 1 – there will be handouts and reference links shared.	
Reference Books:	
1	English vocabulary in use – Alan Mc'Carthy and O'dell
2	APAART: Speak Well 1 (English language and communication)
3	APAART: Speak Well 2 (Soft Skills)
4	Business Communication – Dr. Saroj Hiremath
Web References:	
1	Train your mind to perform under pressure- Simon Sinek https://www.captureyourflag.com/interview-library/simon-sinek-on-training-your-mind-to-perform-under-pressure.html
2	Brilliant way one CEO rallied his team in the middle of layoffs https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html
3	Will Smith's Top Ten rules for success https://www.youtube.com/watch?v=bBsT9omTeh0

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Online Resources:			
1	https://www.coursera.org/learn/learning-how-to-learn		
2	https://www.coursera.org/specializations/effective-business-communication		
Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
C1.6.1	Understand	Immersion (interview)	5
C1.6.2	Understand	Create Resume	4
C1.6.3	Apply	Group Assignment – community service	5
C1.6.4	Understand	Group activities	3
C1.6.5	Apply	Record a conversation	3
Summative Assessment based on End Semester Project			
Bloom's Level			
Understand	Paper Trek followed by project		50
Apply			
Analyse			

Lesson Plan

Unit No	Objective	Bloom's Level	Content	Type of Class	Duration
1	Recognize the need for life skills and values	Understand	Overview of LOL (include activity on introducing self)	Lecture & reflection	1 hour
			Class activity – presentation on favorite cricket captain in IPL and the skills and values they demonstrate	Activity	1 hour

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			Self-work with immersion – interview a maid, watchman, sweeper, cab driver, beggar and narrate what you think are the values that drive them	Immersion activity	2 hours
			Overview of business communication	Lecture with videos	1 hour
			Activity: Write a newspaper report on an IPL match	Class activity with 3 iterations - Formative Evaluation	1 hour
			Activity: Record a conversation between a celebrity and an interviewer	Class activity with 3 iterations - Formative Evaluation	1 hour
			Quiz Time	Summative Evaluation for Unit	30 mins
	Recognize own strengths and opportunities	Understand	Self-awareness – identity, body awareness, stress management	Anubhav Activities	4 hours
Unit No	Objective	Bloom's Level	Content	Type of Class	Duration
				(Please conduct at least one activity per week and	

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				include the Meditation session in it)	
2	Understand the basic tenets of communication Unit name: Be At Ease (BAE) (in Millennial lingo it means Before Anyone Else)	Understand	Essential Grammar – I: Refresher on Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion Tenses: Applications of tenses in Functional Grammar – Take a quiz and then discuss	Lecture with audio and video	1 hour
			Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong sentence structure (e.g. Zindagi Na Milegi Dobara where the characters use ‘the’ before every word)	Lecture with video/audio	1 hour
			Communication Skills: Overview of Communication Skills Barriers of communication, Effective communication		1 hour
			Types of communication- verbal and non – verbal – Role-play based learning Importance of Questioning	Activity based learning	1 hour
			Listening Skills: Law of nature-Importance of listening skills,	Activity based learning	1 hour

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Unit No	Objective	Bloom's Level	Content	Type of Class	Duration
			Difference between listening and hearing, Types of listening.		
	Recognize own strengths and opportunities	Understand	Expressing self, connecting with emotions, visualizing and experiencing purpose	Anubhav Activities (Please conduct at least one activity per week and include the Meditation session in it)	4 hours
	Apply the basic communication practices in different types of communication	Apply	Activity: Skit based on communication skills	Formative Evaluation	4 hours
			Evaluation on Listening skills – listen to recording and answer questions based on them	Formative Evaluation	30 mins
3	Understand the basic tenets of communication Talk Mail Write (TMW) - In Millennial it means That Moment When	Understand	Email writing: Formal and informal emails, activity	Activity based learning	1 hour

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			Verbal communication: Pronunciation, clarity of speech	Audio and video based learning	30 minutes
			Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary – Read Economic Times, Reader's Digest, National Geographic and take part in a GD, using the words you learnt/liked from the articles. Group discussion using words learnt	Activity based learning (Group Discussion) Flipped classroom where students will study words before coming to class	1 hour
Unit No	Objective	Bloom's Level	Content	Type of Class	Duration
			Practice: Toastmaster style Table Topics speech with evaluation	Activity based learning	2 hours over 2/3 days
			Written Communication: Summary writing, story writing	Activity based learning	1 hour
			Build your CV – start writing your comprehensive CV including every achievement in your life, no format, no page limit	Formative Evaluation	30 minutes
	Apply the basic communication practices in different types of communication	Apply	Project: Create a podcast on a topic that will interest college students	Formative Evaluation	1 hour

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	Recognize own strengths and opportunities	Understand	Life skill: Stress management, working with rhythm and balance, colours, and teamwork	Anubhav Activities (Please conduct at least one activity per week and include the Meditation session in it)	4 hours
	Apply the basic communication practices in different types of communication	Apply	Project: Create a musical using the learnings from unit	Formative Evaluation	2 hours
4	Unit 4 Recognize the need for life skills and values Unit name: Realities of Facing Life (ROFL)	Understand	Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to?	Interactive learning	3 hours
Unit No	Objective	Bloom's Level	Content	Type of Class	Duration
			Introduction to life skills What are the critical life skills	Activity and Video	1 hour
			Multiple Intelligences Embracing diversity – Activity on appreciation of diversity	Video and activity based	1 hour
	Apply the life skills to different situations	Apply	Life skill: Community service – work with an NGO and make a presentation	Field work: Formative Evaluation	10 hours

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BTCBSBS106	PCC	Business Communication & Value Science - I	0	0	0	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

			Life skill: Join a trek – Values to be learned: Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation	Field work: Formative Evaluation	12 hours
TOTAL					65 hours
	Summative Evaluation	Bloom's Level	Type of Assessment	Marks	Total
		Understand	Knowledge Test	20 marks	50 marks
		Apply	Project (to be evaluated by TCS)	20 marks	
		Apply	Group discussion (to be evaluated by TCS)	10 marks	

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BTCSBS107	HSSM (IKS)	Indian Knowledge System (IKS)	Max	0	0	0	0	50	2	0	0	2
			Min	0	0	0	25					

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COURSE OBJECTIVES:

The student will have ability to:

1. To get some knowledge about Indian Culture.
2. To Know Indian Languages and Literature religion and philosophy and the fine arts in India.
3. To Explore the Science and Scientists of Ancient, Medieval and Modern India.
4. To Understand education systems in India.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Understand philosophy of Indian culture.
- CO2** Distinguish the Indian languages and literature.
- CO3** Explain the philosophy of ancient, medieval and modern India.
- CO4** Outline the information about the fine arts in India.
- CO5** Analyze the contribution of scientists of different eras.
- CO6** Understand education systems in India.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
- ATL3** Midterm Exams
- ATL4** Flip Class
- ATL5** Seminar Presentation
- ATL6** Assignments

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ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.	6	ATL5 ATL6
II	Indian Languages and Literature: Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature.	6	ATL5 ATL6
III	Religion and Philosophy: Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only).	6	ATL5 ATL6
IV	Fine Arts in India (Art, Technology & Engineering): Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Science and Technology in India, development of science in ancient, medieval and modern India.	6	ATL5 ATL6
V	Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India.	6	ATL5 ATL6
Total Hours		30	

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ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005.
2. "Science in Sanskrit", Samskrita Bharti Publisher, ISBN 13: 978- 8187276333, 2007.

Reference Books

1. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200.
2. Narain, "Examinations in ancient India", Arya Book Depot, 1993.
3. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989.
4. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN 13: 978-8120810990, 2014.

	Assessment	
1.	Students must submit a hard copy of the report on the prescribed topic or syllabus.	
2.	The students will present a report through seminar, which will be held by a Faculty Coordinator constituted by the concerned department as per norms of the institute. The evaluation through seminar presentation will be based on the following criteria. a) Quality of material presented. b) Effectiveness of presentation. c) Depth of knowledge and skills.	

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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	3	2	3	1	1	-	2	-	-	-
CO2	-	-	-	-	-	2	-	1	-	3	-	2	-	-	-
CO3	-	-	-	-	-	3	2	3	1	2	-	2	-	-	-
CO4	1	-	2	-	-	3	1	1	2	2	-	2	-	-	-
CO5	3	2	2	1	1	3	2	2	1	2	-	3	-	-	-
CO6	-	-	-	-	-	3	1	2	2	2	-	3	-	-	-

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Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (Computer Science and Business Systems –TCS)

SEMESTER-I (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTC SBS108	VSEC	Basic Programming (Python Scripting)	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		15	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To develop proficiency in creating based applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using Py Lab.
5. To be able to use generators for generating series like Fibonacci.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Ability to create robust applications using the Python programming language.
- CO2** Ability to test and debug applications written using the Python programming language.
- CO3** Ability to create applications for solving computational problems using the Python Programming Language.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
- ATL3** Midterm Exams
- ATL4** Flip Class
- ATL5** Seminar Presentation
- ATL6** Assignments

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ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Python: Introduction to programming, Python IDE, Python Interpreters, Interpreter vs. Compiler, The basic elements of Python, Python Data types, mathematical operations and working with numbers. Testing and debugging Modules.	6	ATL5 ATL6 ATL8
II	Data Structures: Control statement and loops. Python data structures, lists, tuples, dictionaries, sets, zip and their operations. Mutability and Immutability. Functions and Magic Methods.	6	ATL5 ATL6 ATL8
III	Exceptions and assertions: Handling exceptions, Exceptions as a control flow mechanism, Assertions. Classes and Object oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding.	6	ATL5 ATL6 ATL8
IV	Numpy and Pandas: Python list vs. NumPy arrays, Creating a NumPy Array, Basic ndarray, Shape of NumPy array, Size of NumPy array, Random numbers in ND array, The Shape and Reshaping of NumPy Array, Dimensions of NumPy array, Reshaping a NumPy array, Flattening a NumPy array, Pandas Data Frames, Indexing in Pandas using loc and iloc.	6	ATL5 ATL6 ATL8
V	Matplotlib: Matplotlib Introduction, Line Chart, Scatter Plot, Bar Graph, Histogram, Subplots, Pie Chart, Pyplot, Matplotlib with Pandas and Numpy. Specify Color, Markings and Line Styles, Adjust Thickness, Label Tilt, and Legend.	6	ATL5 ATL6 ATL8
Total Hours		30	

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ADDITIONAL RESOURCES

A. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India.
2. Allen Downey, Jeffrey Elkner and Chris Meyers "How to think like a Computer Scientist, Learning with Python", Green Tea Press.

Reference Books

1. Mark Lutz "Learning Python" O'Reilly Media; 5 editions.
2. David Beazley "Python Cookbook, Third edition" O'Reilly Media.
3. Python Essential Reference, 4th Edition Addison-Wesley Professional.
4. Mark Lutz "Programming Python: Powerful Object-Oriented Programming" David Beazley "Python Cookbook" Third edition, O'Reilly Media.

Suggested e-resources (Websites/e-books)

- 1 <https://nptel.ac.in/courses/106106182>

LIST OF PRACTICAL

	Title	CO Mapping
1.	Write a Python Program to Print Hello world!	CO1
2.	Write a program to demonstrate different number data types in Python.	CO1
3.	Write a program to perform different Arithmetic Operations on numbers in Python.	CO1
4.	Write a Program to Swap Two Variables.	CO1
5.	Write a Program to Convert Celsius to Fahrenheit.	CO1
6.	Write a Program to Find the Largest Among Three Numbers.	CO2
7.	Write a Program to Check Prime Number.	CO2

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8.	Write a Program to Find the Factorial of a Number.	CO2
9.	Write a Program to Print the Fibonacci sequence.	CO3
10.	Write a program to create, append, and remove lists in python.	CO3
11.	Write a program to demonstrate working with tuples in python.	CO3
12.	Write a program to demonstrate working with set in python.	CO3
13.	Write a program to demonstrate working with dictionaries in python.	CO3
14.	Write a program to find reverse of given number using function.	CO2
15.	Write a python Program to call data member and function using classes and objects.	CO1
16.	Write a program to read 3 subject marks and display pass or failed using class and object.	CO3
17.	Write a program in Python to handle user defined exception for given problem.	CO2
18.	Write a program using a Numpy module to create an array and check the following: a. Type of array b. Axes of array c. Shape of array c. Type of elements in array.	CO3
19.	Write a python program to concatenate the data frames with two different objects.	CO3
20.	Write a Python program to Demonstrate how to Draw a Scatter Plot, Bar Graph and Pie Chart using Matplotlib.	CO3

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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	3	1	1	1	2	1	1	3	3	1	1
CO2	3	3	2	2	3	1	1	2	2	2	1	3	2	1	2
CO3	3	3	3	3	3	2	2	1	3	2	2	3	3	3	2

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