



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

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

B. Tech (CSE/ IT): All Programs

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*				
BTCSH102	BS	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:

- To introduce fundamental concepts of statistics and probability.

COURSE ALIGNMENT WITH UNSDG:

“The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education).**”

COURSE OUTCOMES:

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

- CO1** Collect and classify primary and secondary data for statistical analysis.
- CO2** Calculate and interpret measures of central tendency and dispersion.
- CO3** Apply Bayes' Theorem and probability distributions to solve real-world problems.
- CO4** Evaluate mathematical expectations, moments, and moment-generating functions.
- CO5** Solve problems involving integration and differentiation, including multiple integrals.

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
- ATL7** Poster
- ATL8** Oral Viva-voce examination
- ATL9** Industrial Visit Report

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PREREQUISITES:

Basic Mathematics

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Statistics: Definition and objectives of Statistics. Applications in Science. Collection of Data: Internal/External, Primary/Secondary. Population, Sample, and Representative Sample	9	ATL1 ATL3
II	Descriptive Statistics: Classification and Tabulation of Univariate Data. Graphical Representation and Frequency Curves. Measures of Central Tendency and Dispersion. Bivariate Data Summarization.	9	ATL1 ATL3 ATL6
III	Probability Theory: Experiments, Sample Space, and Events. Combinational and Conditional Probability. Bayes Theorem. Discrete & Continuous Distributions (Binomial, Poisson, Geometric, Normal, Chi-Square, T, F).	9	ATL1 ATL3 ATL6 ATL8
IV	Expected Values & Moments: Mathematical Expectation and its Properties. Variance and Moments. Interpretation of results. Moment Generating Functions.	9	ATL1 ATL3
V	Calculus: Basic Concepts of Differential and Integral Calculus. Application of Double and Triple Integrals in engineering contexts.	9	ATL1 ATL3 ATL8
TOTAL		45	

ADDITIONAL RESOURCES

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

MIT OpenCourseWare, "MIT RES.6-012 Introduction to Probability, Spring 2018," YouTube playlist. (Apr. 24, 2018). [Online]. Available:

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<https://www.youtube.com/playlist?list=PLUI4u3cNGP60hI9ATjSFgLZpbNJ7myAg6>.

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOKS:

1. S. M. Ross, *Introduction to Probability Models*. New York, NY, USA: Academic Press.
2. A. M. Goon, M. Gupta, and B. Dasgupta, *Fundamentals of Statistics*, Vols. I & II. Kolkata, India: World Press.

REFERENCE BOOKS:

1. B. S. Grewal, *Higher Engineering Mathematics*, 44th ed. New Delhi, India: Khanna Publishers, 2017.
2. S. M. Ross, *A First Course in Probability*, 10th ed. Upper Saddle River, NJ, USA: Prentice Hall, 2018.
3. I. R. Miller, J. E. Freund, and R. Johnson, *Probability and Statistics for Engineers*, 4th ed. New Delhi, India: PHI Learning, 2010.
4. A. M. Mood, F. A. Graybill, and D. C. Boes, *Introduction to the Theory of Statistics*, 3rd ed. New York, NY, USA: McGraw-Hill Education, 1974.
5. P. V. O'Neil, *Advanced Engineering Mathematics*, 7th ed. Stamford, CT, USA: Thomson Learning, 2011.
6. M. D. Greenberg, *Advanced Engineering Mathematics*, 2nd ed. Upper Saddle River, NJ, USA: Pearson Education, 1998.
7. P. N. Wartikar and J. N. Wartikar, *Applied Mathematics*, vols. I & II. Pune, India: Vidyarthi Prakashan, 1992.

Suggested e- resources (Websites/e- books)

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ma139

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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	2	-	-	1	-	-	-	2	1	3	-
CO2	3	3	1	2	2	-	-	-	-	-	-	2	1	3	-
CO3	3	3	3	2	-	1	-	-	-	-	-	2	2	3	2
CO4	3	3	2	-	-	-	-	-	-	-	-	1	1	3	-
CO5	3	3	2	2	-	-	-	-	-	-	-	2	2	2	-

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BTCS101M	BEC	Introduction to Computer Science and Engineering	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 understand the basics of computers including hardware, software, how data is stored, and how operating systems manage daily tasks.
- To learn step-by-step problem solving using simple blocks of computational thinking, flowcharts, and basic algorithms.
- To get a friendly introduction to AI, Cyber security and Ethics.

COURSE ALIGNMENT WITH UNSDG:

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

COURSE OUTCOMES:

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

- CO1** Apply computational thinking frameworks and algorithmic design techniques to formulate structured solutions for engineering problems.
- CO2** Analyze fundamental AI paradigms, network architectures, and information security threats to determine appropriate use cases and defensive mechanisms.
- CO3** Evaluate digital ethics frameworks, algorithmic biases, and data privacy regulations to propose responsible technology implementations.

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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- ATL7 Poster
 ATL8 Oral Viva-voce examination
 ATL9 Industrial Visit Report

PREREQUISITES:

None

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Foundations of Computational Thinking & Logic Computational Thinking Framework: decomposition, pattern recognition, abstraction, algorithmic design. Engineering Problem-Solving methodologies. Logical Control Structures: sequence, selection, iteration. Error Classification: syntax vs. logical errors. Systematic Debugging strategies	9	ATL1 (Quiz) ATL3 (Midterm Exams) ATL 8(Oral Viva-Voce Examination)
II	Algorithmic Design & Problem Representation Diagrammatic Problem Solving with flowchart symbols, Structural Flowcharting for linear, conditional, and repetitive scenarios. Pseudo-code conventions and structured representation. Logic Translation: Flowcharts to pseudocode. Algorithmic Evaluation: correctness and efficiency	9	ATL1 (Quiz) ATL3 (Midterm Exams) ATL 8(Oral Viva-Voce Examination))
III	Artificial Intelligence Paradigms Historical Foundations, Core Concepts, Machine Learning Paradigms: Supervised and Unsupervised Learning. Introduction to Data Science and applications. Key AI Domains: Natural Language Processing (NLP), Computer Vision, Machine Translation and Indian Knowledge Systems (IKS).	9	ATL1 (Quiz) ATL3 (Midterm Exams) ATL 8(Oral Viva-Voce Examination)
IV	Cybersecurity, Information Security Computer Networks: LAN, WAN, Network Interconnecting Devices. Cybersecurity Threats: Viruses, Worms, Trojan Horses, Malware. Defensive Mechanisms: Firewalls, Antivirus Software,	9	ATL1 (Quiz) ATL3 (Midterm Exams) ATL 8(Oral Viva-Voce

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	Secure Password Practices, Safe Browsing Protocols.		Examination)
V	Digital Ethics Data Pipeline, Algorithmic Fairness, Accountability, Data Privacy, Prevention of Algorithmic Bias. Generative AI and Intellectual Property: Copyright & Ownership, Hallucinations & Misinformation	9	ATL1 (Quiz) ATL3 (Midterm Exams) ATL 8(Oral Viva-Voce Examination)
	Total Hours	45	

ADDITIONAL RESOURCES

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

https://www.youtube.com/watch?v=S-7LrggTfA8&list=PLZ2ps_7DhBYSzaAFqpyQKqmoni-EefS7 (IIT Madras)

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. V. Rajaraman, *Fundamentals of Computers*, 6th ed. New Delhi, India: PHI Learning, 2014.
2. R. Thareja, *Computer Fundamentals and Programming in C*, 2nd ed. Oxford, UK: Oxford University Press, 2016

Reference Books

1. M. Bishop, *Computer Security: Art and Science*, 2nd ed., Boston, MA: Addison-Wesley, 2019.
2. S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, 4th ed., Upper Saddle River, NJ: Pearson, 2021.
3. J. Wing, *Computational Thinking*, Cambridge, MA: MIT Press, 2017.
4. P. Denning and M. Tedre, *Computational Thinking*, Cambridge, MA: MIT Press, 2019.
5. D. Leslie, *Ethics of Artificial Intelligence: A Framework for Fairness, Transparency, and Accountability*, London: Alan Turing Institute, 2020.

Suggested e- resources (Websites/e- books)

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			Min	24	16		0	0				

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1. Ethics of AI Bias https://www.youtube.com/watch?v=NgaW_p7gsRc [MIT OCW]
2. <https://teachablemachine.withgoogle.com/>

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
CO 1	3	1	1		2							1	3	1	
CO 2	2	1			2	1						1	1	3	2
CO 3					1	3	1	3		1		2	1	2	1

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B. Tech (CSE/IT), CSE (ES, MA, AIML-IBM, DS, FSDB, GenAI, MLCC, ICS, BDCE)

SEMESTER-I (2026-30)

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BTCS103M	DCC	Computer System Organization	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.

COURSE OBJECTIVES:

The student will have ability to:

1. To understand the basic model of a modern computer with its various processing units.
2. To impart knowledge on CPU and it's processing of programs.
3. To provide the information for hardware utilization methodology.
4. To impart knowledge of Multiprocessor and inter-process communication.

COURSE ALIGNMENT WITH UNSDG:

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

COURSE OUTCOMES:

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

- CO1 Understand the architecture of a modern computer.
- CO2 Explain the functional behavior of CPU and its other processing units.
- CO3 Knowledge of the Peripherals of a Computer System.
- CO4 Give the information to speed-up the working of Computer System.

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
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- ATL7 Poster
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ATL9 Industrial Visit Report

PREREQUISITES:

Knowledge of Computer System Organization (BTCS103M)

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Computer Basics: Von Newman model, CPU, Memory, I/O, Bus, Memory registers, Program Counter, Accumulator, Instruction register, Micro-operations, Register Transfer Language, Instruction cycle, Instruction formats and addressing modes.	9	ATL1 ATL3 ATL4 ATL8
II	Control Unit Organization: Hardwired control unit, Micro-programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming. Arithmetic and Logic Unit: Arithmetic Processor, Addition, subtraction, multiplication, and division, Floating point, and decimal arithmetic.	9	ATL1 ATL3 ATL4 ATL8
III	Input Output Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor, Data transferring approaches and modes.	9	ATL1 ATL3 ATL4 ATL8
IV	Memory organization: Memory Hierarchy, Cache Memory - Organization and types of cache mappings, Virtual memory, Memory Management Hardware.	9	ATL1 ATL3 ATL4 ATL8
V	Multiprocessors: Pipeline and Vector processing, Instruction and arithmetic	9	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.

	pipelines, Vector and array processors, Interconnection structure and inter-processor communication.		ATL4 ATL8
Total		45	

ADDITIONAL RESOURCES

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

<https://www.youtube.com/watch?v=4TzMyXmzL8M>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOKS:

1. M. Morris Mano, Computer System Architecture, Fourth edition, Pearson Education, 2015.
2. William Stallings, Computer Organization and Architecture, Seventh Edition, PHI, 2009.

REFERENCES:

1. A. S. Tanenbaum, Structured Computer Organization, 6th ed. Boston, MA, USA: Pearson Education, 2016.
2. J. P. Hayes, Computer Architecture and Organization, 3rd ed. New Delhi, India: McGraw-Hill, 2017.
3. J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, 4th ed. San Francisco, CA, USA: Morgan Kaufmann / Elsevier, 2007.
4. R. S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th ed. New Delhi, India: Penram International Publishing / Prentice Hall, 2015.
5. N. Carter, Computer Architecture (Schaum's Outlines), 3rd ed. New Delhi, India: Tata McGraw-Hill, 2012.
6. C. Hamacher, Z. Vranesic, and S. Zaky, Computer Organization, 5th ed. New Delhi, India: Tata McGraw-Hill, 2002.

Suggested e- resources (Websites/e- books)

1. https://inst.eecs.berkeley.edu/~cs152/sp26/152_policies/
2. <https://ocw.mit.edu/courses/6-823-computer-system-architecture-fall/>

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

B. Tech (CSE/IT), CSE (ES, MA, AIML-IBM, DS, FSDB, GenAI, MLCC, ICS, BDCE)

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*				
BTCS103M	DCC	Computer System Organization	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		15	10				

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

S.No.	Title	Co Mapping
1.	Study of peripherals, components of a Computer System.	CO3
2.	Write a C program for sum of two binary numbers.	CO2
3.	Write a C program for multiplication of two binary numbers.	CO2
4.	Write a C program to implement Booth's algorithm for multiplication.	CO2
5.	Write a C program to implement Restoring Division Algorithm.	CO2
6.	Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.	CO1
7.	Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples.	CO1
8.	Write an assembly language code in GNUsim8085 to implement data transfer instruction.	CO1
9.	Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.	CO1
10.	Write an assembly language code in GNUsim8085 to add two 8 bit numbers stored in memory and also storing the carry.	CO1,CO2

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	2	1	-	-	-	-	-	-	-	-	2	2	1	1
CO2	3	3	2	-	1	-	-	-	-	-	-	2	3	2	2
CO3	3	2	2	2	-	-	-	-	-	-	-	1	2	-	1
CO4	3	3	3	2	2	-	-	-	-	-	-	3	3	3	2

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

B. Tech (CSE/IT): All Programs

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*				
BTCS107M	SEC	Program Development using C	Max	0	0	0	30	20	0	0	2	1
			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. Identify situations where computational methods and computers would be useful.
2. Given a computational problem, identify and abstract the programming task involved.
3. Approach the programming tasks using techniques learned and write pseudo-code.
4. Choose the right data representation formats based on the requirements of the problem.
5. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand
6. Write the program on a computer, edit, compile, debug, correct, recompile and run it.
7. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

COURSE OUTCOMES:

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

- CO1** Understand the basic terminologies used in computer programming.
- CO2** Proficient in using the basic constructs of C, to develop a computer program.
- CO3** Understand the use of functions, pointers, arrays and files in programming.
- CO4** Understand the fundamentals of procedure-oriented programming and be able to apply it in computer program development.

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
- ATL7** Poster

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B. Tech (CSE/IT): All Programs

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*				
BTCS107M	SEC	Program Development using C	Max	0	0	0	30	20	0	0	2	1
			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.

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

None

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Programming Languages: Evolution of Programming Languages, Structured Programming, The Compilation Process, Object Code, Source Code, Executable Code, Operating Systems, Interpreters, Linkers, Loaders, Fundamentals Of Algorithms, Flowcharts.	6	ATL1 ATL4 ATL8
II	Introduction to 'C' Language: Character Set. Variables and Identifiers, Built-In Data Types. Variable Definition, Arithmetic Operators and Expressions, Constants And Literals, Simple Assignment Statement, Basic Input/ Output Statement, Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Switch Statement.	6	ATL1 ATL4 ATL8
III	Arrays and Pointers: Array Manipulation; Searching, Insertion, Deletion of an Element from an one dimensional Array; Finding the Largest/Smallest Element in an Array; Two Dimensional Arrays, Addition/Multiplication of Two Matrices, Transpose of a Square Matrix, Address Operators, Pointer Type Declaration, Pointer Assignment, Pointer Initialization, Pointer Arithmetic, Pointer Arrays.	6	ATL1 ATL4 ATL8
IV	Functions: Modular Programming and Functions, Prototype of a Function: Parameter List, Return Type, Function Call, Block Structure, Call by Reference, Call by Value, Recursive Functions and Arrays as Function Arguments.	6	ATL1 ATL4 ATL8

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B. Tech (CSE/IT): All Programs

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*				
BTCS107M	SEC	Program Development using C	Max	0	0	0	30	20	0	0	2	1
			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.

V	Structure: Structure Variables, Initialization, Structure Assignment, Structures and Arrays: Arrays of Structures.	6	ATL1 ATL4 ATL8
	Total Hours	30	

ADDITIONAL RESOURCES

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

<https://www.youtube.com/watch?v=48S8Bsh4V2w>

B. Assignments & Coding Problems:

MIT OCW 6.S096 Problem Sets

C. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOKS:

- B. S. Gottfried, Programming with C, 2nd ed. New Delhi, India: Tata McGraw-Hill, 2006.
- Head First C: A Brain-Friendly Guide

REFERENCE BOOKS:

- A. B. Tucker, Programming Languages, 2nd ed. New Delhi, India: Tata McGraw-Hill, 1986.
- T. W. Pratt and M. V. Zelkowitz, Programming Languages: Design and Implementation, 4th ed. New Delhi, India: Prentice Hall of India, 2001.
- H. Schildt, C: The Complete Reference, 4th ed. New Delhi, India: Tata McGraw-Hill, 2000.
- Y. Kanetkar, Let Us C, 16th ed. New Delhi, India: BPB Publications, 2018.
- R. Bangia, Fundamentals of Programming Languages, 1st ed. New Delhi, India: Cyber Tech Publications, 2007.
- G. Perry and D. Miller, C Programming Absolute Beginner's Guide, 3rd ed. Indianapolis, IN, USA: Que Publishing, 2013.

Suggested e- resources (Websites/e- books)

- <https://ocw.mit.edu/courses/6-s096-introduction-to-c-and-c-january-iap-2013/>

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B. Tech (CSE/IT): All Programs

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*				
BTCS107M	SEC	Program Development using C	Max	0	0	0	30	20	0	0	2	1
			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.

2. <https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/>

LIST OF PRACTICALS		
S.No.	Title	Co Mapping
1.	Write a C program to display “This is my first C Program.	CO1
2.	Write a C program to calculate area and circumference of a circle.	CO2
3.	Write a C program to perform addition, subtraction, division and multiplication of two numbers.	CO2
4.	Write a program to calculate simple and compound interest.	CO2
5.	Write a program to swap values of two variables with and without using third variable.	CO2
6.	Write a program to display the size of every data type using “size of” operator	CO1
7.	Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.	CO2
8.	Write a program to input two numbers and display the maximum number.	CO2
9.	Write a program to find the largest of three numbers using ternary operators.	CO2
10.	Write a program to find the roots of quadratic equation.	CO2
11.	Write a program to input name, marks of 5 subjects of a student and display the name of the student.	CO2
12.	Write a Program to Check Whether a Number is Prime or not.	CO2
13.	Write a program to find the largest and smallest among three entered numbers and also display whether the Identified largest/smallest number is even or odd.	CO2
14.	Write a program to find the factorial of a number.	CO2
15.	Write a program to check number is Armstrong or not.(Hint: A number is Armstrong if the sum of cubes of individual digits of a number is equal to the number itself).	CO2
16.	Write a program to check whether a number is Palindrome or not	CO2
17.	Write a program to generate Fibonacci series.	CO2
18.	Write a program to find GCD (greatest common divisor or HCF) and LCM (least common multiple) of two numbers.	CO2
19.	Write a Program to Search an element in array.	CO3
20.	Write a Program to perform addition of all elements in Array.	CO3
21.	Write a Program to find the largest and smallest element in Array.	CO3

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B. Tech (CSE/IT): All Programs

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*				
BTCS107M	SEC	Program Development using C	Max	0	0	0	30	20	0	0	2	1
			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.

22.	Write a Program for deletion of an element from the specified location from Array.	CO3
23.	Write a Program to access an element in 2-D Array.	CO3
24.	Write a program for addition of two matrices of any order in C.	CO3
25.	Write a Program to multiply two 3 X 3 Matrices.	CO3
26.	Write a program to add, subtract, multiply and divide two integers using user-defined type function with Return type.	CO3
27.	Write a program to generate Fibonacci series using recursive function.	CO3
28.	Write a program to find the sum of all the elements of an array using pointers.	CO3
29.	Write a program to swap value of two variables using pointer.	CO3
30.	Write a program to add two numbers using pointers.	CO3
31.	Write a program to input and print array elements using pointer.	CO3
32.	Write a program to create a structure named company which has name, address, phone and Of Employee as member variables. Read name of company, its address, phone and non-employee. Finally display this member's value.	CO4
33.	Write a program to read Roll No, Name, Address, Age & average-marks of 12 students in the BCT class and display the details from function.	CO4
34.	Write a program to add two distances in feet and inches using structure.	CO4

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	1	-	-	1	-	-	-	-	-	-	2	2	1	-
CO2	3	3	2	2	3	-	-	-	-	-	-	2	3	2	1
CO3	3	3	3	2	3	-	-	-	-	-	-	2	3	2	2
CO4	3	3	3	2	2	-	-	-	-	-	-	3	3	2	1

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

B.Tech. (CSE-Generative AI/DS/FSDB-IBM) (in association with IBM)

SEMESTER-I (2026-2030)

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*				
BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			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. Develop a strong foundation in clean coding principles, web technologies, and JavaScript programming for creating maintainable and efficient software applications.
2. Apply JavaScript, Node.js, Express.js, and MongoDB to design and develop dynamic web applications using modern programming practices.
3. Promote problem-solving, software development skills, and professional coding standards through practical implementation of full-stack web programming concepts..

COURSE ALIGNMENT WITH UNSDG:

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

COURSE OUTCOMES:

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

- CO1** Explain the principles of clean coding, HTML, CSS, JavaScript fundamentals, and software development best practices.
- CO2** Apply JavaScript programming concepts, including variables, control structures, functions, arrays, objects, and DOM manipulation to develop interactive web pages.
- CO3** Develop dynamic web applications using Node.js, Express.js, and MongoDB by implementing routing, file handling, and CRUD operations.
- CO4** Analyze software design practices and select appropriate web technologies, programming constructs, and frameworks to solve real-world application problems.
- CO5** Design and implement a full-stack web application by integrating front-end and back-end technologies while following clean coding standards and software engineering practices

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

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			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.

ASSESSMENT TOOLS:

- ATL1 Quiz
- 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 Skills, Basic Programming Concepts, Data Handling Concepts, Spreadsheet Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Clean Coding Understand the importance of bad and good code. Understand the importance of meaningful distinct names. Usage of domain and function names Usage of exceptions and its error code names/descriptions. Understand about clean and bad comments. Understand the process of vertical and horizontal formatting. Introduction to Web-designing HTML basic commands, Webpage creation using tags like formatting tags, table, frame and form tags. CSS types and properties with examples	6	ATL2 ATL3 ATL4 ATL8

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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*				
BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			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.

II	Objects Learn about data abstraction. Understand the data and object anti-symmetric. Javascript Basics Nature of JavaScript language. Understand JavaScript primitive types. Javascript objects Understand Java Script Array Objects. Understand Java Script Date Objects Understand Java Script Error Objects	8	ATL2 ATL3 ATL4 ATL8
III	Javascript variables and Control statements Understand how to define JavaScript Variables. Work Java Script If statements. Work Java Script switch statements Work. JavaScript for and while loop statements Javascript Functions Declare a JavaScript function. Creating custom objects with functions. Adding functions to prototypes. Self-executing functions	8	ATL2 ATL3 ATL4 ATL8
IV	Client side Javascript Understand Scripts in HTML documents. Describe the document object model (DOM) hierarchy. Overview of the DOM specification levels. Describe the window and document objects. Accessing document elements. Common API in web and XML scripting Node JS Introduction Understand NodeJS and its features. Understand Express Framework. Understand Key features of MongoDB	6	ATL2 ATL6
V	Installation and Configuration Install NodeJS on command line. Hands on: Create sample NodeJS + Express project using command line. Install Node eclipse plugin, Hands-on: Create sample NodeJS + Express project using Eclipse File System Understand __dirname and filename	6	ATL2 ATL3 ATL4 ATL8

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SEMESTER-I (2026-2030)

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*				
BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			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.

	Understand synchronous vs Asynchronous file read. Understand View Templates. How to serve static content in NodeJS. Connecting to the database using NodeJS Install and Setup MongoDB NodeJS Mongo Driver. Perform CRUD Operation. Understand Connection Pooling using NodeJS and Mongo Driver. Hands on Develop Web Application using Node JS and Mongo DB		
	Total Hours	34	

ADDITIONAL RESOURCES

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

<https://nodejs.org/docs/latest/api/>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOK:

1. J. Duckett, *JavaScript and JQuery: Interactive Front-End Web Development*. Indianapolis, IN, USA: Wiley, 2014.
2. M. Haverbeke, *Eloquent JavaScript*, 4th ed. San Francisco, CA, USA: No Starch Press, 2024.

REFERENCE BOOKS:

1. D. Flanagan, *JavaScript: The Definitive Guide*, 7th ed. Sebastopol, CA, USA: O'Reilly Media, 2020.
2. A. Holowaychuk, *Express in Action: Writing, Building, and Testing Node.js Applications*. Shelter Island, NY, USA: Manning Publications, 2014.

LIST OF PRACTICAL

S.No. Title

1. Develop a simple HTML webpage demonstrating text formatting, tables, lists,

CO Mapping

CO1

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BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		15	9				

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images, hyperlinks, and forms.

- | | | |
|-----|---|---------------|
| 2. | Design responsive webpages using Internal, External, and Inline CSS with layouts, colors, fonts, and positioning. | CO1 |
| 3. | Write JavaScript programs to demonstrate variables, operators, input/output, and expressions. | CO2 |
| 4. | Implement decision-making and looping constructs (if-else, switch, for, while, do-while) in JavaScript. | CO2 |
| 5. | Develop JavaScript programs using arrays, objects, functions, and event handling. | CO2 |
| 6. | Implement DOM manipulation to dynamically modify HTML elements, forms, and styles using JavaScript. | CO2, CO4 |
| 7. | Install and configure Node.js, npm, and Express.js; create a basic web server. | CO3 |
| 8. | Develop Node.js applications demonstrating routing, modules, and file system operations. | CO3 |
| 9. | Connect Node.js applications with MongoDB and perform CRUD operations. | CO3 |
| 10. | Build a RESTful web application using Express.js and MongoDB. | CO3, CO4 |
| 11. | Apply clean coding principles, naming conventions, formatting, and commenting standards to an existing JavaScript project. | CO1, CO4 |
| 12. | Mini Project: Design and develop a full-stack web application using HTML, CSS, JavaScript, Node.js, Express.js, and MongoDB following clean coding practices. | CO3, CO4, CO5 |

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BTIBM105N	DCC	Software Foundation and Programming (1. Clean Coding; 2. Javascript; 3. NodeRed; 4. NodeJS)	Max	0	0	0	30	20	0	0	2	1
			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 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	-	-	2	-	-	2	-	1	-	2	2	1	-
CO2	2	3	2	2	3	-	-	-	1	2	-	2	3	2	-
CO3	2	3	3	3	3	-	-	-	2	2	1	2	3	2	1
CO4	2	3	3	2	3	1		2	2	2	1	2	3	2	1
CO5	2	3	3	3	3	1		2	3	3	2	2	3	2	2

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

B. Tech (All Branches)

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*				
HUCS101	AEC	Communication Skills	Max	60	20	20	0	20	1	0	2	2
			Min	24	16		0	8				

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. Develop an understanding of the fundamentals of professional and organizational communication.
2. Improve verbal, non-verbal, listening, and interpersonal communication skills required in engineering environments.
3. Enhance grammatical accuracy, vocabulary usage, and confidence in workplace communication.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, SDG 4 (Quality Education): Effective communication and language proficiency for lifelong learning, SDG 5 (Gender Equality): Inclusive and respectful communication practices, SDG 8 (Decent Work and Economic Growth): Workplace communication and employability skills.

COURSE OUTCOMES:

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

- CO1** Demonstrate understanding of communication process, barriers, and professional communication ethics.
- CO2** Apply verbal and non-verbal communication skills effectively in academic and workplace situations.
- CO3** Use correct grammar, vocabulary, pronunciation, and listening skills for effective communication.
- CO4** Participate confidently in presentations, group discussions, and interpersonal interactions.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Audio-Visual Learning and Peer Learning
- T2** Assignments, Language Lab Sessions, Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning
- ATL3** Midterm Exams

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

B. Tech (All Branches)

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*				
HUCS101	AEC	Communication Skills	Max	60	20	20	0	20	1	0	2	2
			Min	24	16		0	8				

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.

ATL4 Group Discussion

ATL5 Seminar Presentation

ATL6 Assignments

ATL7 Language Lab Performance

ATL8 Oral Viva-voce examination

PREREQUISITES:

Basic understanding of English language and communication.

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Communication: Meaning, Nature, Process and Importance of Communication; Principles of Communication, Types of Communication; Verbal and Non-Verbal Communication; Channels of Communication, Communication Barriers.	6	ATL1, ATL4
II	Listening and Reading Skills: Listening Skills: Process, Types, Difference between Hearing and Listening, Barriers to Effective Listening. Reading Skills: Reading Comprehension, Process, Reading speed Strategies, SQ3R Reading technique.	6	ATL2, ATL7
III	Grammar and Vocabulary Building: Parts of Speech; Tenses; Subject-Verb Agreement; Sentence Structure; Active Passive Voice, Direct Indirect Speech.	6	ATL3, ATL4
IV	Business Correspondence: Business Letter, Parts & Layouts of Business letters, Calling/ Sending Quotations/ Orders/ Complaints.	6	ATL5, ATL6

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

B. Tech (All Branches)

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*				
HUCS101	AEC	Communication Skills	Max	60	20	20	0	20	1	0	2	2
			Min	24	16		0	8				

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V	Speaking Skills: Public Speaking, Presentation Skills and Group Discussion and Debate.	6	ATL6, ATL8
	Total Hours	30	

ADDITIONAL RESOURCES

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

Professional email writing, digital communication etiquette, teamwork, presentation skills, interview skills, and workplace communication

B. Remedial classes for slow learners:

Grammar reinforcement sessions, vocabulary building exercises, guided speaking practice, listening exercises, and individual mentoring.

SUGGESTED READINGS:

1. Raman, M., & Sharma, S. (2015). Technical communication: Principles and practice (3rd ed.). Oxford University Press.
2. Raman, M., & Sharma, S. (2018). Communication skills (2nd ed.). Oxford University Press.
3. Kumar, S., & Lata, P. (2018). Communication skills (2nd ed.). Oxford University Press.
4. Rizvi, A. M. (2017). Effective technical communication (2nd ed.). McGraw Hill Education.
5. Murphy, R. (2019). Essential grammar in use: A self-study reference and practice book for elementary learners of English (4th ed.). Cambridge University Press.

Suggested e- resources (Websites/e- books)

1. British Council Learn English
2. BBC Learning English

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

B. Tech (All Branches)

SEMESTER-I (2026-30)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
HUCS101	AEC	Communication Skills	Max	60	20	20	0	20	1	0	2	2
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3. Cambridge English Resources
4. NPTEL Communication Skills Courses
5. SWAYAM Communication Courses

LIST OF PRACTICAL

	Title	CO Mapping
1.	Self-Introduction	CO2
2.	Active Listening Exercise	CO3
3.	Conversation Practice	CO2
4.	Telephone Etiquette	CO2
5.	Role Play	CO2
6.	Group Discussion	CO4
7.	Presentation Skills Activity	CO4
8.	JAM Session	CO4
9.	Extempore Speaking	CO4

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B. Tech (All Branches)

SEMESTER-I (2026-30)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
HUCS101	AEC	Communication Skills	Max	60	20	20	0	20	1	0	2	2
			Min	24	16		0	8				

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	-	1	-	-	-	1	-	3	2	3	-	1	1	-	-
CO2	-	1	-	-	1	1	-	2	3	3	-	2	2	1	-
CO3	1	1	-	-	1	-	-	-	2	3	-	2	2	-	-
CO4	-	2	1	-	1	1	-	2	3	3	-	3	1	2	-

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B.Tech. 2026 Onwards

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTPH101		Applied Physics	Max	60	20	20	30	20	3	1	2	5
			Min	24	16		14	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 the ability to:

1. Explain the fundamental concepts of quantum mechanics, including wave-particle duality, the uncertainty principle, the Schrödinger wave equation, and the particle-in-a-box model.
2. Describe the principles of solid-state physics, semiconductor devices, Hall effect, and superconductivity, and relate them to modern electronic applications.
3. Explain nuclear structure, nuclear models, particle accelerators, and radiation detectors used in nuclear science and technology.
4. Illustrate the principles of laser operation, optical fibre communication, and their applications in science, medicine, industry, and communication systems.
5. Analyze the phenomena of interference, diffraction, and polarisation of light and their applications in optical instruments and experimental physics.
6. Perform physics experiments systematically, record and analyse experimental data and draw scientifically valid conclusions.

COURSE ALIGNMENT WITH UNSDG: The Course aims to fulfil the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

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

1. Explain the fundamental concepts of Quantum Physics, Solid State Physics, Semiconductors, and Superconductivity.
2. Describe the principles of Nuclear Physics and Laser Physics and their technological

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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.

applications.

- Analyze the behaviour of light using the principles of geometrical and wave optics and related optical devices.
- Apply the laws and concepts of Physics to solve problems relevant to engineering and technological applications.
- Perform physics experiments, analyze experimental data, evaluate results, and draw scientifically valid conclusions.
- Perform experimental investigations, process and interpret the collected data, and draw logical conclusions supported by scientific evidence.

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

AT1-1	Quiz
AT1-2	Activity Based Learning
AT1-3	Midterm Exams
AT1-4	Flip Class
AT1-5	Seminar Presentation

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			Marks	THEORY			PRACTICAL					
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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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AT1-6	Assignments
AT1-7	Poster
AT1-8	Oral Viva-voce examination
AT1-9	Industrial Visit Report

Prerequisites: SSC Standard knowledge of Physics.

Module	Descriptors/Topics	Hours	Assessment tools
I	Quantum Physics: Introduction to Quantum hypothesis, Matter wave concept, Wave Group and Particle velocity and relation between them, Uncertainty principle, Compton Effect (without derivation), Wave function and its physical significance, Energy and Momentum Operator, Development of time-dependent and time-independent Schrödinger wave equation, Determination of wavefunction and energy of particle in a one-dimensional box, Introduction to quantum computer, Applications of AI in Physics.	08	AT1 AT2 AT3 AT6 AT8
II	Solid State Physics: Basic formulation of the free electron model and Kronig-Penney model, Intrinsic and Extrinsic semiconductors, P-N junction diode, Zener diode, Tunnel diode, Photodiode, Solar cells, Hall	08	AT1 AT2 AT3

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			Marks	THEORY			PRACTICAL					
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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.

	Effect, Introduction to Superconductivity, Meissner effect, Type I & II Superconductors.		AT6 AT8
III	Nuclear Physics: Nuclear Structure & Properties, Binding Energy and Mass Defect, Nuclear models: Comparative Study of Liquid drop and Shell Model, Particle accelerators: LINAC, Cyclotron and Betatron. Detectors and Counters: Bainbridge Mass Spectrograph, Giger-Muller counters.	08	AT1 AT2 AT3 AT6 AT8
IV	Laser & Fiber Optics: Stimulated and Spontaneous Emission, Einstein's A&B Coefficients, Population Inversion, Pumping, Optical Resonator, Properties and Applications of Laser, Ruby, He-Ne lasers. Introduction to Optical fibre, Acceptance angle and cone, Numerical Aperture, applications of optical fibre.	08	AT1 AT2 AT3 AT6 AT8
V	Wave Optics: Introduction to Interference, Constructive and Destructive interference. Interference in Thin films, Newton's rings experiment, Michelson's interferometer, Introduction to Diffraction and its Types, Qualitative Study of Diffraction at a single slit, double slit and n-slit (without derivation), resolving power, Rayleigh criterion, Concept of Polarized light, Brewsters law. Indian Knowledge System (IKS) in	8	AT1 AT2 AT3 AT6 AT8

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			Marks	THEORY			PRACTICAL					
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BTPH101		Applied Physics	Max	60	20	20	30	20	3	1	2	5
			Min	24	16		14	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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	Astronomical Instrumentation.		
	Total Hours	40	

List of experiments (Any Eight)	1.	Determination of radius of curvature "R" of convex lens by Newton's ring experiment.
	2.	Determination of Frequency of A.C. mains by electrically maintained vibrating rod.
	3.	Determination of Resolving Power of Telescope.
	4.	Determination of wavelength of LASER using Diffraction Grating.
	5.	Determination of Planck's constant using Photocell.
	6.	To study forward and reverse characteristics of Zener diode.
	7.	To study forward and reverse characteristics of P-N diode.
	8.	To study V-I characteristics of Tunnel diode.
	9.	To determine Young's Modulus using Cantilever method.
	10.	To determine the mass of cane sugar dissolved in water using Half shade Polarimeter.
	11.	To study characteristics of a photodiode.
	12.	Determination of Energy band gap (Eg) using PN Junction Diode.
	13.	Determination of μ and ω of a given Prism using a spectrometer.
	14.	Measurement of height of a given object using Sextant.

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Choice Based Credit System (CBCS)

B.Tech. 2026 Onwards

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*				
BTPH101		Applied Physics	Max	60	20	20	30	20	3	1	2	5
			Min	24	16		14	9				

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	15. Measurement of Numerical aperture of fiber by LASER.
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Additional Resources

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

nptel.ac.in/courses/108106181

<https://nptel.ac.in/courses/115103129>

<https://nptel.ac.in/courses/104104082>

B. Remedial classes for slow learners: As per the AUMP SOP for slow and fast learners.

Suggested Readings:

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B.Tech. 2026 Onwards

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Reference Books	"Engineering Physics", by Dr. S. L. Gupta and Sanjeev Gupta, Dhanpat Rai Publication, New Delhi. "Engineering Physics", by Navneet Gupta, Dhanpat Rai Publication, New Delhi. "Engineering Physics", by H. J Sawant, Technical Publications, Pune, Maharashtra. "Engineering Physics". by MN. Avdhanulu & P. G. Kshirsagar, S. Chand & Co. Edition (2012). "Fundamentals of Physics", by Halliday, Wiley, India. "Concepts of Modern Physics", by Beiser, TMH, New Delhi. "Atomic and Nuclear Physics", by Brijlal and Subraminayan. - LASERSs and Electro Optics by Christopher C. Davis, Cambridge Univ. Press (1996). "LASER theory and applications", by A. K. Ghatak & Tyaga raja n, TMH (1984). - Introduction to Atomic Physics, H. E. White Quantum Mechanics: Schaums Outlines, Y. Peleg, R. Pnini, E. Zaarur, E. Hecht. - B.Sc. Practical Physics, C. L. Arora, S. Chand Publishing, Revised Edition - Advanced Practical Physics for Students, B. L. Flint & H. T. Worsnop, Asia Publishing House / CBS Reprint, Reprint Edition.
Suggested e- resources (Websites/e-books)	https://swayam.gov.in https://ndl.iitkgp.ac.in Virtual Labs https://epgp.inflibnet.ac.in

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