



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

B. Tech (CSE/IT): All Programs

SEMESTER-I/II (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*				
BTCS102M	BEC	Introduction to Design Thinking	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. The objective of this course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

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** Define Design Thinking and identify its role in innovation.
- CO2** Conduct user research to empathize with stakeholders and define core problems.
- CO3** Generate creative ideas through various ideation techniques.
- CO4** Develop low-fidelity prototypes and iterate based on user feedback.

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:

None.

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Design Thinking: Definition, History, Mindset of a Design Thinker (Empathy, Optimism, Iteration), Design Thinking vs. Analytical Thinking.	9	ATL1 ATL3 ATL6 ATL8
II	Empathize Phase: User-centric research, Observation techniques, Interviewing for empathy, Immersion, Empathy Maps, Persona development.	9	ATL1 ATL3 ATL6 ATL8
III	Define Phase: Analysis and Synthesis of research, Point of View (POV) statements, "How Might We" (HMW) questions, Identifying user needs and insights.	9	ATL1 ATL3 ATL6 ATL8
IV	Ideate Phase: Rules of Ideation, Brainstorming, Mind Mapping, SCAMPER, Storyboarding, Selecting and prioritizing ideas.	9	ATL1 ATL3 ATL6 ATL8
V	Prototype & Test: Types of Prototyping (Paper, Digital, Physical), Low-fidelity vs. High-fidelity, Feedback loops, Iterative testing, Final Presentation.	9	ATL1 ATL3 ATL6 ATL8
Total Hours		45	

ADDITIONAL RESOURCES

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

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https://www.youtube.com/watch?v=_r0VX-aU_T8

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOK:

- Developing Thinking Skills (The Way to Success)

REFERENCE:

- E. Balagurusamy, Developing Thinking Skills (The Way to Success), 1st ed. New Delhi, India: Khanna Publishing House, 2022.

Suggested e- resources (Websites/e- books)

- NPTEL - Design Thinking: A Primer
- CircuitVerse - Interactive Logic Simulator

LIST OF PRACTICAL

S.No.	Title	CO Mapping
1.	To study the operation of various logic gates and verify their truth tables.	CO1
2.	To verify De morgan's theorem	CO1
3.	To verify the versatility of NAND and NOR gates	CO1
4.	To compare and verify standard SOP/POS expression with minimized Boolean form using K- map.	CO1
5.	To design and verify Adder and subtractor circuits.	CO2
6.	To design and verify multiplexer and demultiplexer using basic logic gates.	CO2
7.	To realize 4-bit parallel adder circuit.	CO2
8.	To design and verify encoder and decoder circuits using ICs.	CO2
9.	To verify the truth table of different flip flops.	CO3
10.	To verify the functionality of shift register.	CO3

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11.	To verify the functionality of counter circuit.	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	2	2	1	-	-	2	-	-	-	-	-	2	1	1	-
CO2	-	3	2	3	1	3	2	2	2	2	-	2	2	2	-
CO3	2	3	3	-	-	2	-	-	3	2	1	2	2	2	-
CO4	2	2	3	3	2	-	-	-	3	3	2	2	3	2	1

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTC SH107	BS	Linear Algebra	Max	60	20	20	0	0	3	1	0	4
			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. Know the fundamental principles of the Linear algebra.
2. Understand and apply the basics of the Matrices and Vector Space.

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 the techniques to find the Solution of Linear equations.
- CO2 Apply the basics of the calculus of the Determinants.
- CO3 Apply the basics of the calculus of the Matrices.
- CO4 Apply the concept of Singular value decomposition and Principal component analysis in Image Processing and Machine Learning.

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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- ATL3 Midterm Exams
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- ATL6 Assignments
- ATL7 Poster

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BTCSH107	BS	Linear Algebra	Max	60	20	20	0	0	3	1	0	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.

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Matrices and Determinants: Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.	9	ATL1 ATL3 ATL6
II	Vectors and linear combinations: Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices	9	ATL1 ATL3 ATL6
III	Vector space: Dimension; Basis; Orthogonally; Projections; Gram-Schmidt orthonormalization and QR decomposition	9	ATL1 ATL3 ATL6
IV	Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermitian and unitary matrices	9	ATL1 ATL3 ATL6
V	Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.	9	ATL1 ATL3 ATL6
Total Hours		45	

ADDITIONAL RESOURCES

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

- MIT OpenCourseWare Lecture Portal (18.06): <https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/>

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B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOK:

1. G. Strang, *Linear Algebra and Its Applications*, 4th ed. Belmont, CA: Thomson, Brooks/Cole, 2006.

REFERENCE BOOKS:

1. E. Kreyszig, *Advanced Engineering Mathematics*, 9th ed. Hoboken, NJ, USA: Wiley, 2005.
2. R. G. Bartle and D. R. Sherbert, *Introduction to Real Analysis*, 5th ed. New York, NY, USA: Wiley, 1999.
3. J. Stewart, *Calculus: Early Transcendentals*, 5th ed. Boston, MA, USA: Thomas Learning (Brooks/Cole), 2003.

Suggested e- resources (Websites/e- books)

1. MIT OpenCourseWare: MIT 18.06 Linear Algebra, Spring 2010.
2. NPTEL: Linear Algebra.

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

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

SEMESTER-II (2026-30)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS202M	BEC	Object Oriented Programming with C++	Max	60	20	20	30	20	3	0	2	4
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COURSE OBJECTIVES:

The student will have ability to:

1. To explain abstract data types, classes and different types of objects.
2. To analyze the public, protected and private modes of inheriting the classes.
3. To demonstrate the overloading of functions and operators to grant them a different meaning.
4. To provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs.

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** Identify and describe the components of object-oriented technology and justify their relevance.
- CO2** Implement inheritance for code reusability and polymorphism.
- CO3** Implement object-oriented approach for real world scenarios.
- CO4** Use advance features like templates and exception to make programs supporting reusability and sophistication
- CO5** Develop the applications using object oriented programming with C++.

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

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- ATL6 Assignments
- ATL7 Poster
- ATL8 Oral Viva-voce examination
- ATL9 Industrial Visit Report

PREREQUISITES:

Knowledge of Object Oriented Programming with C++ (BTCS202M)

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Concepts of OOP: Introduction OOP, Procedural vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP. C++ Basic Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures.	9	ATL1 ATL4 ATL8
II	C++ Functions: The Main Function, Function prototyping, Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments.	9	ATL1 ATL4 ATL8
III	Objects and Classes: Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, friend function. Inheritance: Concept of Inheritance, types of inheritance, access modifiers, overriding, virtual base class	9	ATL1 ATL4 ATL8
IV	Polymorphism: Polymorphism and its types, Pointers in C++, Pointers and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism, Abstract Methods and Classes. Exception Handling, Templates function and class in C++	9	ATL1 ATL4 ATL8
V	I/O and File management: Concept of Streams, Cin and Cout Objects, C++ Stream Classes, Unformatted and	9	ATL1 ATL4

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	Formatted I/O, Manipulators, File Stream, C++ File Stream Classes, File Management Functions, File Modes, Binary and Random Files.		ATL8
	Total Hours	45	

ADDITIONAL RESOURCES

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<https://www.youtube.com/watch?v=vLnPwxZdW4Y>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOKS:

1. B. Stroustrup, *Programming: Principles and Practice Using C++*, 3rd ed. Boston, MA, USA: Addison-Wesley, 2024.
2. G. Ruggiero, *Software Architecture with C++: Design modern systems using effective architecture concepts, design patterns, and techniques with C++20*. Birmingham, UK: Packt Publishing, 2022.

REFERENCE BOOKS:

1. P. Deitel and H. Deitel, *C++ How to Program*, 11th ed. Boston, MA, USA: Pearson, 2024.
2. N. M. Josuttis, *C++23 - The Complete Guide*. Hamburg, Germany: Leanpub, 2026.
3. J. Galowicz, *C++20 STL Cookbook*. Birmingham, UK: Packt Publishing, 2020.
4. B. Cyganek, *Introduction to Programming with C++ for Engineers*. Hoboken, NJ, USA: Wiley-IEEE Press, 2020.

Suggested e- resources (Websites/e- books)

1. MIT OpenCourseWare Core Object-Oriented C++ Programming Guide: <https://ocw.mit.edu/courses/6-096-introduction-to-c-january-iap-2011/pages/lecture-notes/>

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LIST OF PRACTICALS

S.No.	Title	Co Mapping
1.	Write a program to display the following output using a single cout statement. Maths=90, Physics=74, Chemistry=76	CO1
2.	Write a program to read 2 numbers from the keyboard and display the larger value on the screen.	CO1
3.	Write a function using reference variables as arguments to swap the values of a pair of integers.	CO1
4.	Write a macro that obtains the largest of 3 numbers.	CO1
5.	Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object, depending on the units in which the result are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.	CO3
6.	Define a class to represent a bank account. Include the following members: Data members 1. Name of the depositor 2. Account number 3. Type of account 4. Balance amount in the account Member functions 1. To assign initial values 2. To deposit an amount 3. To withdraw an amount after checking the balance 4. To display name and balance Write a main program to test the program.	CO3
7.	Design a constructor for bank account class.	CO3
8.	A book shop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system	CO3

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SEMESTER-II (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*				
BTCS202M	BEC	Object Oriented Programming with C++	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.

displays the book details and requests for the number of copies required. If the requested copies book details and requests for the number of copies required. If the requested copies are available, the total cost of the requested copies is displayed; otherwise the message "Required copies not in stock" is displayed.

Design a system using a class called books with suitable member functions and Constructors. Use new operator in constructors to allocate memory space required.

9. Improve the system design in exercise 8 to incorporate the following features: CO3
 - (a) The price of the books should be updated as and when required. Use a private member function to implement this.
 - (b) The stock value of each book should be automatically updated as soon as a transaction is completed.
 - (c) The number of successful transactions should be recorded for the purpose of statistical analysis. Use static data members to keep count of transaction.
10. Design a C++ Class 'Complex' with data members for real and imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operations of two complex numbers using operator overloading (using either member functions or friend functions). CO2, CO3
11. Create a base class shape. Use this class to store two double type values that could be used to compute area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base a member function getdata() to initialize base class data member and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine it the derived class to suit their requirements. CO2
12. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes curacct and savacct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks: CO2, CO5
 - a. Accept deposit from a costumer and update the balance.
 - b. Display the balance
 - c. Compute and deposit interest.
 - d. Permit withdrawal and update the balance.

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SEMESTER-II (2026-30)

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BTCS202M	BEC	Object Oriented Programming with C++	Max	60	20	20	30	20	3	0	2	4
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e. Check for the minimum balance, impose penalty, necessary and update balance.

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

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT201M	DCC	Data Communication	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 understand the concepts of data communications.
2. To be familiar with the Transmission media and Tools.
3. To study the functions of OSI layers.
4. To learn about IEEE standards in computer networking.
5. To get familiarized with different protocols and network components.

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 Process and functions of data communications
- CO2** Understand Transmission media and Tools
- CO3** Understand the functions of OSI layers
- CO4** Understand IEEE standards in computer networking
- CO5** Understand different protocols and network components

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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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT201M	DCC	Data Communication	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.

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction: Data Communication Components, Types of Connections, Transmission Modes, Network Devices, Topologies, Protocols and Standards, OSI Model, Transmission Media, Bandwidth, Bit Rate, Bit Length, Baseband and Broadband Transmission, Attenuation, Distortion, Noise, Throughout, Delay and Jitter.	9	ATL3 ATL8 ATL6
II	Data Encoding: Unipolar, Polar, Bipolar, Line and Block Codes. Multiplexing: Introduction and History, FDM, TDM, WDM, Synchronous and Statistical TDM. Synchronous and Asynchronous transmission, Serial and Parallel Transmission.	9	ATL3 ATL8 ATL6
III	Error Detection & Correction: Correction, Introduction–Block Coding–Hamming Distance, CRC, Flow Control and Error Control, Stop and Wait, Error Detection and Error Go Back– N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, CSMA/CD, CDMA/CA.	9	ATL3 ATL8 ATL6
IV	Network Switching Techniques: Circuit, Message, Packet and Hybrid Switching Techniques.X.25, ISDN.Logical Addressing, Ipv4, Ipv6, Address Mapping, ARP, RARP, BOOTP and DHCP, User Datagram Protocol, Transmission Control Protocol, SCTP.	9	ATL3 ATL8 ATL6
V	Application Layer Protocols: Domain Name Service	9	ATL3

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT201M	DCC	Data Communication	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.

	Protocol, File Transfer Protocol, TELNET, WWW and Hyper Text Transfer Protocol, Simple Network Management Protocol, Simple Mail Transfer Protocol, Post Office Protocol v3.		ATL6 ATL8
	Total Hours	45	

ADDITIONAL RESOURCES

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

https://www.youtube.com/playlist?list=PLU14u3cNGP60_JNv2MmK3wkOt9syvfQWY (MIT OCW)

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

TEXTBOOK:

1. B. A. Forouzan, *Data Communication and Networking*, 4th ed. New Delhi, India: Tata McGraw Hill, 2011.

REFERENCE BOOKS:

1. L. L. Peterson and P. S. Davie, *Computer Networks*, 5th ed. Amsterdam, Netherlands: Elsevier, 2012.
2. W. Stallings, *Data and Computer Communication*, 8th ed. Upper Saddle River, NJ, USA: Pearson Education, 2007.
3. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet*. Upper Saddle River, NJ, USA: Pearson Education, 2005.

Suggested e- resources (Websites/e- books)

1. MIT OpenCourseWare Data Communication and Networks Companion:

<https://ocw.mit.edu/courses/6-263j-data-communication-networks-fall-2002/>

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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*				
BTIT201M	DCC	Data Communication	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 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	1	-	-	-	-	-	-	-	-	2	2	2	1
CO2	3	2	2	2	3	-	1	-	-	-	-	2	2	1	1
CO3	3	3	2	-	2	-	-	-	-	-	-	2	3	2	2
CO4	3	2	3	-	-	1	-	1	-	-	-	2	3	1	2
CO5	3	3	3	2	3	-	-	-	-	-	-	2	3	2	3

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B. Tech CSE (ICS)

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*				
BTICS210	SEC	Secure Programming for Linux	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		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.

COURSE OBJECTIVES:

The student will have ability to:

1. Provide students with a fundamental understanding of the Linux command-line environment and essential administration tasks.
2. Enable students to manage users, groups, file permissions, and software packages within a Red Hat Enterprise Linux (RHEL) environment.
3. Equip students with the skills to configure networking, secure remote access, and monitor system processes for effective server management.

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** To introduce students to the basics of the Linux operating system and command-line usage
- CO2** Students will understand core cybersecurity principles and identify common security threats
- CO3** Deploy, monitor, and troubleshoot system services, networking configurations, and virtualized environments in a professional RHEL setting.
- CO4** Students will identify and prevent common vulnerabilities such as buffer overflow and injection attacks
- CO5** Students will apply input validation and proper error handling in programs

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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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTICS210	SEC	Secure Programming for Linux	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		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.

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 Linux & Security Basics Introduction to Linux operating system, features and architecture, basic Linux commands for file handling and process management, Linux file system structure, users and groups, file permissions and access control. Introduction to cybersecurity concepts including confidentiality, integrity and availability (CIA triad), types of security threats such as malware, phishing, and unauthorized access.	6	ATL1 ATL2 ATL6
II	Secure Programming Fundamentals Concept of secure programming, importance of writing secure code, common programming errors and risks. Introduction to C programming in Linux environment, compilation process using GCC, basics of input/output handling, input validation techniques, secure vs insecure functions, and safe coding practices.	8	ATL1 ATL4 ATL8
III	Common Vulnerabilities in Linux Programs	6	ATL2

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTICS210	SEC	Secure Programming for Linux	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		15	10				

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	Overview of common software vulnerabilities including buffer overflow, format string vulnerabilities, integer overflow, race conditions, command injection, and file handling issues. Understanding causes, examples, and basic methods to identify vulnerabilities in programs.		ATL3 ATL8
IV	Secure Coding Practices Techniques for secure coding include input validation and sanitization, safe memory management, avoiding buffer overflow, proper error and exception handling, principle of least privilege, and writing secure shell scripts. Guidelines for developing robust and secure applications.	8	ATL2 ATL5 ATL6
V	Linux System Security & Testing Linux security mechanisms including file permissions and access control, basic concepts of SELinux/AppArmor, firewall configuration using iptables/ufw, user authentication methods, password management and hashing, logging and monitoring using system logs. Introduction to debugging tools such as GDB, basics of static and dynamic code analysis, vulnerability scanning concepts, and secure code review techniques.	8	ATL2 ATL3
Total Hours		36	

ADDITIONAL RESOURCES:

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

<https://www.udemy.com/course/linux-basics-for-beginners/>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Secure Programming Cookbook for C and C++, McGraw-Hill, 2003.

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BTICS210	SEC	Secure Programming for Linux	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		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.

- The Linux Programming Interface, No Starch Press, 2010.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Study and practice basic Linux commands for file and directory operations (ls, cp, mv, rm, mkdir, etc.)	CO1
2.	Create and manage users and groups; assign and modify file permissions using chmod, chown, and umask. e files from command line	CO1, CO3
3.	Write, compile, and execute simple C programs in Linux using GCC.	CO1, CO5
4.	Demonstrate unsafe input handling (e.g., gets, scanf without limits) and implement input validation techniques.	CO5
5.	Develop programs to illustrate buffer overflow concepts (basic demonstration).	CO4
6.	Identify and fix format string vulnerabilities in sample C programs.	CO4
7.	Implement secure C programs using safe functions (fgets, strncpy, etc.) and proper error handling.	CO5
8.	Write basic shell scripts and apply secure scripting practices.	CO5
9.	Perform file handling securely in C (open, read, write with proper checks).	CO5
10.	Experiment with Linux file permissions and access control mechanisms.	CO1, CO3
11.	Configure basic firewall rules using iptables or ufw.	CO3
12.	Use system logging tools (syslog) to monitor system activities.	CO3
13.	Debug C programs using GDB (breakpoints, step execution, variable tracking).	CO5
14.	Perform basic static code analysis using available tools.	CO4, CO5
15.	Conduct simple vulnerability assessment and code review of sample programs.	CO2, CO4, CO5

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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 (ICS)

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*				
BTICS210	SEC	Secure Programming for Linux	Max	0	0	0	30	20	0	0	2	1
			Min	0	0		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.

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

Chairperson

Board of Studies,
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Chairperson

Faculty of Studies,
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Controller of Examination

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Registrar

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore