

**Minutes of BoS Meeting in CSE (Block chain)**

With reference to dean academic email dated 13 May 2025 BoS meeting of **B. Tech. –CSE (Block chain)** has been conducted successfully under the visionary guidance of BoS chairperson and members on dated 27.05.2025 from 11:00 AM to 1:00PM in hybrid mode.

During meeting following members were present.

<b>Sr.No.</b>	<b>Name</b>	<b>Designation and Institute</b>	<b>Role in BoS</b>
1.	Dr. Kanak Saxena	Prof. & Head, CSE Department, SATI Vidisha	Chairperson
2.	Dr. Nanhey Singh	Professor, CSE, Netaji Subhas University of Technology, New Delhi	Subject experts
3.	Dr. Dilip Singh Sisodiya	Associate Professor NIT, Raipur(CG)	Alumnus Member
4.	Shri Bhuvan Joshi	Industry Expert, Data nutts IT Solutions	Member
5.	All Regular Faculty of the Department		Member

The following deliberation took place in meeting

<b>BoS Agenda Items</b>	
<b>Item 1</b>	To confirm the minutes of previous BoS meeting held in the month of 19 <sup>th</sup> Dec. 2024. <ul style="list-style-type: none"> <li><b>The minutes of previous BoS meeting held on 19<sup>th</sup> Dec. 2024 were presented discussed and confirmed.</b></li> </ul>
<b>Item 2</b>	To review and propose change in syllabus of theory/practical's and CO's if any, for the subjects in I and II Semester for 2025-2026 admitted batch. <ul style="list-style-type: none"> <li><b>The scheme and syllabus of B.Tech CSE (BC) I &amp;II SEM along with COs and Mapping presented, discussed and in courses CSA 101 with 18 %, CSA 102 with 05 %, CSA 103 with 05 % change is confirmed. (Annexure. I)</b></li> </ul>
<b>Item 3</b>	To review and propose change in syllabus of theory/practical's and CO's if any, for the subjects in III and IV Semester for 2024-2025 admitted batch. <ul style="list-style-type: none"> <li><b>The scheme and syllabus of B.Tech BC –III and IV SEM along with COs and Mapping presented, discussed and in course BC – 305, 12% change is confirmed. (Annexure. I).</b></li> </ul>
<b>Item 4</b>	To propose change in syllabus of theory/practical's and CO's if any, for the subjects in V and VI Semester for 2023-2024 admitted batch. <ul style="list-style-type: none"> <li><b>The scheme and syllabus of B.Tech BC V and VI SEM along with COs and Mapping presented, discussed and Change in the codes of the Open Electives as OE-1 and OE-II in the V and VI</b></li> </ul>

	<b>semester respectively(2023-24 Admitted), and in course BC 501 - 21% change is confirmed. (Annexure. I and II)</b>
<b>Item 5</b>	To propose change in syllabus of theory/practical's and CO's if any, for the subjects in CSE (BC) VII and VIII Semester for 2022-2023 admitted batch. committee suggested the following updates: <ul style="list-style-type: none"> <li>• <b>Change subject title Big Data Analytics to Data Engineering &amp; Analytics.</b></li> <li>• <b>Add one more department elective Bioinformatics.</b></li> <li>• <b>Remove the Medical Applications from the Deep Learning Syllabus.</b></li> <li>• <b>The scheme and syllabus of B.Tech CSE (BC)VII and VIII SEM along with COs and Mapping presented, discussed and suggestions incorporated and confirmed. (Annexure. III)</b></li> </ul>
<b>Item 6</b>	To propose the modified list of courses through Swayam /NPTEL for Honors and Minors degree as per AICTE model curriculum. <ul style="list-style-type: none"> <li>• <b>The Mooc courses are introduced as per the NPTEL courses list published in the May. 2025 for the session July-Dec. 2025 for the Minor degree and the honors degree discussed and confirmed (Annexure. IV)</b></li> </ul>
<b>Item 7</b>	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for <b>Dec. 2025</b> . <ul style="list-style-type: none"> <li>• <b>COs attainments, discussed and members are satisfied with attainment level.</b></li> </ul>
<b>Item 8</b>	To review curricula feedback from various stakeholders, its analysis and impact {Stakeholder feedback analysis must also contain an Action Taken Report (ATR) and the details/data of the stakeholders who have responded through GOOGLE form (such as Name, organization, mail id, phone no., if available) must also be shared along with the feedback of the alumni/employer}. <ul style="list-style-type: none"> <li>• <b>On curricula feedback from various stakeholders, its analysis and impact, discussed and confirmed. (Annexure. V)</b></li> </ul>
<b>Item 9</b>	To review the Course Outcomes (COs) feedback of various courses, its analysis, and ATR (Dec 2025 semester) <ul style="list-style-type: none"> <li>• <b>Discussed and satisfied.</b></li> </ul>
<b>Item 10</b>	To discuss and recommend the scheme structure & syllabi of PG Program MCA along with their Course Outcomes (COs). <ul style="list-style-type: none"> <li>• <b>No change in scheme</b></li> <li>• <b>Added Elective subjects as per the current need (Annexure VI)</b></li> <li>• <b>Change in the nomenclatural of MCA 301 for the 25 – 26 admitted students.</b></li> </ul>
<b>Item 11</b>	To recommend the scheme structure of Ph.D. Course Work (specific to Doctoral Research Scholars, if any) <ul style="list-style-type: none"> <li>• <b>No change in structure of Ph.D. Course Work</b></li> </ul>

### Annexure. I

CSE/BC Semester: II Sem	Code CSA101 – Introduction to Computer Science and Programming	Subject	L T P C 3 0 2 4
<b>Course Objectives:</b>			
<ul style="list-style-type: none"> <li>To introduce the Computer Science and Programming and Basic concepts of computers.</li> <li>To understand the components of computers and generation, organization of computers.</li> <li>To familiarize students with the programming and problem-solving concepts using C Programming language.</li> <li>The course will help students to solve the problem using computer programming.</li> </ul>			
<b>Prerequisite:</b> Basics of C, Fundamental knowledge of Computer			
<b>CO1</b>	Familiarize the importance of computer science and Programming. Understand the concept of generation of computers and learn about components of computer systems.		
<b>CO2</b>	Understand the concept of Problem-solving using C and Implement the flowchart and program for solving Mathematical and Engineering problems.		
<b>CO3</b>	Articulate the Modular Programming Concept and Solve the Engineering Problem using Modular Programming.		
<b>CO4</b>	Articulate the Advance C Programming Concept to Solve the Engineering Problem using Structure, Union.		
<b>CO5</b>	Describe the basic concepts of pointers, file handling and their applications.		
<b>Unit-I</b>	<b>Introduction to Computer Science and Engineering:</b> Computer: Definition, Classification, Generation, Organization-Memory & Storage Systems. Introduction of Programming: characteristics, types, algorithm. Programming solving using computer concept, flowchart. Rules/conventions of coding, documentation, naming variables.		6 Hrs
<b>Unit-II</b>	<b>Problem Solving using C:</b> History of C, Structure of a C Program; Data types, Constant & Variable, Operators - arithmetic, logical, bitwise, relational, ternary, expressions, Control Constructs – if-else, for, while, do-while, conditional looping, Switch-case statements, Escape statements, Special constructs – Break, continue, exit(), goto labels, Type conversion & type casting, Priority & associativity of operators; Type modifiers.		10 Hrs
<b>Unit-III</b>	<b>Modular Programming:</b> Introduction to Arrays, Declaration and Initialization, Accessing Array Elements, Types of Arrays, Operations on Arrays, Arrays and Functions, Applications of Arrays. Functions; Arguments; Calling a function; Return statement; Parameter passing – call by value, call by reference; Scope, visibility and life-time rules for various types of variables; Storage classes.		9 Hrs
<b>Unit-IV</b>	<b>Advance C Programming:</b> Structure – basic, declaration, membership operator, pointer to structure, referential operator, self-referential structures, structure within structure, array in structure, array of structures, type def. Union – basic, declaration; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion.		8 Hrs
<b>Unit -V</b>	<b>Pointers:</b> Pointers, Pointers - & and * operators, pointer arithmetic, Arrays and Pointers, applications in memory management. <b>File Handling:</b> Basic file operations, including reading and writing data to files. Pre-processor Directives: C pre-processor – basics, #Include, #define, Enumerated data type.		7 Hrs
<b>Text Books</b>			

<ul style="list-style-type: none"> <li>• Let us C By Yashwant Kanetkar, BPB Publication.</li> <li>• Programming in C, Schaum Outline, McGraw-Hill</li> </ul>															
<b>Reference Books</b>															
<ul style="list-style-type: none"> <li>• Programming in ANSI-C By E. Balagurusami, TMH Publication.</li> <li>• C Programming language By Kernighan, Brian, W, Retchie, Dennis, PHI Publication</li> <li>• Information Technology: Theory and Practice by PRADEEP K. SINHA, PRITI SINHA</li> </ul>															
	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	PO <sub>1</sub> <sub>1</sub>	PO <sub>1</sub> <sub>2</sub>	PSO 1	PSO 2
	CO-1	3	3										2	3	1
	CO-2	3	2	3		1							2	3	1
	CO-3	2	3			1							2	3	1
	CO-4	2	3	2		1							2	2	1
	CO-5		3	2									1	3	1

**\*\*Made changes from the previous one=18%**

CSE/BC Semester: II Sem	Code CSA102 – Digital Electronics	Subject	L T P C 3 0 0 3
<b>Course Objectives:</b> The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design. To familiarize students with the different number systems, logic gates, minimization of logic circuits and combinational and sequential circuits utilized in the different digital circuits and systems. The course will help student to design and analyze the digital circuits and systems.			
<b>Prerequisite:</b> Basics knowledge of mathematics			
CO1	Convert different number systems and codes used in digital circuits and systems.		
CO2	Simplify and analyze the digital logic circuits using Boolean algebra and other mapping techniques.		
CO3	Analyze and design different combinational logic circuits using different mapping techniques and mathematical tools.		
CO4	Compare different types of sequential circuits		
CO5	Study and compare different types of Counters.		
<b>Unit-I</b>	<b>Introduction to Digital Electronics:</b> Review of number system and conversions; Binary Arithmetic, Signed and Unsigned representation, Binary codes, Gray Code, Code Conversions, Error detection and correction codes - parity check codes and Hamming code.		8
<b>Unit-II</b>	<b>Boolean Algebra and Switching Functions</b> - Study of basic logic gates, Basic postulates and fundamental theorems of Boolean algebra; Standard representation of logic functions - SOP and POS forms; Simplification of switching functions - K-map and Quine-McCluskey tabular methods.		8
<b>Unit-III</b>	<b>Combinational Logic Modules and their applications:</b> Adders, Sub tractors, Code Converters, parity generators and comparators, Encoders & Decoders, BCD to seven-segment decoder, Multiplexers& De-multiplexers and their applications.		9
<b>Unit-IV</b>	<b>Sequential Circuits and Systems:</b> Set-Reset latches and flip flops, D-flip-flop, R-S flip-flop, J-K Flip-flop, Master slave Flip flop, edge triggered flip-flop, T flip-flops, Shift registers, classification of shift registers.		7
<b>Unit -V</b>	<b>Counters classification:</b> asynchronous counters, synchronous counters, counters design, BCD counter,		7 Hrs
<b>Text Books</b>			
<ul style="list-style-type: none"> <li>• M. Mano, "Digital Logic and Computer Design", Pearson Education.</li> <li>• T. L. Floyd, "Digital Fundamentals", Pearson Education.</li> <li>• A. Anand Kumar, "Fundamentals of Digital Circuits", PHI.</li> </ul>			
<b>Reference Books</b>			
List and Links of e-learning resources:			
<ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/108/105/108105132/">https://nptel.ac.in/courses/108/105/108105132/</a> <a href="https://de-iitr.vlabs.ac.in/">https://de-iitr.vlabs.ac.in/</a></li> </ul>			

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	PO <sub>1</sub> <sub>1</sub>	PO <sub>1</sub> <sub>2</sub>	PSO 1	PSO 2
CO-1	3	2	3	2	3					2	2	1	2	2
CO-2	3	2	1	2	2	2				2	2	2	2	2
CO-3	2	2	2	1	2	1				1	2	2	2	1
CO-4	3	2	3	1	2	1				2	2	2	2	1
CO-5	3	2	3			1				2	1	2	1	2

**\*\*Made changes from the previous one=05%**

CSE/BC Semester: II Sem	Code CSA103	Subject –Problem Solving and Data Structures	L T P C 3 0 2 4
<b>Prerequisite:</b> Basics of C, Fundamental knowledge of Computer			
<b>Course Objective:</b>			
Introduce the fundamentals of data structures and how these concepts are useful in problem solving.			
CO1	To teach efficient storage mechanisms of data for easy access.		
CO2	To design and implementation of various basic and advanced data structures.		
CO3	To introduce various techniques for representation of the data in the real world.		
CO4	To develop applications using data structures.		
CO5	To improve the logical ability.		
<b>Unit-I</b>	Problem solving concepts: top-down, bottom-up design, Concept of data type, variable, constant and pointers. Dynamic memory allocation. Introduction to data structure: Linear, Nonlinear, Primitive and Non primitive. Arrays- Concepts of Arrays, Single dimensional array, two dimensional array- Representation and Address Calculation, Operations on arrays with algorithms (traversing, searching, inserting, deleting) and analysis.		8 Hrs.
<b>Unit-II</b>	List-Singly linked lists: Representation in memory, Operations on singly linked list with algorithms (traversing, searching, insertion, deletion) Doubly linked list-Operations with algorithms and analysis. Circular linked lists- Operations with algorithms and analysis. Representation & manipulations of polynomials/sets using linked lists.		6 Hrs.
<b>Unit-III</b>	Stack- Introduction to Stack and its operations, Implementation of stack using array and linked list with comparison. Application of stacks (Polish Notations, converting infix to postfix notation, evaluating postfix notation, Parenthesis balancing, Recursion). Queue- Introduction to Queue and its operations. Implementation of queue using array and linked list. De-queue, circular queue, priority queue. Applications of queue		9 Hrs.
<b>Unit-IV</b>	Tree- Definition and terminology, concept of binary tree and representation, Traversing binary tree (pre order, post order, in order) Operation with algorithm -insertion and deletion. Binary Search Trees and Concept of balance tree (AVL). Graph- Definition and terminology, Types of graphs, Representation of graph. Traversing of graph- Breadth First Traversing and Depth First Traversing.		9 Hrs.
<b>Unit -V</b>	Searching- Search methods- Linear search, Binary search and Hashing (collision, chaining and probing) with their algorithms and analysis. Sorting- Sorting Methods-Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Radix sort, Shell sort with their algorithms and analysis.		8 Hrs.
<b>Text Books</b>			
1. Data Structure- Schaum's Series- McGraw Hill Publication			
<b>Reference Books</b>			
1. Data Structure- Horwitz and Sartaj Sahni			
2.Data Structure through C, Yashwant Kanekar, BPB Publication.			
<b>List of Experiments</b>			
1. Write program to implement pointers and structure in C to understand the concepts of Dynamic memory allocation.			
2. Write a program to implement concept of linear array with following operations: i. Traverse an array.			

- ii. Find minimum item, maximum item, and average of an array items. iii. Insert a new item at beginning, end and middle position within an array. iv. Delete an item from an array.
3. Write a program to implement singly linked list with following operations i. Insert a new item at beginning, end and middle position within a single linked list. ii. Delete an item from single linked list. iii. Traverse a single linked list.
4. Modify the singly linked list program to make it for doubly linked list.
5. Write a program to implement Stack with its operations (Push, Pop, Peek, IsEmpty) using: i. Using array ii. Using linked list
6. Write a program to evaluate postfix notation using stack.
7. Write program to implement queue with its operations (enqueue, dequeue) using: i. Using array ii. Using linked list
8. Modify the queue program to implement circular queue with its operations.
9. Write a program to implement binary search tree with insert and delete operations.
10. Write a program to implement depth first traverse and breadth first traverse on a graph.
11. Write program to implement linear search and binary search on a given array.
12. Write a program to sort a given list of 10000 random integers and compare their execution time using: i. Bubble sort ii. Insertion sort iii. Merge sort iv. Quick sort v. Radix sort

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	PO <sub>1</sub> <sub>1</sub>	PO <sub>1</sub> <sub>2</sub>	PSO 1	PSO 2
CO-1	2	2							1			2	2	2
CO-2	2	2		1								1	1	2
CO-3	2	3		1	2							2	2	3
CO-4	2	3		1	2							2	2	3
CO-5	1	1						2				1	2	

**\*\*Made changes from the previous one=05%**

CSE/BC Semester: III Sem	Code CS/BC –305	Subject Computer System Organization	L T P C 0 3 0 3
<b>Prerequisite:</b> Fundamentals Knowledge of digital electronics			
<b>CO1</b>	Understand the organization and levels of design in computer architecture and understand the concepts of Register transfer languages. arithmetic micro-operations, logic micro-operations, shift micro-operations		
<b>CO2</b>	Understand the Instruction cycle, memory reference instructions, input-output, and interrupt, addressing modes, data transfer, and manipulation, program control. Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.		
<b>CO3</b>	Describe address sequencing, micro program example, and design of control unit		
<b>CO4</b>	Knowledge about Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory Input or output Interface, asynchronous data transfer, modes of transfer, Priority interrupt, and direct memory access. .		
<b>CO5</b>	5. Explore the Parallel processing, pipelining-arithmetic pipeline, instruction pipeline Characteristics of multiprocessors, interconnection structures, inter processor arbitration, inter-processor Communication, and synchronization.		
<b>Unit-I</b>	Introduction: Function and structure of a computer, Functional components of a computer, Interconnection of components, Performance of a computer, Register Transfer language : Register Transfer, Bus and Memory Transfers, Three-State Bus Buffers, Memory Transfer, Arithmetic Micro operations Binary Adder, Binary Adder-Subtractor, Binary incrementer, Arithmetic Circuit, Logic Micro operations, Shift Micro Operations, Arithmetic Logic Shift Unit, List of Logic Micro operations, , Shift Micro operations, Arithmetic Logic Shift Unit		6 Hrs.
<b>Unit-II</b>	CPU design: Instruction codes, computer register, computer instructions, Timing and control, Instruction cycle, , memory reference instructions, input-output, and interrupt, addressing modes, data transfer, and manipulation, and program control. Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.		7 Hrs.
<b>Unit-III</b>	Control unit: Control memory, address sequencing, micro program example, Microinstruction Format, Symbolic Microinstructions, The Fetch Routine, Symbolic Micro program and design of the control unit, Micro program Sequencer.		8 Hrs.
<b>Unit-IV</b>	Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.		7 Hrs.
<b>Unit -V</b>	Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, interconnection structures, interprocessor arbitration, inter-processor communication, and synchronization.		7 Hrs.
<b>Text Books</b>			
M. Morris Mano, “Computer Systems Architecture”, Pearson, 3rd edition			

**Reference Books**

- John D. Carpinelli, “Computer Systems Organization and Architecture”, Pearson, 1st Edition.
- Patterson, Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Morgan Kaufmann.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	1	1	2										1	2
CO-2	2	2	2										1	2
CO-3	2	1	2										1	2
CO-4	2	1	2											2
CO-5	2	2	1										1	2

**\*\*Made changes from the previous one=12%**

CSE/BC Semester: V Sem	Code CS-501	Subject Artificial Intelligence	L T P C 3 0 0 3
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory and Data Structure			
<b>CO1</b>	1.To understand the various characteristics of Intelligent agents		
<b>CO2</b>	2. To learn the different search strategies in AI		
<b>CO3</b>	3. Skills in various knowledge representation.		
<b>CO4</b>	4. Appreciate the uncertainty in designing AI systems and propose algorithms for the same		
<b>CO5</b>	5. Build awareness of AI facing major challenges and the complexity of typical problems within the field.		
<b>Unit-I</b>	<b>Introduction:</b> Introduction - Definition - Future of Artificial Intelligence - Characteristics of Intelligent Agents - Typical Intelligent Agents - Problem Solving Approach to Typical AI problems. State Space Search, Constraints Satisfaction Problems.		6 Hrs.
<b>Unit-II</b>	<b>Problem Solving Methods:</b> Problem solving Methods - Search Strategies - Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Backtracking Search - Performance of search algorithms.		7 Hrs.
<b>Unit-III</b>	<b>Knowledge Representation:</b> First Order Predicate Logic - Unification - Forward Chaining - Backward Chaining - Resolution - Knowledge Representation using First order Predicate logic - Reasoning Systems. Weak and Strong Slot and Filler System.		8 Hrs.
<b>Unit-IV</b>	<b>Uncertain Knowledge and Reasoning:</b> Uncertainty - review of probability - probabilistic Reasoning - Bayesian networks - inferences in Bayesian networks Temporal models		7 Hrs.
<b>Unit -V</b>	<b>Advance Topics:</b> <b>Game Playing, Planning and Expert System</b> minimax algorithm, Optimal decisions in multiplayer games, Alpha-Beta Pruning, move ordering, Evaluation functions, Cutting off search, Forward pruning. Expert system: Definition, Role of knowledge in expert system, Architecture of expert system, Expert system development life cycle.		7 Hrs.
<b>Text Books</b>			
1. Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07- 008770- 5, TMH			
<b>Reference Books</b>			

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig 3rd Edition, Prentice Hall, 2010
2. Introduction to Artificial Intelligence, Dan W Patterson Pearson, 2009
3. Artificial Intelligence and Intelligent Systems by Padhy, Oxford University Press
4. Artificial intelligence, Addison Wesley, Patrick Henry Winston 1992
5. Heuristic Search: Theory and Applications, Stefan Edelkamp, Stefan Schroedl Morgan Kaufman, 2002

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	2					2	2	1				3	1	
CO-2	3		2	2	1	2	1	1				1	3	
CO-3	3	3		2	2	2	2	2				2	2	1
CO-4	3	3	2	3	3		3	1				1	2	1
CO-5	2	3	2	2	3		2	3				2	3	

**\*\*Made changes from the previous one=22%**

## Annexure II

		<b>SAMRAT ASHOK TECHNOLOGICAL INSTITUTE VIDISHA (M.P.)</b> (A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV Bhopal)													
		<b>Scheme of Examination (Semester-V) Bachelor of Technology (B. Tech.) – CSE (BC)</b> <b>for Batch Admitted in session - 2023-24</b>													
Subject Code	Subject Category	Subject Name	Maximum Marks Allotted								Contact Hrs.			Total Credits	
			Theory				Practical				Total Marks	L	T		P
			ES	MS	Assignment	Quiz	ES	LW	Quiz						
BC 501	DC	Artificial Intelligence	60	20	10	10	--	--	--	100	3	0	0	3	
BC 502	DC	Distributed System	60	20	10	10	--	--	--	100	3	0	0	3	
BC 503	DC	Cryptography and Network Security	60	20	10	10	--	--	--	100	3	1	0	4	
BC 504	DE	DE-1	60	20	10	10	--	--	--	100	3	0	0	3	
BC 505	OC	OE-1	60	20	10	10	--	--	--	100	3	0	0	3	
BC 506	DLC	Programming Lab-1*	--	--	--	--	60	20	20	100	0	0	4	2	
BC 507	DLC	Programming Lab-2**	--	--	--	--	60	20	20	100	0	0	4	2	
BC 508	ILC	Internship Evaluation	--	--	--	--	50	--	--	50	0	0	4	2	
	ILC	Extracurricular Activities	It is a one credit per year activity to be endorsed in eight semester mark sheet												
<b>Total</b>			<b>300</b>	<b>100</b>	<b>50</b>	<b>50</b>	<b>170</b>	<b>40</b>	<b>40</b>	<b>750</b>	<b>15</b>	<b>1</b>	<b>12</b>	<b>22</b>	
<b>List of Courses for Honors Degree (MOOCs)</b>														<b>Credits</b>	
<b>List of Courses for Minor Degree (MOOCs)</b>														<b>Credits</b>	

\* Programming Lab-1 : Practical's based on departmental Core subjects.

\*\* Programming Lab-2 : Open source-1

**Total 20 credits required for Honours / Minor degree**

**DE**

<b>Code</b>	<b>BC 504 (A)</b>	<b>BC 504 (B)</b>	<b>BC 504 (C)</b>
<b>DE-1</b>	Web Technology	Introduction to Crypto currency	Software Testing

**OE**

<b>Code</b>	<b>BC 505 (A)</b>	<b>BC 505 (B)</b>	
<b>OE-1</b>	Foundation of Data Science	Cryptography and Network Security	
<b>Prerequisite</b>	Discrete Mathematics	Computer Networks	



**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE VIDISHA (M.P.)**  
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV Bhopal)

**Scheme of Examination (Semester-VI) Bachelor of Technology (B. Tech.) –  
for Batch Admitted in session - 2023-24**

Subject Code	Subject Category	Subject Name	Maximum Marks Allotted								Contact Hrs.			Total Credits	
			Theory				Practical				Total Marks	L	T		P
			ES	MS	Assignment	Quiz	ES	LW	Quiz						
BC 601	DC	Cloud Computing	60	20	10	10	--	--	--	100	3	1	0	4	
BC 602	DC	Introduction to Smart Contract	60	20	10	10	--	--	--	100	3	0	0	3	
BC 603	DE	DE-II	60	20	10	10	--	--	--	100	3	0	0	3	
BC 604	DE	DE-III	60	20	10	10	--	--	--	100	3	0	0	3	
OE 605	OE	OE-II	60	20	10	10	--	--	--	100	3	0	0	3	
BC 606	DLC	Programming Lab-III	--	--	--	--	60	20	20	100	0	0	4	2	
BC 607		Minor Project	--	--	--	--	100	50		150	0	0	8	4	
	ILC	Extracurricular Activities	It is a one credit per year activity to be endorsed in eight semester mark sheet.												
<b>Total</b>			<b>300</b>	<b>100</b>	<b>50</b>	<b>50</b>	<b>160</b>	<b>70</b>	<b>20</b>	<b>750</b>	<b>15</b>	<b>1</b>	<b>12</b>	<b>22</b>	
<b>List of Courses for Honors Degree (MOOCs)</b>														<b>Credits</b>	
<b>List of Courses for Minor Degree (MOOCs)</b>														<b>Credits</b>	

**Additional total 20 credits required for Honors / Minor degree**

Internship-III (120 Hrs) External /Institute Level (Will be Evaluated in VII Semester)
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<b>Code</b>	<b>BC-603 (A)</b>	<b>BC-603 (B)</b>	<b>BC-603 (C)</b>
<b>DE-II</b>	Project Management	Advanced Web Technology	Cyber Security using Block chain

<b>Code</b>	<b>BC-604 (A)</b>	<b>BC-604 (B)</b>	<b>BC-604 (C)</b>
<b>DE-III</b>	Soft Computing	Digital Image Processing	Data Warehouse & Data Mining

<b>Code</b>	<b>OE-605 (A)</b>	<b>OE-605 (B)</b>	<b>OE-605 (C)</b>
<b>OE-II</b>	Machine Learning	Exploratory Data Analysis	Introduction to Smart Contract
<b>Prerequisite</b>	Discrete Mathematics & AI	Data Science	Foundation of Block chain

### Annexure III

		<b>SAMRATASHOKTECHNOLOGICALINSTITUTEVIDISHA(M.P.)</b> <b>(A Govt. Aided UGC Autonomous &amp; NAAC Accredited Institute Affiliated to RGPV Bhopal)</b>												
		<b>Scheme of Examination(Semester-VII)</b>												
		<b>For Batch Admitted in session -2022-23</b>												
		<b>Bachelor of Technology (B.Tech.)– CSE(Block Chain)</b>												
Subject Code	Subject Category	Subject Name	Maximum Marks Allotted							ContactHrs. per week			Total Credits	
			Theory				Practical			Total Marks	L	T		P
			ES	MS	Assignment	Quiz	ES	LW	Quiz					
BC-701	DC	Deep Learning	60	20	10	10	--	--	--	100	3	0	0	03
BC-702	DE-4	DE-4	60	20	10	10	--	--	--	100	3	0	0	03
BC-703	DE-5	DE-5	60	20	10	10	--	--	--	100	3	0	0	03
BC-704	DE-6	DE-6	60	20	10	10	--	--	--	100	3	0	0	03
BC-705	PROJ	Major Project Prelim	--	--	--	--	30	20	--	50	0	0	4	02
BC-706	DLC	Programming Lab IV (Covers the above subjects practical)	--	--	--	--	50	50	--	100	0	0	4	02
BC-707	ILC	Internship-III (Completed in Third Year)	--	--	--	--	--	100	--	100	0	0	4	02
<b>Total</b>			<b>240</b>	<b>80</b>	<b>40</b>	<b>40</b>	<b>80</b>	<b>170</b>	<b>--</b>	<b>650</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>18</b>
BC-708	ILC	Extracurricular Activities			It is a one credit per year activity endorse in eight semester mark sheet									
MST: Minimum two mid semester tests to be conducted during Semester														

<b>DE -4</b>	<b>DE-5</b>	<b>DE-6</b>
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<b>A</b>	Distributed Ledger Technology	Android Programming	Wireless Networks
<b>B</b>	Bio-Informatics	NLP	Data Engineering & Analytics
<b>C</b>	Optimization Technique	Block chain and IOT	Pervasive and Ubiquitous Computing

Abbreviations:ES-EndSemester,MS-MidSemester,LW-LaboratoryWork,Assignment(L:Lecture,T:Tutorial,P:Practical),BFC-BasicScienceCourse,ESC-EngineeringScience Course, HSMC-Humanities Science & Management Course, MAC-Mandatory Audit Course, HEC-Holistic Education Course, ILC-Institute Level Course, DC Department Course, DE-Department Elective, OE-Open Elective, DLC-Departmental Laboratory Course



**SAMRATASHOKTECHNOLOGICALINSTITUTEVIDISHA(M.P.)**  
**(AGovt.AidedUGCAutonomous&NAACAccreditedInstituteAffiliatedtoRGPVBhopal)**

**Scheme of Examination(Semester-VIII)**

**forBatchAdmittedinSession-2022-23**

**Bachelor of Technology (B.Tech.)- CSE(Block Chain)**

Subject Code	Subject Category	Subject Name	Maximum Marks Allotted					ContactHrs. per week			Total Credits	
			Theory			Practical		Total Marks	L	T		P
			ES	MS	Assignment/ Quiz	ES	LW					
BC-801	PROJ	Major Project	--	--	--	250	150	400	0	0	20	10
BC-802	ILC	Extracurricular Activities	It is a one credit per year activity endorsed in eight semester mark sheet			100	--	100	--	--	--	04
<b>Total</b>						<b>350</b>	<b>150</b>	<b>500</b>	0	0	20	<b>14</b>

Abbreviations:ES-EndSemester,MS-MidSemester,LW-LaboratoryWork,Assignment(L:Lectre,T:Tutorial,P:Practical),BFC-BasicScienceCourse,ESC-EngineeringScience Course, HSMC-Humanities Science & Management Course, MAC-Mandatory Audit Course, HEC-Holistic Education Course, ILC-Institute Level Course, DC Department Course, DE-Department Elective, OE-Open Elective, DLC-Departmental Laboratory Course

**Minor Degree and Honors Degree:**

**Students can opt any number of subjects depending on the number of credits he/she wants to earn in a particular semester for Honours/Minor Degree. Total 20credits required for Honours/Minor Degree (From V to VIII Semester – Refer pool of attached subjects for Honours/Minor Degree)**

CSE(BC) Semester: VII Sem	Code BC-701	Subject Deep Learning	L T P C 3 0 0 3
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory, and Data Structures			
<b>Course Objective</b> -The objective of this course is to introduce students to deep learning algorithms and their applications to solve real problems.			
<b>CO1</b>	Describe the feed-forward and deep networks.		
<b>CO2</b>	Design single and multi-layer feed-forward deep networks and tune various hyper parameters.		
<b>CO3</b>	Implement deep neural networks to solve a problem.		
<b>CO4</b>	Analyze the performance of deep networks.		
<b>CO5</b>	Apply Deep learning to typical problems in their field of research.		
<b>Unit-I</b>	History of Deep Learning, Deep Learning Success Stories, review of Neuron model, activation functions, Perceptron Learning, Multilayer Perceptrons (MLPs), Feed forward Neural Networks, Back propagation, weight initialization methods, Batch Normalization, Representation Learning, GPU implementation, Decomposition – PCA and SVD.		6 Hrs.
<b>Unit-II</b>	Deep Feed forward Neural Networks, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, Adam, RMSProp, Auto encoder, Regularization in auto-encoders, Denoising auto-encoders, Sparse auto encoders, Contractive auto-encoders, Variational auto-encoder, Auto-encoders relationship with PCA, Dataset augmentation..		7 Hrs.
<b>Unit-III</b>	Introduction to Convolutional Neural Networks (CNN) and its architectures, CCN terminologies: ReLU activation function, Stride, padding, pooling, convolutions operations, Convolutional kernels, types of layers: Convolutional, pooling, fully connected, Visualizing CNN, CNN examples: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, RCNN, etc. Deep Dream, Deep Art Regularization: Dropout, drop Connect, unit pruning, stochastic pooling, artificial data, injecting noise in input, early stopping, Limit Number of parameters, Weight decay, etc.		8 Hrs.
<b>Unit-IV</b>	Introduction to Deep Recurrent Neural Networks and their architectures, Back propagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Gated Recurrent Units (GRUs), Long Short Term Memory (LSTM), Solving the vanishing gradient problem with LSTMs, Encoding and decoding in RNN network, Attention Mechanism, Attention over images, Hierarchical Attention, Directed Graphical Models.		7 Hrs.
<b>Unit -V</b>	Introduction to Deep Generative Models, Restricted Boltzmann Machines (RBMs), Gibbs Sampling for training RBMs, Deep belief networks, Markov Networks, Markov Chains, Autoregressive Models: NADE, MADE, Pixel RNN, Generative Adversarial Networks (GANs), Applications of Deep		7 Hrs.

	Learning in Object detection, speech/ image recognition, video analysis, NLP.	
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**Text Books**

1. Andreas Muller, &quot; Introduction to Machine Learning with Python: A Guide for Data Scientists”, First edition, O&#39; Reilly Edition, 2016.

**Reference Books**

1. Ian Goodfellow, Yoshua Bengio, and Aaron Courville; Deep Learning, MIT Press, 2017.
2. Chris Bishop; Pattern Recognition and Machine Learning, Springer publication, 2006.
3. Aurelien Geon, “Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems”, First Edition, O’Reilly publication, 2017.
4. Francois Chollet, “Deep Learning with Python,” First Edition, Manning Publications, 2018.

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 1	PO <sub>1</sub> <sub>1</sub>	PO <sub>1</sub> <sub>2</sub>	PSO 1	PSO 2	
CO-1	2	2							1				2	2	2
CO-2	2	2		1									1	1	2
CO-3	2	3		1	2								2	2	3
CO-4	2	3		1	2								2	2	3
CO-5	1	1						2					1	2	

<b>CSE(BC)</b> <b>Semester:</b> <b>VII Sem</b>	<b>Code</b> <b>BC –702(A)</b>	<b>Subject</b> <b>Distributed Ledger Technology</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory and Data Structure			
<b>CO1</b>	1. Understand the cryptographic basis for cryptocurrency.		
<b>CO2</b>	2. Choose a blockchain implementation based on real time scenario.		
<b>CO3</b>	3. Categorize the various types of blockchains.		
<b>CO4</b>	4. Examine the techniques for anonymity preservation.		
<b>CO5</b>	5. Identify and understand the use cases of distributed ledger technology. 6. Evaluate alternative Blockchains and their applicability.		
<b>Unit-I</b>	Introduction to Blockchain, Crypto currencies and Distributed Ledgers: Block chain, Distributed Ledgers - Cryptographic basics for cryptocurrency Hashing, signature schemes, encryption schemes and elliptic curve cryptography - CAP theorem Permissioned Ledger, Tokenized blockchains, Token less blockchains, Side chains.		6 Hrs.
<b>Unit-II</b>	Essentials of Cryptocurrencies :Distributed identity: Digital identification ; Decentralized network - Distributed ledger: Permissioning framework, Blockchain data structure - Double spending; Network consensus -Sybil attacks, Block rewards and miners, Difficulty under competition, Forks and consensus chain, The 51% attack, Confirmations and finality - The limits of proof-of-work - Alternatives to Proof of Work.		7 Hrs.
<b>Unit-III</b>	Blockchain Implementations : Bitcoin: Bitcoin and Merkle Root - Eventual Consistency & Bitcoin - Bitcoin and Secure Hashing - Bitcoin block-size - Bitcoin Mining- Bitcoin Scripting. Blockchain Collaborative Implementations:- ERC 20 and the token explosion.		8 Hrs.
<b>Unit-IV</b>	Pseudo-anonymity vs. anonymity - Succinct non interactive argument for Knowledge ( SNARK) - pairing on Elliptic curves - Zcash - Zk-SNARKS for anonymity preservation. Financial Services: Accounting and audit, Global payments, Programmable money - Citizen Identification, Voting - Healthcare: Electronic health records system - Supply chain management - Trade finance - Tokenization of real assets		7 Hrs.
<b>Unit -V</b>	Distributed Ledger Technology in alternative Blockchains Alternative Blockchains: Kadena, Rootstock, Drivechain, Quorum Transaction manager: Crypto Enclave, Quorum Chain - Network manager. Tezos, Storj, Maid safe, BigChainDB. The impact of distributed ledger technology, limitations of existing distributed ledger platforms, possible enhancements to existing platforms, and possibilities of having new applications, Future use cases of distributed ledger technology		7 Hrs.

<b>Text Books:</b>															
1.Treccani, A., Lipton, A. (2021). Blockchain And Distributed Ledgers: Mathematics, Technology, And Economics - First Edition, Singapore: World Scientific Publishing Company.															
2.Wattenhofer, R. (2019), Blockchain Science: Distributed Ledger Technology - Third Edition, United States: Independently Published.															
<b>Reference Books:</b>															
1.Goldfeder, S., Bonneau, J., Miller, A., Felten, E., Narayanan, A. (2016). Bitcoin and Cryptocurrency Technologies - First Edition, Princeton University Press.															
2.Bashir, I. (2020). Mastering Blockchain: A Deep Dive Into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and More Third Edition, United Kingdom: Packt Publishing.															
	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO-1	2	2							1			2	2	2
	CO-2	2	2		1								1	1	2
	CO-3	2	3		1	2							2	2	3
	CO-4	2	3		1	2							2	2	3
	CO-5	1	1						2				1	2	

<b>CSE(BC)</b> <b>Semester: VII</b>	<b>Code</b> <b>BC – 702(B)</b>	<b>Subject</b> <b>Bio-Informatics</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Prerequisite:</b> Concepts in chemistry, Databases & Information retrieval.			
<b>Course objectives:</b> To provide the knowledge of information storage, management, retrieval and analysis procedures and techniques which are useful and applicable in the field of bio sciences.			
CO1	Understand the fundamental theoretical concepts in pervasive computing		Level 3: Apply
CO2	Conclude the enabling technologies that drive the pervasive and ubiquitous computing		Level 3: Apply
CO3	Analyze and compare the performance of different data dissemination techniques		Level 6: Create
CO4	Formulate the design aspects, that are essential to create the model of pervasive computing		Level 6: Create

CO5	Develop solutions for problems related to pervasive and ubiquitous computing system through investigation	Level 3: Apply
Unit – I	Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA and RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.	6 Hrs.
Unit – II	Bioinformatics Databases and Image Processing: Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.	7 Hrs.
Unit – III	Sequence Alignment and database searching: Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequence Alignment.	8 Hrs.
Unit – IV	Gene Finding and Expression: Cracking the Genome, Biological decoder ring, finding genes through mathematics and learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, Mining the Gene Expression Data.	7 Hrs.
Unit – V	Proteomics and Problem solving in Bioinformatics: Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA and Protein sequences, Strategies and options for similarity search , flowcharts for protein structure prediction	7 Hrs.
Text Books:		
<ol style="list-style-type: none"> <li>1. Gopal and Jones, “BIOINFORMATICS with fundamentals of Genomics and Proteomics”, TMH Pub.</li> <li>2. Rastogi, “Bioinformatics – Concepts, skills and Applications”, CBS Pub.</li> </ol>		
Reference Books:		
<ol style="list-style-type: none"> <li>1. Bergeron, “Bioinformatics computing”, PHI.</li> <li>2. Claverie , “Bioinformatics”, Wiley pub</li> </ol>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	0	0	0	2	0	0	0	0	0
CO2	2	0	3	0	0	3	0	0	0	0	2	0
CO3	0	2	0	3	3	2	0	0	1	0	0	0
CO4	2	0	2	0	0	3	0	0	0	0	3	0
CO5	0	3	3	0	0	2	0	0	0	0	1	3

CSE(BC) Semester:VII Sem	Code BC-702(C)	Subject Optimization Technique	LTP C 3 0 0 3
<b>Prerequisite:</b> Fundamentals of Computing and Programming			
CO1	Understanding the Concept of optimization and classification of optimization problems.		
CO2	Formulation simplex methods variable with upper bounds		
CO3	Study the Queuing Model, poisson and exponential distributions		
CO4	Understand the maximization and minimization of convex functions		
CO5	To study equality constraints, inequality constraints		
Unit - I	INTRODUCTION Concept of optimization – classification of optimization – problems.		8
Unit - II	LINEAR PROGRAMMING: Examples of linear programming problems – formulation simplex methods variable with upper bounds – principle- duality -dual simplex method - sensitivity analysis – revised simplex procedure – solution of the transportation problem – assignment – network minimization – shortest route problem – maximal two problem – L.P. representation of networks.		10
Unit - III	QUEUEING THEORY Queuing Model, poisson and exponential distributions -Queues with combined arrivals and departures- random and series queues.		9
Unit - IV	UNCONSTRAINED OPTIMIZATION: Maximization and minimization of convex functions. Necessary and sufficient conditions for local minima – speed and order of convergence – univariate search – steepest and descent methods- metcher reeves method -conjugate gradient method.		9
Unit - V	CONSTRAINED OPTIMIZATION Necessary and sufficient condition – equality constraints, inequality constraints -kuhu – tucker conditions – gradient projection method – penalty function methods – cutting plane methods of sibel directions.		9
Text Books:			
1. Rao S.S, "Optimization – Theory and applications", Wiley Easter Ltd., 1979.			
Reference Books:			
1. David G.Luerbeggan, "Introduction to Linear and Non Linear Programming", Addison Wesley Publishing Co.1973.			
2. Hadley G. "Nonlinear and – dynamic programming" Addison Wesley Publishing Co. 1964.			
3. Cordan C.C. Beveridge and Robert S. Schedther, "Optimization, Theory and Practice" McGraw Hill Co.1970.			
4. HarndyA.Tahh. "operations Research, An Introduction", Macmillan Publishers Co.NewYork,1982.			
5. Beightferand S. others, "Foundations of Optimization Pill", New Delhi, 1979.			

COs	Programme Outcomes (POs)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3										2	3	1
CO2	3	2	3		1							2	3	1
CO3	2	3		2	1							2	3	1
CO4	2	3	2		1							2	2	1
CO5	2	3	2	2	2							1	3	1

<b>CSE(BC)</b> <b>Semester:</b> <b>VII</b>	<b>Code</b> <b>BC – 703(A)</b>	<b>Subject</b> <b>Android Programming</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory and Data Structure			
CO1	Understand Android architecture and project lifecycle		Level 2: Understand
CO2	Develop responsive user interfaces using Android UI components		Level 6: Create
CO3	Handle data storage with SharedPreferences, SQLite, and Room		Level 2: Understand
CO4	Build apps with services, broadcasts, and background processing		Level 6: Create
CO5	Connect apps to online services and deploy Android applications		Level 6: Create
Unit – I	<b>Introduction to Android &amp; Development Environment:</b> History and evolution of Android OS <b>Android architecture:</b> Linux kernel, Libraries, Android Runtime (ART), Application Framework, Android SDK and Android Studio installation, Creating and running a simple app, Project structure (manifest, Gradle, src, res), Activity lifecycle, Intents, and event handling, Permissions and app components (Activities, Services, Broadcast Receivers, Content Providers)		8 Hrs.
Unit – II	<b>User Interface Design &amp; Layouts:</b> Views and ViewGroups: TextView, EditText, Button, ImageView, RecyclerView. <b>Layouts:</b> LinearLayout, RelativeLayout, ConstraintLayout, FrameLayout, Handling user input and UI events. <b>Menus:</b> Options Menu, Context Menu, Popup Menu, Dialogs and Toast messages, Styles and Themes, Accessibility and Localization.		8 Hrs.
Unit – III	<b>Data Storage and Persistence:</b> SharedPreferences, Internal and External Storage. <b>SQLite Database:</b> Creating, updating, querying, Room Persistence Library (with LiveData and ViewModel), JSON parsing and file operations, Content Providers.		8 Hrs.
Unit – IV	<b>Advanced Components &amp; Background Tasks:</b> Fragments and Fragment lifecycle, Navigation components and Jetpack architecture. <b>Notifications:</b> Standard and custom. <b>Services:</b> StartedService and IntentService, Broadcast Receivers, AsyncTask, Handlers, and WorkManager, Sensors and multimedia APIs (Camera, Audio).		8 Hrs.

Unit - V	<b>Connectivity, Publishing &amp; Modern Features:</b> Networking with Retrofit/Volley, RESTful API integration and JSON handling. <b>Firebase Integration:</b> Realtime Database, Authentication, Cloud Messaging, App signing, versioning, and publishing to Google Play Store, Jetpack Compose (intro only), Best practices for performance and security, Testing and debugging tools (Logcat, Profiler, Unit/UI Testing)	8 Hrs.
<b>List of Experiments</b> <ol style="list-style-type: none"> <li>1. Setting up Android Studio, Creating First App (Hello Android)</li> <li>2. Designing UI using Layouts (Linear, Relative, Constraint)</li> <li>3. Event handling using Buttons, EditText, and Listeners</li> <li>4. Activity Lifecycle and Intent Navigation</li> <li>5. Implementing RecyclerView with Adapter</li> <li>6. Using SharedPreferences and Internal Storage</li> <li>7. SQLite database CRUD operations</li> <li>8. Room Persistence Library integration</li> <li>9. Fragment lifecycle and communication</li> <li>10. Notifications and background services</li> <li>11. Using Retrofit to fetch API data</li> <li>12. Firebase integration – Realtime DB or Authentication</li> <li>13. Testing and debugging with Logcat and Profiler</li> <li>14. App packaging, signing, and publishing (demo)</li> </ol>		
<b>Text Books</b> <ul style="list-style-type: none"> <li>• “Android Programming: The Big Nerd Ranch Guide” by Bill Phillips, Chris Stewart, and Kristin Marsicano – A hands-on guide for modern Android development.</li> <li>• “Professional Android” by Reto Meier and Ian Lake – Covers advanced topics and industry-level practices.</li> </ul>		
<b>Reference Books</b> <ul style="list-style-type: none"> <li>• “Android Development with Kotlin” by Marcin Moskala and Igor Wojda – Great for those using Kotlin for Android.</li> <li>• “Head First Android Development” by Dawn Griffiths and David Griffiths – A beginner-friendly, visual guide.</li> <li>• “Kotlin Programming: The Big Nerd Ranch Guide” – Useful for understanding Kotlin's integration with Android.</li> <li>• Official Android Developer Documentation – <a href="https://developer.android.com">https://developer.android.com</a> – Most up-to-date and authoritative resource.</li> </ul>		

**CO/POMapping**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	3										2	3	1
<b>CO2</b>	3	2	3		1							2	3	1
<b>CO3</b>	2	3		2	1							2	3	1
<b>CO4</b>	2	3	2		1							2	2	1
<b>CO5</b>	2	3	2	2	2							1	3	1

<b>CSE(BC0 Semester: VII</b>	<b>Code BC – 703(B)</b>	<b>Subject NLP</b>	<b>L T P C 3 0 0 3</b>
Prerequisite: A solid foundation in mathematics, programming (especially Python), and basic machine learning concepts is essential			
CO1	Define approaches to syntax and semantics in NLP.		Level 3: Apply
CO2	Realize approaches to discourse, generation, dialogue, and summarization within NLP.		Level 3: Apply
CO3	Illustrate current methods for statistical approaches to machine translation.		Level 6: Create
CO4	Realize machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, and clustering.		Level 6: Create
CO5	Use unsupervised methods, log-linear and discriminative models, and the EM Algorithm as applied within NLP.		Level 3: Apply
Unit - I	INTRODUCTION -Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications -The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.		7 Hrs.
Unit - II	MORPHOLOGY AND PART OF SPEECH TAGGING-Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models –Transformation-based Models - Maximum Entropy Models. Conditional Random Fields		9 Hrs.
Unit - III	SYNTAX PARSING- Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars -Features and Unification -Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs.		8 Hrs.
Unit - IV	SEMANTIC ANALYSIS-Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation -Supervised – Dictionary-based and Unsupervised Approaches - Compositional semantics Semantic Role Labeling and Semantic Parsing – Discourse Analysis.		7 Hrs
Unit - V	APPLICATIONS-Named entity recognition and relation extraction- IE using sequence labeling- Machine Translation(MT) - Basic issues in Statistical translation- word alignment- phrase-based translation.		7 Hrs
Text Books			
1. Daniel Jurafsky and James H. Martin, Speech and Language Processing (2nd Edition), Prentice Hall;			

**Reference Books**

1 edition, 2008. Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schuetze, MIT Press, 1999

2. Steven Bird, Ewan Klein, and Edward Loper. Natural Language Processing with Python, O'Reilly Media; 1 edition, 2009

<b>CO \ PO Mapping</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	3										2	3	1
<b>CO2</b>	3	2	3		1							2	3	1
<b>CO3</b>	2	3		2	1							2	3	1
<b>CO4</b>	2	3	2		1							2	2	1
<b>CO5</b>	2	3	2	2	2							1	3	1

<b>CSE(BC)</b> <b>Semester:</b> <b>VII</b>	<b>Code</b> <b>BC – 703(C)</b>	<b>Subject</b> <b>Block chain and IoT</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory and Data Structure			
CO1	Demonstrate the working of IoT and Blockchain		Level 3: Apply
CO2	Identify Consensus mechanism for Blockchain Application		Level 3: Apply
CO3	Discover the security challenges in IoT		Level 6: Create
CO4	Analyze the need of BaaS for Organizations		Level 6: Create
CO5	Apply the Blockchain usecases for IoT sector		Level 3: Apply
Unit – I	INTRODUCTION TO IoT & BLOCKCHAIN: Introduction to Internet of Things (IoT)- Concepts and definitions of IoT-History of IoT –IoT vs Conventional Network-IoT Architecture- Introduction to Blockchain-Generations of Blockchain- Structure of Blockchain- Opportunities and challenges in IoT and Blockchain.		6 Hrs.
Unit – II	CONSENSUS ALGORITHMS : Building Blocks of Block chain-Database-Block-Hash-Minor-Transaction-Smart Contracts-Consensus Mechanisms-PoW-PoS-Characteristics of Block chain-Types of Block chain- Permissioned Block chain Permissionless Block chain-Consortium Block chain.		7 Hrs.
Unit – III	IOT SECURITY : IoT Layer Challenges – Sensing layer– Challenges in end nodes –Threat based on Network layer Service layer based threats-Application Interface layer –Cross layer Challenges-Challenge to implementation of IoT in Blockchain-IoT Device Integration challenges.		8 Hrs.
Unit – IV	BLOCKCHAIN AS A SERVICE (BAAS): Defining of Blockchain as a Service - IoT Cloud server security challenges– Cloud computing with BaaS-Hybrid Cloud server with BaaS for Remote Monitoring-Case study: Industries adopting BaaS for security.		7 Hrs.
Unit – V	BLOCKCHAIN USECASES IN IOT SECTOR: Autonomous Decentralized peer to peer telemetry-Blockchain Enabled Security for Smart cities-Blockchain Enabled Smart Home Architecture-Blockchain based self-managed VANETs-Security and privacy of data.		7 Hrs.
Text Books			

1. Brojo Kishore Mishra , Sanjay Kumar Kuanar “Handbook of IoT and Blockchain: Methods, Solutions, and Recent Advancements (Internet of Everything (IoE)) “, CRC Press; 1st edition , November 2020.
2. Shiho Kim ,Ganesh, Chandra Deka, Peng Zhang, ”Role of Blockchain Technology in IoT Applications”, Volume 115 in the Advances in Computers series ,first edition ,Academic Press 2019
3. Harshita Patel , Ghanshyam Singh Thakur,”Blockchain Applications in IoT Security” 1st Edition by IGI Global; 1st edition 2020
4. David Etter,” IoT Security: Practical Guide Book”, CreateSpace Independent Publishing Platform, 2016.

**Reference Books:**

John Soldatos, ” Building Blocks for IoT Analytics”, River Publishers,2016

**E BOOKS:**

1. [https://www.researchgate.net/publication/337649428\\_Handbook\\_of\\_IoT\\_and\\_Blockchain\\_Methods\\_Solutions\\_and\\_Recent\\_Advancements](https://www.researchgate.net/publication/337649428_Handbook_of_IoT_and_Blockchain_Methods_Solutions_and_Recent_Advancements).

COs	Programme Outcomes (POs)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3			1								2	1
CO2	3	3			1					2			2	
CO3	3	3	3			1							2	
CO4	3	3			1								2	
CO5	3	3	3		3							3	2	

CSE(BC) Semester: VII	Code BC – 704(A)	Subject Wireless Network	L T P C 3 0 0 3
Prerequisite: Basics of Network networking.			
CO1	Identify the basic concept of wireless networks.		Level 3: Apply
CO2	Analyze traffic theories, mobile radio propagation, channel coding, and cellular concepts.		Level 3: Apply
CO3	Compare and contrast multiple division techniques and mobile Communications systems.		Level 6: Create
CO4	Apply wireless ID technologies, in particular RFID work.		Level 6: Create
CO5	Explain and differentiate between technologies like 2.5G and 3G.		Level 3: Apply
Unit - I	<b>Introduction of Wireless Networks:</b> Different Generations of Wireless Networks. Characteristics of the Wireless Medium: Radio Propagation Mechanisms, Path Loss Modeling and Signal Coverage, Effect of Multipath and Doppler, Channel Measurement and Modeling Techniques.		6 Hrs.
Unit - II	<b>Network Planning:</b> Introduction, Wireless Network Topologies, Cellular Topology, Cell Fundamentals Signal to Interferences Radio Calculations, Network Planning for CDMA Systems. <b>Wireless Network Operations:</b> Mobility Management, Radio Resources and Power Management.		7 Hrs.
Unit - III	<b>Multiple Division Techniques:</b> FDMA, TDMA, CDMA, OFDM, SDMA. Comparison of Multiple Division Techniques, Modulation Techniques – AM, FM, FSK, PSK, QPSK, QAM, 16QAM <b>Mobile Data Networks:</b> Introduction, Data Oriented CDPD Network, GPRS, EDGE and High Data Rates, SMS in GSM, Mobile Application Protocols.		8 Hrs.
Unit - IV	<b>Introduction to Wireless LAN:</b> Evolution of WLAN, Wireless Home Networking, Technologies for Home Area Network (HAN), Overview of IEEE 802.11, Reference Architecture, PHY and MAC Layer, Wireless ATM, HIPERLAN.		7 Hrs.
Unit - V	<b>Standards: IEEE 802.15 WPAN, HomeRF, Bluetooth, Interference between Bluetooth and 802.11, Adhoc Networks, Introduction to 2.5 G and 3 G Networks.</b>		7 Hrs.
Text Books			

1. Kaveh Pahlavan, Prashant Krishnamurthy, “principles of Wireless Networks”, PHI.
2. Qing- An Zeng, Dharma Prakash Agrawal, “Introduction to Wireless and Mobile Systems”, CENGAGE Learning.

#### Reference Books

1. Sumit Kasera, Nishit Narang, A P Priyanka, “2.5 G Mobile Networks: GPRS and EDGE”, TMH
2. Dr. Kamilo Feher, “Wireless Digital Communications”, PHI. Jochen Schiller, “Mobile Communications”, PEARSON.

#### Sites to be added

COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	1				2		1					2	1
CO-2	3	3		2	3		3				1		2	
CO-3	3	2	2									3		3
CO-4	2		1	2	1		2				2		2	1
CO-5	2	3											2	

<b>CSE(BC)</b> <b>Semester:</b> <b>VII</b>	<b>Code</b> <b>BC – 704(B)</b>	<b>Subject</b> <b>Data Engineering &amp; Analytics</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Prerequisite:</b> Discrete mathematics, Basic probability theory and Data Structure			
CO1	Understand big data analytics as the next wave for businesses looking for competitive advantage		Level 2: Understand
CO2	Access and Process Data on Distributed File System		Level 3: Apply
CO3	Explore tools and practices for working with big data.		Level 3: Apply
CO4	Develop Big Data Solutions using Hadoop Eco System.		Level 3: Apply
CO5	Apply Machine Learning Techniques using R.		Level 4: Analyze
Unit - I	Introduction to Big Data And Hadoop: Dawn of the Big Data Era, Definition and Features of Big Data, Big Data Value, The Development of Big Data, Challenges of Big Data, Big Data Analytics, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.		6 Hrs.
Unit - II	HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.		7 Hrs.
Unit - III	Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.		8 Hrs.

Unit - IV	Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction	7 Hrs.
Unit - V	Data Analytics with R: Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.	7 Hrs.

**Text Books:**

1. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

**Reference Books:**

2. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
3. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
4. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R
5. Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
6. Anand Rajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press,2012.
7. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with AdvancedAnalytics”, John Wiley & sons, 2012.

COs	Programme Outcomes (POs)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		2	2										
CO2	1		2	2	1								2	2
CO3	2	2	2	2	2								2	2
CO4		1	2	2	1								2	2
CO5	2	2	2	2	1						1		2	2

CSE(BC) Semester: VII	Code BC – 704(C)	Subject Pervasive and Ubiquitous Computing	L T P C 3 0 0 3
Prerequisite: <b>Operating System</b>			
CO1	Understand the fundamental theoretical concepts in pervasive computing		Level 3: Apply
CO2	Conclude the enabling technologies that drive the pervasive and ubiquitous computing		Level 3: Apply
CO3	Analyze and compare the performance of different data dissemination techniques		Level 6: Create
CO4	Formulate the design aspects, that are essential to create the model of pervasive computing		Level 6: Create
CO5	Develop solutions for problems related to pervasive and ubiquitous computing systems through investigation		Level 3: Apply
Unit – I	<b>Introduction:</b> Pervasive Computing: Principles-Characteristics-interaction transparency-context aware-automated experience capture - Vision and challenges of pervasive computing - Pervasive computing infrastructure - Architecture for pervasive computing-Pervasive devices-embedded controls-smart sensors and actuators-Context communication and access services.		6 Hrs.
Unit – II	<b>Technologies:</b> Device Technology for Pervasive Computing: Hardware - Human-machine interfaces - Biometrics - Operating Systems-Java for pervasive devices-Voice Technology: Basics of Speech Recognition-Voice standards-Speech Applications - Speech and Pervasive Computing - Security - Personal Digital Assistants.		7 Hrs.
Unit – III	<b>Sensor Networks and RFID:</b> Introduction to Sensor networks: Sensor Node Architecture - Sensor Network Architecture - Types of sensor networks - Platforms for Wireless sensor networks - Applications of Wireless Sensor networks - Introduction to RFID -transponder and reader architecture -Types of tags and readers -Frequencies of operation – Application of RFID Technologies.		8 Hrs.
Unit – IV	<b>Introduction to Ubiquitous Computing:</b> An introduction - overview - challenges to research topics in ubiquitous computing including sensors - ambient displays - tangibles - middleware - mobility - allocation and context awareness - Architecture for ubiquitous computing: new devices and communications - software architectures - Wireless standards & protocols for ubiquitous networks-Near field communication(NFC)-Bluetooth classic-Bluetooth Low Energy(BLE)-WiFi Direct.		7 Hrs.

Unit – V	<b>Ubiquitous Computing Applications</b> : Ubiquitous applications: the appropriate design - Weiser's vision of ubiquitous computing - mixed reality and sensible design- Wearable computing- Glass and Augmented Reality- Eye-Tracking- Digital Pen and Paper Mobile social networking & crowd sensing Event based social network.	7 Hrs.
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**Text Books:**

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec, Klaus Rindtorff, “Pervasive Computing: Technology and Architecture of Mobile Internet Applications”, Sixth Edition, Pearson Education, New Delhi, 2009.
2. Seng Loke, “Context-Aware Computing Pervasive Systems”, Auerbach Pub., Taylor and Francis Group, New York, 2007.
3. John Krumm, “Ubiquitous Computing Fundamentals”, CRC Press, 2010.

**Reference Books:**

1. Genco, S. Sorce, “Pervasive Systems and Ubiquitous Computing”, WIT Press, 2012.
2. Guruduth S. Banavar, Norman H. Cohen, Chandra Narayanaswami, “Pervasive Computing: An Application- Based Approach”, Wiley Interscience, 2012.
3. Frank Adelstein, SKS Gupta, GGRichard, L Schwiebert, “Fundamentals of Mobile and Pervasive Computing”, Tata McGraw Hill, New Delhi, 2005.
4. Stefen Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions”, Second Edition, Wiley, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	0	0	0	2	0	0	0	0	0
CO2	2	0	3	0	0	3	0	0	0	0	2	0
CO3	0	2	0	3	3	2	0	0	1	0	0	0
CO4	2	0	2	0	0	3	0	0	0	0	3	0
CO5	0	3	3	0	0	2	0	0	0	0	1	3

<b>CSE(BC)</b> <b>Semester: VII</b>	<b>Code</b> <b>BC – 705 Major Project Prelim</b>	<b>Subject</b>	<b>L T P C</b> <b>3 0 0 3</b>
CO1	To apply engineering management principles and effectively communicate about well-defined engineering activities.		Level 3: Apply
CO2	To apply the knowledge/ skills/ modern engineering tools learnt in previous semesters, to solve real life industrial / engineering / professional problems.		Level 3: Apply
CO3	To modify/ improve the existing engineering / professional systems by applying appropriate and modern technology/ tools		Level 4: Analyze
CO4	To develop systems / components / methods / processes / resources to cater to the needs of the nearby small scale / medium industry/ startup		Level 6: Create
CO5	To analyze innovation in proposed solution for prevailing engineering / professional issues / problems / concerns		Level 6: Evaluate
<p>This course aims to provide more weightage to project work in a team.</p> <p>The object of this major project work &amp; its dissertation is to enable the student to extend further the investigative study taken up during minor project, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a supervisor from the department. This is expected to provide good training for the students in R&amp;D work and technical leadership.</p> <p>Participation in any technical event/ competition to fabricate and demonstrate an innovative machine or product or prototype could be encouraged under this course.</p> <p>The assignment to normally include:</p> <ol style="list-style-type: none"> <li>3. In depth study of the topic assigned in the light of the report prepared under minor project.</li> <li>4. Review and finalization of the approach to the problem relating to the assigned topic.</li> <li>5. Preparing an action plan for conducting the investigation, including teamwork.</li> <li>6. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed.</li> <li>7. Final development of product/process, testing, results, conclusions and future directions.</li> <li>2. Preparing a paper for Conference presentation/Publication in Journals, if possible.</li> <li>3. Preparing a Dissertation in the standard format for being evaluated by the Department.</li> <li>4. Final seminar presentation before a departmental committee.</li> </ol>			

<p>Report format and writing style</p>	<p>The following should be the order of contents for the report/ dissertation and should be strictly maintained-</p> <ol style="list-style-type: none"> <li>I. Cover Page</li> <li>II. Candidate’s Declaration</li> <li>III. Institute Certificate</li> <li>IV. Acknowledgement</li> <li>V. Abstract</li> <li>VI. Notation, Naming Convention and Abbreviations</li> <li>VII. Table of Contents</li> <li>VIII. List of Figures</li> <li>IX. List of Tables</li> <li>X. Chapters: include but not limited to introduction, motivation, objectives, activity schedule chart, role of each group member, literature work, identified research gaps, research statements, problem statement, proposed methodology, technology used, algorithms, use case/ class diagram/ block diagram/ etc., result snapshots, pseudo code, innovation, feedback from stockholders, etc.</li> <li>XI. Conclusion and Future Work</li> <li>XII. Report on suggestions provided by Mentor and Its Incorporation</li> <li>XIII. Your Publications: Proof of published Research Papers/ Patent/ Book Chapters/ Technical Articles/ Posters/ Project Exhibition/ Technical Competitions/ Internship Certificate etc.</li> <li>XIV. References: Follow standard format to write the references including IEEE, APA, MLA, Chicago, etc.</li> </ol> <p><b>General Instructions for writing reports-</b></p> <p>The report should be written in Times New Roman font style, justify text alignment, 1.5 line spacing and black font color with A4 size page margin 2.5, 1.5, 15. 1.5 (Left, Right, Top, Bottom).</p> <ul style="list-style-type: none"> <li>• Chapter heading with 16 pts font size, all caps, bold.</li> <li>• Main Heading with 16 pts font size, bold.</li> <li>• Sub Heading with 14 pts font size, bold.</li> <li>• Second Sub Heading with 12 pts font size, bold, Italic.</li> <li>• Paragraphs should be written with 12 pts. font style, normal text.</li> </ul>	
<p>Evaluation Phases</p>	<p>Evaluation is based on the work done, quality of report, performance in viva-voce, presentation etc.</p> <p>The major project will have two mid semester presentations and one end semester presentation that will be monitored by the Project Evaluation Committee.</p>	

Project Evaluation Committee	A project evaluation committee is constituted that includes Head of the Department, Project Coordinator, Mentor, & External Expert to evaluate the project based on evaluation matrix.	
Distribution of Marks	Term Work/ Lab Work/ Sessional evaluation of 50 marks will be carried out in 40%and 60% ratio by the mentor and project evaluation committee-I. Mentor analyzed the project and awarded the marks during Mid Sem-I and Mid Sem-II. Project evaluation committee-I will assess the project during end-semester examination. Project evaluation committee-II will assess the project during schedule of practical viva examination for 100 marks.	
Rubrics and Points for Project Evaluation	<p><b>Mid Sem. I Evaluation (10 Marks)</b></p> <ul style="list-style-type: none"> <li>• Analysis of Clarity &amp;Significance ofProblemStatement (PS) and Identification of Gap</li> <li>• Analysis of Requirement Engineering</li> <li>• Analysis of SelectedTechnological Stack, Project Cost, Time, Resource Management, etc.</li> <li>• Analysis of Project Feasibilities and ApplicationImpact on Society</li> <li>• Analysis of Planning, Designing&amp; Risk Management</li> </ul> <p><b>Mid Sem. II Evaluation (10 Marks)</b></p> <ul style="list-style-type: none"> <li>• Analysis on Incorporation of Suggestions</li> <li>• Analysis of Use case/ Block Diagram/ etc. of Proposed Model</li> <li>• Analysis of Innovation and Creativity inSolution</li> <li>• Analysis of Coding, Security Issues&amp; Other Concerns</li> <li>• Analysis of Content’s Quality in Synopsis</li> </ul> <p><b>Internal Evaluation (30 Marks)</b></p> <ul style="list-style-type: none"> <li>• Analysis of Implementation Level</li> <li>• Analysis of Deployment Status</li> <li>• Analysis of Demonstration &amp; Presentation</li> <li>• Analysis of Uniqueness and Innovation</li> <li>• Analysis of Publication Status</li> </ul> <p><b>External Evaluation (100 Marks)</b></p> <ul style="list-style-type: none"> <li>• Analysis of Comparation with ExistingSolutions and Benchmarks</li> <li>• Analysis of Maintenance of Implemented Solution</li> <li>• Analysis of Project Report Work</li> <li>• Clear division of work, use of collaboration tools</li> <li>• Other Pointsby Director/ Dean/HoD/ Coordinator/ Mentor</li> </ul>	

Reference Books	<ul style="list-style-type: none"> <li>• S. M. LaValle, “Planning algorithms”, Cambridge University Press, 2006.</li> <li>• Project Management – David I Cleland – Mcgraw Hill International Edition.</li> <li>• Project Management – Gopalkrishnan – Mcmillan India Ltd.</li> </ul>
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<b>CO-PO Mapping</b>												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	1	1	1	2	2	1	2
CO2	2	3	3	2	2	1	1	1	2	1	1	2
CO3	2	2	3	2	3	1	1	1	3	2	1	2
CO4	3	3	3	3	2	1	1	1	2	2	1	3
CO5	1	1	1	1	1	1	1	2	3	3	1	2

CSE(BC) Semester: VII	Code            Subject BC – 706 Internship-III (Completed in Third Year)	L T P C 3 0 0 3
CO1	Design, implement, and evaluate computing systems or components in realistic constraints.	Level 3: Apply
CO2	Communicate effectively and work collaboratively in a professional environment.	Level 2: Understand
CO3	Exhibit professional ethics and understand the societal impact of technology.	Level 4: Analyze
CO4	Develop adaptability, problem-solving skills, and lifelong learning mindset.	Level 6: Create
CO5	Reflect on the internship experience for personal and professional development.	Level 3: Analyze
<p>This course aims to bridge the gap between academic learning and industry practices by providing students with real-world exposure to professional work environments. It enables students to apply their theoretical knowledge of computer science and engineering to practical tasks, develop technical and soft skills, and understand organizational culture and expectations.</p>		
<b>Objectives</b>	<p><b>Practical Application:</b>To provide hands-on experience in solving real-world engineering problems using the concepts learned in the classroom.</p> <p><b>Industry Exposure:</b>To expose students to the structure, functioning, and workflow of IT and software development organizations.</p> <p><b>Skill Development:</b>To enhance students' technical, analytical, communication, and teamwork skills in a professional context.</p> <p><b>Professionalism:</b>To inculcate ethical practices, time management, and responsibility in a workplace environment.</p> <p><b>Career Readiness:</b>To prepare students for future employment or entrepreneurial ventures by equipping them with industry-relevant experience.</p> <p><b>Problem Solving and Innovation:</b>To encourage critical thinking and innovative problem-solving approaches in technology projects.</p>	

<p><b>Evaluation Process</b></p>	<p>The internship of the students completed in third year will be evaluated in the following two stages:</p> <ul style="list-style-type: none"> <li>• Industry Evaluation about Students</li> <li>• Evaluation through seminar presentation/viva-voce at the Institute</li> </ul> <p><b>Industry Evaluation about Students</b></p> <p>The industry will evaluate the students during internship period and put the remark on certificate. An evaluation will be carried out based on this remark or other important points mentioned by industry.</p> <p><b>Evaluation through seminar presentation/viva-voce at the Institute</b></p> <p>The student will give a seminar based on his training report, before an expert committee constituted by the department. The evaluation will be based on the following criteria:</p> <ol style="list-style-type: none"> <li>a. Impact/ Level of company</li> <li>b. Type of Internship(paid, unpaid, with stipend, etc.)</li> <li>c. Quality of content presented</li> <li>d. Effectiveness of presentation&amp; solution</li> <li>e. Proper planning &amp; designing solutions</li> <li>f. Depth of knowledge and communication skills</li> <li>g. Project management and role of team members</li> <li>h. Tool used during internship</li> <li>i. Attendance records, daily diary, departmental reports shall also be analyzed along with the Internship Report.</li> </ol> <p>Seminar presentations will enable sharing knowledge &amp; experience amongst students &amp; teachers and build communication skills and confidence in students.</p>	
<p><b>Record to be submit</b></p>	<p>Students need to submit the copy of-</p> <ol style="list-style-type: none"> <li>j. Internship Certificate</li> <li>k. Internship Report</li> <li>l. Internship Presentation</li> </ol>	
<p><b>Report/ Presentation Guidelines</b></p>	<p>Few suggested points for PPT Presentation but not limited to-</p> <ul style="list-style-type: none"> <li>• Title of Internship Work</li> <li>• Objective of the Internship</li> <li>• Details of Internship company/organization/institution</li> <li>• Introduction of the Area of Work</li> <li>• Work done during Internship</li> <li>• Learning Outputs</li> <li>• Conclusion</li> <li>• Future Scope</li> <li>• Internship Completion Certificate/ Proof</li> </ul>	

<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• "The Internship Bible" – Mark Oldman &amp; Samer Hamadeh</li> <li>• "Technical Communication: Principles and Practice" – Meenakshi Raman &amp; Sangeeta Sharma</li> </ul>
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<b>CO-PO Mapping</b>												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3						2	1
CO2									3	3	2	
CO3						2	1	3				
CO4	1	2	2	2	2				2	2	2	3
CO5	1								2		2	3

<b>CSE(BC)</b> <b>Semester:</b> <b>VIII</b>	<b>Code</b> <b>BC –801</b>	<b>Subject</b> <b>Major Project</b>	<b>L T P C</b> <b>0 0 20 10</b>
CO1	Analyze the identified real-world computing problem with clear objectives and scope.		Level 4: Analyze
CO2	Apply appropriate algorithms, programming practices, and engineering principles to design a solution.		Level 3: Apply
CO3	Implement and deploy a functional software/hardware prototype using relevant tools, platforms, and technologies.		Level 6: Create
CO4	Analyze results with metrics (e.g., performance, efficiency, usability) and validate the solution.		Level 5: Evaluate
CO5	Consider ethical, societal, and environmental implications of the computing solution.		Level 5: Evaluate
<p>This course aims to provide full weightage to project work in a team.</p> <p>The object of the final major project work &amp; its dissertation is to enable the student to deploy project, analyze performance, security issues, ethical concerns etc. of the investigative study taken up during major project prelim during VII semester of the BTech course, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a supervisor from the department. This is expected to provide good training for the students in R&amp;D work and technical leadership.</p> <p>Participation and publication of research papers, book chapters, patent, startup, etc. to fabricate and demonstrate an innovative machine or product or prototype could be encouraged under this course.</p> <p>The assignment to normally include:</p> <ol style="list-style-type: none"> <li>1. In depth, result analysis of the project work conducted under major project prelim work.</li> <li>2. Students are required to weekly report their project work to their respective mentors.</li> <li>3. Deploy the implemented project work and make it available to society for further use.</li> <li>4. Review ethical concern and sustainability issues and resolve it relating to the assigned topic.</li> <li>5. Complete the testing of the deployed project work.</li> <li>6. Present your work in Journal, conferences, books, patent publications, etc.</li> <li>7. Prepare a project report in the standard format for being evaluated by the Department.</li> <li>8. Final seminar presentation before a departmental committee.</li> </ol>			

<p>Report format and writing style</p>	<p>The following should be the order of contents for the report/ dissertation and should be strictly maintained-</p> <ol style="list-style-type: none"> <li>I. Cover Page</li> <li>II. Candidate's Declaration</li> <li>III. Institute Certificate</li> <li>IV. Acknowledgement</li> <li>V. Abstract</li> <li>VI. Notation, Naming Convention and Abbreviations</li> <li>VII. Table of Contents</li> <li>VIII. List of Figures</li> <li>IX. List of Tables</li> <li>X. Chapters: include but not limited to introduction, motivation, objectives, activity schedule chart, role of each group member, literature work, identified research gaps, research statements, problem statement, proposed methodology, technology used, algorithms, use case/ class diagram/ block diagram/ etc., result snapshots, pseudo code, innovation, feedback from stockholders, etc.</li> <li>XI. Conclusion and Future Work</li> <li>XII. Report on suggestions provided by Mentor and Its Incorporation</li> <li>XIII. Your Publications: Proof of published Research Papers/ Patent/ Book Chapters/ Technical Articles/ Posters/ Project Exhibition/ Technical Competitions/ Internship Certificate etc.</li> <li>XIV. References: Follow standard format to write the references including IEEE, APA, MLA, Chicago, etc.</li> </ol> <p><b>General Instructions for writing reports-</b></p> <p>The report should be written in Times New Roman font style, justify text alignment, 1.5 line spacing and black font color with A4 size page margin 2.5, 1.5, 15. 1.5 (Left, Right, Top, Bottom).</p> <ul style="list-style-type: none"> <li>● Chapter heading with 16 pts font size, all caps, bold.</li> <li>● Main Heading with 16 pts font size, bold.</li> <li>● Sub Heading with 14 pts font size, bold.</li> <li>● Second Sub Heading with 12 pts font size, bold, Italic.</li> <li>● Paragraphs should be written with 12 pts. font style, normal text.</li> </ul>	
<p>Evaluation Phases</p>	<p>Evaluation is based on the work done, quality of report, performance in viva-voce, presentation etc.</p> <p>The major project will have two internal presentations and two end semester presentations that will be monitored by the Project Evaluation Committee.</p>	

Project Evaluation Committee	A project evaluation committee is constituted that includes Head of the Department, Project Coordinator, Mentor, & External Expert to evaluate the project based on evaluation matrix.	
Distribution of Marks	Term Work/ Lab Work/ Sessional evaluation of 150 marks will be carried out in 40% and 60% ratio by the mentor and project evaluation committee-I. Mentor analyzed the project and awarded the marks during two internal evaluations. Project evaluation committee-I will assess the project during end-semester examination. Project evaluation committee-II will assess the project during schedule of practical viva examination for 400 marks.	
Rubrics and Points for Project Evaluation	<p><b>Evaluation I (30 Marks)</b></p> <ul style="list-style-type: none"> <li>● Analysis of Complexity of the Algorithms</li> <li>● Analysis of Security Issues and its Solutions</li> <li>● Analysis of Testing Practices Adopted</li> <li>● Analysis of Quality of Implementation (Coding Standards, Pilgrims, Desired Output, etc.)</li> <li>● Analysis of Deployment Complexity</li> </ul> <p><b>Evaluation II (30 Marks)</b></p> <ul style="list-style-type: none"> <li>● Analysis on Incorporation of Suggestions</li> <li>● Analysis of Visualization of Results</li> <li>● Analysis of Technical Comparison with baseline/previous systems</li> <li>● Analysis of Clarity of Result Presented</li> <li>● Analysis of Efficiency and Optimization</li> </ul> <p><b>Internal Evaluation (90 Marks)</b></p> <ul style="list-style-type: none"> <li>● Analysis of Technical Novelty in Work</li> <li>● Analysis of Ethical Implications &amp; Real-world Challenges</li> <li>● Analysis of Sustainability of Project</li> <li>● Analysis of Demonstration &amp; Presentation</li> <li>● Analysis of Project Report (research statements, proper citations, quality of references etc.)</li> </ul> <p><b>External Evaluation (400 Marks)</b></p> <ul style="list-style-type: none"> <li>● Analysis of Interpretation and discussion of results</li> <li>● Analysis of Standard, Policies, Benchmark, etc.</li> <li>● Analysis of Data Privacy, Ethical AI Use, Cybersecurity, etc.</li> <li>● Analysis of Publication Quality</li> <li>● Other Points by Director/ Dean/ HoD/ Coordinator/ Mentor</li> </ul>	

Reference Books	<ul style="list-style-type: none"> <li>● S. M. LaValle, “Planning algorithms”, Cambridge University Press, 2006.</li> <li>● Project Management – David I Cleland – Mcgraw Hill International Edition.</li> <li>● Project Management – Gopalkrishnan – Mcmillan India Ltd.</li> </ul>
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**CO-PO Mapping**

	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO 1	3	3		2	2	2	2	2		2		1
CO 2	2	3	2	2	1	1				1	2	
CO 3	3	1	3	2	3	2			2	1	2	1
CO 4	3		1	3	3	1			1		1	
CO 5	2	1	1	2		2	2	3	1		2	3

## Annexure –V

MOOC Courses List - CSE (BC) for Honors/Minor Degree (July – Dec 2025)

### MOOC Course List - CSE for Minor Degree(Jul - Dec 2025)

Course ID	Course Name	Institute	Duration
noc24-cs125	Programming in Modern C++	IIT Kharagpur	12 Weeks
noc24-cs76	Artificial Intelligence for Economics	IIT Kharagpur	8 Weeks
noc24-cs79	Design and Analysis of Algorithms	Chennai Mathematical Institute	8 Weeks
noc24-cs101	Introduction to Machine Learning	IIT Madras	12 Weeks
noc24-cs80	Introduction to Operating Systems	IIT Madras	8 Weeks
noc24-cs103	Getting Started with Competitive Programming	IIT Gandhinagar	12 Weeks
noc24-cs118	Cloud Computing	IIT Kharagpur	12 Weeks
noc24-ge58	Bandit Algorithm	IIT Bombay	12 Weeks
noc24-cs105	Programming in Java	IIT Kharagpur	12 Weeks
noc24-cs114	Deep Learning - IIT Ropar	IIT Ropar	12 Weeks

MOOC Course List - BC for Honours Degree(Jul - Dec 2025)

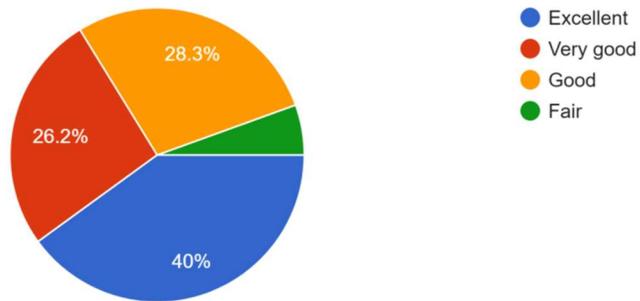
Course ID	Course Name	Institute	Duration
noc24-cs67	Introduction to Quantum Computing: Quantum Algorithms and Qiskit	IIT Madras	4 Weeks
noc24-cs106	Computational Complexity	IIT Hyderabad	12 Weeks
noc24-cs90	Social Network Analysis	IIT Delhi	12 Weeks
noc24-cs70	Introduction to Graph Algorithms	IISc Bangalore	8 Weeks
noc24-cs94	Ethical Hacking	IIT Kharagpur	12 Weeks
noc24-cs95	Introduction to Industry 4.0 and Industrial Internet of Things	IIT Kharagpur	12 Weeks
noc24-cs109	Algorithmic Game Theory	IIT Kharagpur	12 Weeks
noc24-cs100	Randomized Methods in Complexity	IIT Kanpur	12 Weeks
noc24-cs97	Approximation Algorithm	IIT Kharagpur	12 weeks
noc24-cs132	Responsible & Safe AI Systems	IIIT Hyderabad and IIT Madras	12 Weeks

**Annexure –V**

## Feedback from stakeholders 2025 Analysis

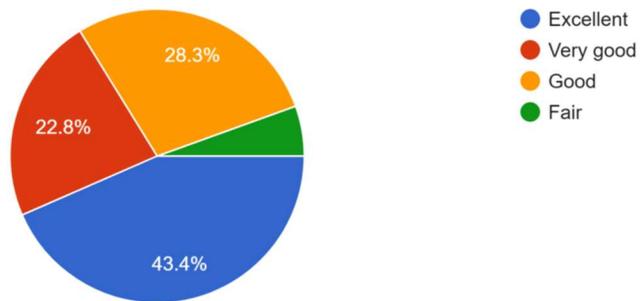
1. How do you rate the curriculum and syllabi of the Courses?

145 responses



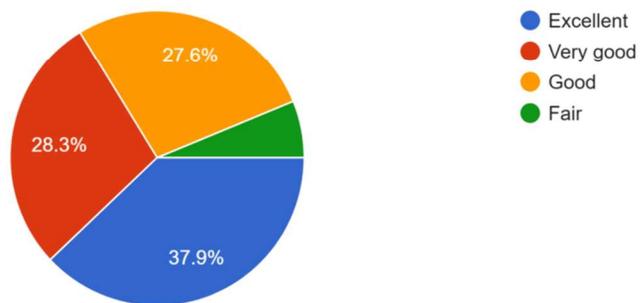
4. How do you rate the quality and relevance of the courses included in the curriculum?

145 responses



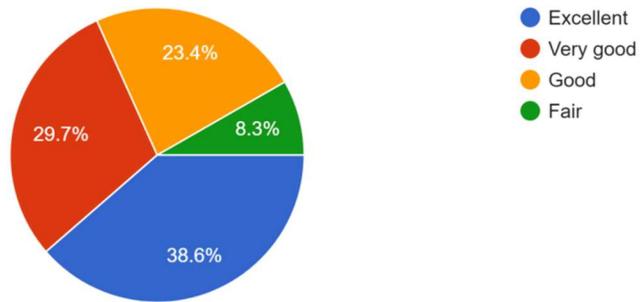
6. How do you rate the electives offered in the program in relation to the technical advancement?

145 responses



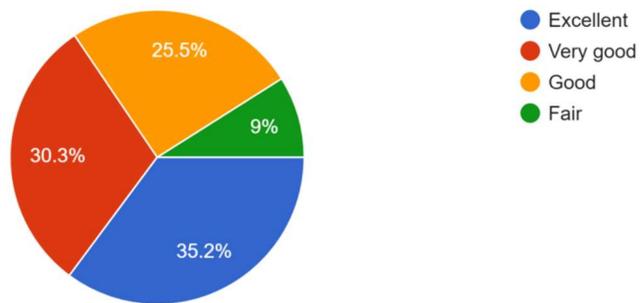
7. How do you rate the laboratory courses in terms of their relevance to the real life applications?

145 responses



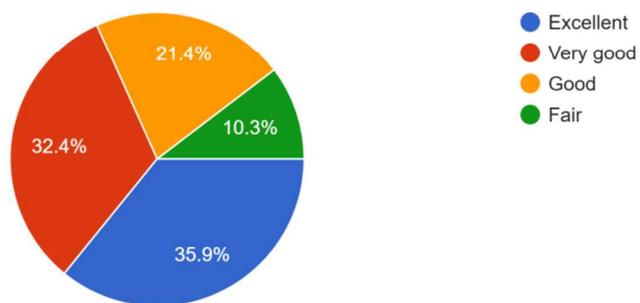
8. How do you rate the trainings offered to use the techniques, skills, and modern engineering tools necessary for engineering practice?

145 responses



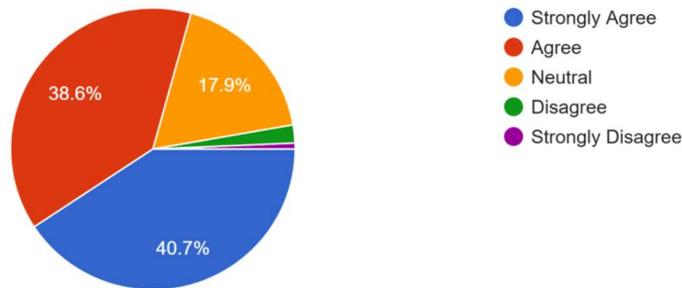
9. How do you rate the courses in terms of their relevance to the latest technologies?

145 responses



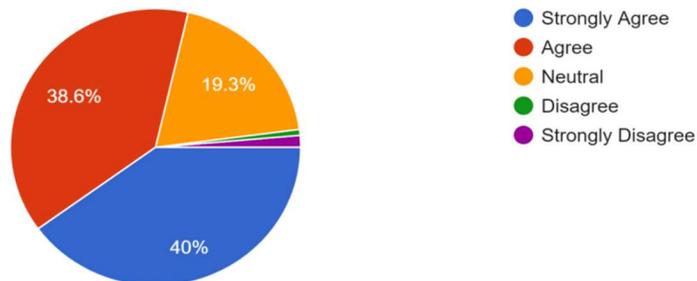
I am satisfied with the CSE program

145 responses



I am satisfied with my ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

145 responses



Some important Comments by students:

The syllabus should be of the appropriate length that could be covered in the given time period of a semester, so that there is time for the students to study and prepare for other opportunities.

Improve the syllabus include more practical and Important things.

the course can be refined to be centred around the real world applications of the subjects

1)New technologies should be introduced

4)In my opinion, we should focus more on practical knowledge and skill development than on theoretical and assignments.

More Industry-Relevant Curriculum:

Include more practical, industry-oriented subjects and updated technologies in the syllabus to align better with current market trends. This would make students more job-ready.

Regularly update the syllabus to match current tech trends (like AI, cloud computing, cybersecurity) and use modern tools and platforms (e.g., GitHub, Docker, AWS) to prepare students for industry standards.

Make course related to the current technology in the field . Don't teach out dated stuff

