HINDI SEVA MANDAL'S (ESTD. 1950)
SHRI SANT GADGE BABA
COLLEGE OF ENGINEERING & TECHNOLOGY
BHUSAWAL - 425 203, DIST. JALGAON(M.S.)
A+ Accredited by NAAC, Government of India
Approved by AICTE, New Delhi; Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere
Tel.No.(O) (02582) 224364, E-Mail:rahulbarjibhe@yahoo.com

Ref. No. SSGBCOET/2025-2026/ 421 Date : 04/05/2026

Notification

It is hereby noticed that the syllabus for S. Y. B.Tech. Computer Science & Engineering has been officially approved. The new curriculum was recommended by the Board of Studies on April 18, 2026, and approved by the Academic Council on April 25, 2026.

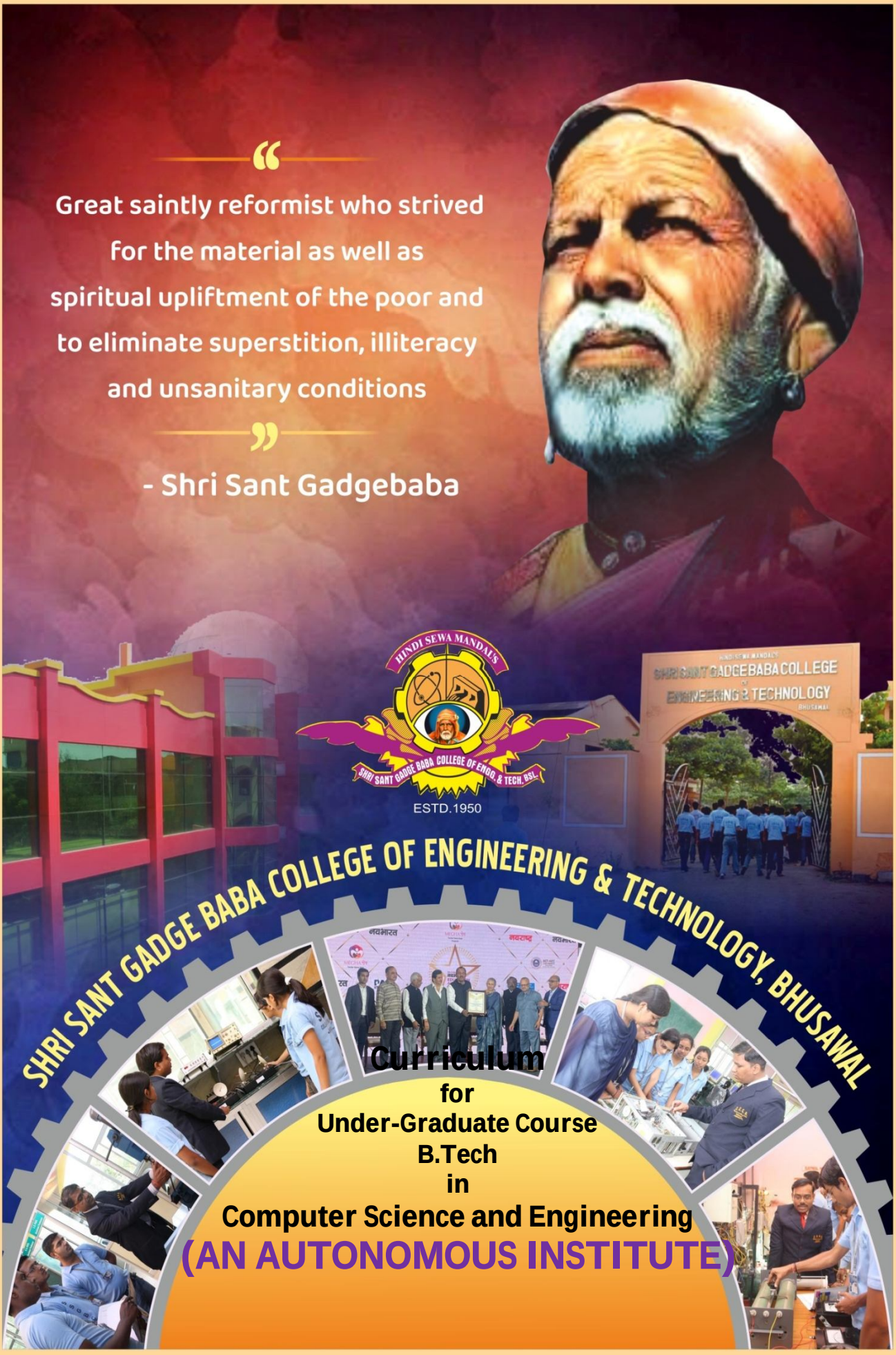
The approved syllabus shall be implemented from 2026-2027 academic year to all concerned semesters for S. Y. B.Tech. Computer Science & Engineering students.

All Head of Department, faculty, and students are hereby informed to take note of same and implement the Syllabus accordingly.

Dr.Dinesh D.Patil
Chairman & Head
BoS, Computer Science & Engg.

Dr.G.A.Kulkarni
Member Secretary
Academic Council

Prof.Dr.R.B.Barjibhe
Principal
Chairman Academic Council


Great saintly reformist who strived
for the material as well as
spiritual upliftment of the poor and
to eliminate superstition, illiteracy
and unsanitary conditions
- Shri Sant Gadgebaba
HINDI SEWA MANDAL'S
SHRI SANT GADGE BABA COLLEGE OF ENGG. & TECH. BSL.
ESTD.1950
SHRI SANT GADGEBABA COLLEGE
ENGINEERING & TECHNOLOGY
BHUSAWAL
SHRI SANT GADGE BABA COLLEGE OF ENGINEERING & TECHNOLOGY, BHUSAWAL
Curriculum
for
Under-Graduate Course
B.Tech
in
Computer Science and Engineering
(AN AUTONOMOUS INSTITUTE)

Hindi Seva Mandal's

Shri Sant Gadge Baba College of Engineering & Technology,

Near Z.T.C., Bhusawal. Dist. - Jalgaon (Maharashtra) - 425203.

An Autonomous Institute Accreditation By NAAC With A+ Grade

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere.)

www.ssgbcoet.com

ESTD.1950

Bachelor of Technology (B. Tech.)

in

Computer Science and Engineering

Programme Structure and Syllabus

With Effective for the First Year admitted Academic Year 2025-2026

4-year, 8 Semester Full time Programme Choice Based Credit System (CBCS) and

Grading System Outcome Based Education Pattern Aligned with

National Education Policy (NEP) 2020

Program Outcomes (PO)

After undergoing the learning process off two years, students of Master of Computer Application will have an ability to build information systems and provide computer based solutions to real life problems. The graduates of this program will demonstrate following abilities and skill sets.

Outcome Identifier	Outcomes
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, applications fundamentals, and an engineering specialization to the solution of Complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze Complex technological problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex computer science and technical problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and Research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Science, engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional Engineering solutions in public and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and Responsibilities and norms of the social & technological practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Second Year Structure 2025-2026 as per NEP 2020 (With Effective from 2026-2027)

Semester III											
Course Category	**Category under NEP**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	**No. Of Credits**
PCC	Programme Core Course	BTCS25PC301	Discrete Mathematics and Computational Logic.	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCS25PC302	Data Structures and Algorithms	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCS25PC303	Object Oriented Programming	2	-	-	20	20	60	100	2
MDM	Multidisciplinary Minor Bucket	BTCS25MD304	MDM-1**	3	-	-	20	20	60	100	3
OE	Open Elective -I	BTCS25OE305	A: Digital Marketing Fundamentals B: Business Communication C: Computer Graphics D: Digital Electronics and Computer Architecture	3	-	-	20	20	60	100	3
PCC	Programme Core Course Lab	BTCS25PC306L	Data Structures and Algorithms Lab	-	-	2	50	-	50	100	1
PCC	Programme Core Course Lab	BTCS25PC307L	Object Oriented Programming Lab	-	-	2	50	-	50	100	1
OE	Open Elective	BTCS25OE308L	Open Elective Lab-I	-	-	2	50	-	50	100	1
HSSM	Vocational & Skill Enhancement Course	BTCS25HM309	Case Study/EDP Programme/ Start Up Activity	-	-	4	50	-	-	50	2
HSSM	Value Education Course	BTCS25HM310	Basics of Human Rights	1	-	-	50	-	-	50	1
VEC	Value Education Course	BTCS25VEC311	Indian Constitution- Value Education	1	-	-	50	-	-	50	1
CEP	Community Engg. Project	BTCS25CEP312	Field Visit/Special Study/ Internship/ Social Activity Project/ Community Initiative	-	-	4	50	-	-	50	2
			Total	**16**	**-**	**14**	**450**	**100**	**450**	**1000**	**23**

MDM-1:The students will have to choose the MDM course being provided by other disciplines offered at the college**

Second Year Structure 2025-2026 as per NEP 2020

Semester IV											
Course Category	**Category under NEP**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	**No. Of Credits**
PCC	Programme Core Course	BTCS25PC401	Design and Analysis of Algorithms	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCS25PC402	Operating System	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCS25PC403	Artificial Intelligence and Neural Networks	2	-	-	20	20	60	100	2
MDM	Multidisciplinary Minor Bucket	BTCS25MD404	MDM-2**	3	-	-	20	20	60	100	3
OE	Open Elective -II	BTCS25OE405	A: Data Communication and Networks B: E-Business C: Introduction to Financial Accounting D: Microprocessor and Microcontroller	2	-	-	20	20	60	100	2
(AEC)	Programme Core Course Lab. (AEC)	BTCS25AE406L	Design and Analysis of Algorithms Lab	-	-	2	50	-	50	100	1
(AEC)	Programme Core Course Lab (AEC)	BTCS25AE407L	Operating System Lab	-	-	2	50	-	50	100	1
(VSEC)	Open Elective Course Lab (VSEC)	BTCS25VSE408L	Open Elective Lab-II	-	-	2	50	-	50	100	1
(VSEC)	Vocational & Skill Enhancement Course	BTCS25VSE409	Workshop/Skill Activity/Course/Seminar	-	-	2	50	-	-	50	1
VEC	Value Education Course	BTCS25VEC410	Universal Human Values-II	3	-	-	20	20	60	100	3
HSSM	Entrepreneurship	BTCS25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	-	-	4	50	-	-	50	2
VEC	Value Education Course	BTCS25VEC412	Life of Shri Sant Gadge Baba	1	-	-	0	-	-	0	AU
VEC	Value Education Course	BTCS25VEC413	Moral and Ethical Development	1	-	-	50	-	-	50	1
			Total	**18**	**-**	**12**	**420**	**120**	**510**	**1050**	**23**

MDM-2:The students will have to choose the MDM course being provided by other disciplines offered at the college**

Semester–III Detailed Syllabus

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC301	Discrete Mathematics and Computational Logics	3	-	-	20	20	60	100	3

Course Description:

This course provides fundamental knowledge of probability, statistics, set theory, mathematical logic, graph theory, and trees. It equips students with analytical and problem-solving skills required for engineering applications, data analysis, algorithm design, and computational modeling. The course emphasizes both theoretical foundations and practical applications relevant to computer science and engineering.

Course Objectives:

1. To understand the fundamental concepts of statistics and probability distributions.
2. To apply sampling theory and hypothesis testing in data analysis.
3. To develop logical reasoning skills using set theory and propositional logic.
4. To understand graph theory concepts and their applications in computing.
5. To analyze tree structures and minimal spanning tree algorithms used in computer science.

Course Outcomes:

CO1: Apply statistical methods and probability distributions to solve engineering problems.

CO2: Perform hypothesis testing and interpret results for decision making.

CO3: Apply principles of set theory and mathematical logic in computational problems.

CO4: Analyze and solve problems using graph theory concepts.

CO5: Implement and analyze tree structures and minimal spanning tree algorithms.

CO–PO Mapping Matrix

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

Syllabus - BTCS25PC301 Discrete Mathematics and Computational Logics

Unit I: Set Theory and Mathematical Logic (09 Hours)

Sets, Venn diagram, Cartesian product, Power sets, Cardinality and countability, Propositional logic, Logical connectives, Truth tables, Normal forms, Validity, Predicate logic, Limitations of predicate logic, Universal and existential quantification, First order logic.

Unit II: Functions, Relations and Combinatorics (09 Hours)

Functions : Subjective, Injective, Bijective and inverse functions, **Relations:**Reflexive, Symmetric, Transitive and Equivalence Relations. **Combinatorics:** Permutations, combinations, Pigeonhole Principle, and basic counting arguments.

Unit III: Graph (09 Hours)

Basic terminology, Multigraphs and weighted graphs, Paths and circuits, Shortest path problems, Euler and Hamiltonian paths, Representation of graph, Isomorphic graphs, Planar graphs, Connectivity, Matching, Coloring.

Unit IV: Tree (09 Hours)

Trees, Rooted trees, Path length in rooted tree, Binary search trees, Spanning trees and cut set, Minimal spanning trees, Kruskal's algorithm for minimal spanning tree, Prim's algorithm for minimal spanning tree.

Unit V: (09 Hours)

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Free and Cyclic Monoids and Groups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields, Boolean Algebra and Boolean Ring, Identities of Boolean Algebra.

Text Books:

1. **Fundamentals of Mathematical Statistics** - S.C. Gupta & V.K. Kapoor, 11th Edition, Sultan Chand & Sons.
2. **Discrete Mathematics and Its Applications** -Kenneth H. Rosen, , 8th Edition, McGraw-Hill Education.
3. **Elements of Discrete Mathematics- A Computer Oriented Approach** -C. L. Liu and D. P. Mohapatra, 4th Edition, McGraw-Hill Education (India), 2013.

Reference Books:

1. **Discrete Mathematical Structures-** J.P. Tremblay & R. Manohar, McGraw-Hill.
2. **Graph Theory with Applications -** J.A. Bondy & U.S.R. Murty, , Elsevier.
3. **Statistics for Engineers and Scientists -**William Navidi, , 5th Edition, McGraw-Hill.
4. **Introduction to Probability and Statistics** - Seymour Lipschutz, , Schaum's Series, McGraw-Hill.

NPTEL Course: Discrete Mathematics, Prof. Sudarshan Iyengar IIT Ropar, Link - https://nptel.ac.in/courses/106106183

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC302	Data Structures and Algorithms	3	-	-	20	20	60	100	3

Course Description:

This course introduces fundamental concepts of data structures and their applications in computer science. It focuses on the design, implementation, and analysis of various linear and non-linear data structures. The course emphasizes problem-solving techniques, algorithm efficiency, and the use of appropriate data structures for developing efficient software solutions.

Course Objectives:

1. To understand the basic concepts of data structures and abstract data types.
2. To analyze the time and space complexity of algorithms.
3. To implement linear data structures such as arrays, stacks, queues, and linked lists.
4. To understand non-linear data structures such as trees and graphs.
5. To apply searching, sorting, and hashing techniques for efficient data processing.

Course Outcomes:

CO1: Understand and apply fundamental concepts of data structures and algorithm analysis.

CO2: Implement and analyze linear data structures such as stacks, queues, and linked lists.

CO3: Apply tree and graph traversal techniques to solve computational problems.

CO4: Implement and compare various searching and sorting algorithms.

CO5: Apply hashing techniques for efficient data storage and retrieval.

CO–PO Mapping Matrix

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

Syllabus - BTCS25PC302 Data Structures and Algorithms

Unit I: Introduction to Data Structures (09 Hours)

Overview of Data Structures and Abstract Data Types (ADT), Classification of Data Structures: Primitive and Non-Primitive, Linear and Non-Linear Data Structures, Time and Space Complexity: Asymptotic Notations (Big-O, Omega, Theta), Arrays: One-dimensional and Multi-dimensional Arrays, Operations on Arrays: Traversal, Insertion, Deletion, Searching, Merging, Applications of Arrays.

Unit II: Stacks and Queues (09 Hours)

Stack: Definition, Operations (Push, Pop, Peek), Array and Linked List Implementation of Stack, Applications of Stack: Expression Evaluation, Infix to Postfix Conversion, Recursion, Queue: Definition and Operations, Types of Queues: Simple Queue, Circular Queue, Priority Queue, Deque, Array and Linked List Implementation of Queues, Applications of Queues

Unit III: Linked Lists (09 Hours)

Introduction to Linked Lists, Types of Linked Lists: Singly, Doubly, Circular Linked Lists, Operations: Insertion, Deletion, Traversal, Searching, Memory Representation and Dynamic Allocation, Comparison between Arrays and Linked Lists, Applications of Linked Lists

Unit IV: Trees and Graphs (09 Hours)

Introduction to Trees: Terminology and Properties, Binary Trees and Binary Search Trees, Tree Traversal Techniques: Inorder, Preorder, Postorder, Introduction to Graphs: Definitions and Terminology, Graph Representations: Adjacency Matrix and Adjacency List, Graph Traversal Algorithms: Breadth First Search (BFS), Depth First Search (DFS), Applications of Trees and Graphs

Unit V: Searching, Sorting and Hashing (09 Hours)

Searching Techniques: Linear Search, Binary Search, Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Advanced Sorting: Merge Sort, Quick Sort, Comparison of Sorting Algorithms, Introduction to Hashing, Hash Functions and Collision Resolution Techniques, Applications of Hashing

Text Books:

1. **Data Structures and Algorithm Analysis in C** – Mark Allen Weiss, Pearson Education.
2. **Fundamentals of Data Structures in C** – Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed, Universities Press.
3. **Data Structures Using C** – Reema Thareja, Oxford University Press.

Reference Books:

1. **Introduction to Algorithms** – Thomas H. Cormen et al., MIT Press.
2. **Data Structures** – Seymour Lipschutz, McGraw-Hill.
3. **An Introduction to Data Structures with Applications** – Jean-Paul Tremblay and Paul G. Sorenson, McGraw-Hill.

NPTEL Course: Data Structures and Algorithms Design, By Prof. Nitin Saxena | IIT Kanpur,
Link - https://nptel.ac.in/courses/106104697

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC303	Object Oriented Programming	2	-	-	20	20	60	100	2

Course Description:

This course introduces the principles of Object-Oriented Programming (OOP) using Java. It covers fundamental programming concepts, object-oriented design, exception handling, multithreading, GUI programming, networking, and database connectivity. The course emphasizes practical implementation to develop robust, secure, and scalable Java-based applications suitable for real-world computing environments.

Course Objectives:

1. To understand object-oriented programming principles and Java fundamentals.
2. To develop Java programs using classes, objects, inheritance, and polymorphism.
3. To implement exception handling, file handling, and multithreaded programming concepts.
4. To design graphical user interfaces using AWT and Swing.
5. To develop network-based and database-driven applications using Java.

Course Outcomes:

CO1: Understand and apply object-oriented programming concepts using Java.

CO2: Develop Java programs incorporating encapsulation, inheritance, and polymorphism.

CO3: Implement exception handling, multithreading, and file handling in Java applications.

CO4: Design GUI-based applications using AWT and Swing components.

CO–PO Mapping Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	–	–	–	–	–	–	1
CO2	3	3	3	1	2	–	–	–	–	–	–	1
CO3	3	3	2	2	3	–	–	–	–	–	–	1
CO4	3	2	3	1	3	–	–	–	–	1	–	1

Syllabus - BTCS25PC303 Object Oriented Programming

Unit I: Introduction to Object-Oriented Programming and Java Fundamentals (08 Hours) Overview of Object-Oriented Programming (OOP) concepts, Features of Java and Java Virtual Machine (JVM), Java program structure and execution flow, Data types, variables, operators, and control statements, Arrays and strings, Introduction to classes and objects, Simple Java programs and compilation process.

Unit II: Input–Output Handling and Encapsulation in Java (08 Hours)

Java I/O streams: byte streams and character streams, File handling in Java, Scanner and Buffered I/O classes, Concept of encapsulation, Access specifies and data hiding, Getter and setter methods, Practical examples demonstrating encapsulation.

Unit III: Inheritance and Exception Handling (07 Hours)

Basics of inheritance, Types of inheritance in Java, Method overriding and use of super keyword, Polymorphism through inheritance, Exception handling concepts, Try–catch–finally blocks, User-defined exceptions.

Unit IV: Multithreading, Applets, and GUI Programming (07 Hours)

Introduction to multithreaded programming, Thread lifecycle and thread creation methods, Thread synchronization, Introduction to Java Applets, Servlets overview and life cycle, Abstract Windowing Toolkit (AWT), Java Swing components and event handling.

Text Books:

1. **Programming with Java: A Primer** – E. Balagurusamy, McGraw-Hill Education, Latest Edition.
2. **Java: The Complete Reference** – Herbert Schildt, McGraw-Hill Education, Latest Edition.

Reference Books;

1. **Core Java Volume I – Fundamentals** – Cay S. Horstmann, Pearson Education, Latest Edition.
2. **Core Java Volume II – Advanced Features** – Cay S. Horstmann, Pearson Education, Latest Edition.
3. **Head First Java** – Kathy Sierra & Bert Bates, O'Reilly Media, Latest Edition.
4. **Introduction to Java Programming** – Y. Daniel Liang, Pearson Education, Latest Edition.
5. **J2EE: The Complete Reference** – Jim Keogh, McGraw-Hill Education.

NPTEL Course: Programming in Java By Prof. Debasis Samanta, IIT Kharagpur.
https://onlinecourses.nptel.ac.in/noc20_cs58/preview

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE305A	**Digital Marketing Fundamentals**	3	-	-	20	20	60	100	3

Course Description:

This course provides a comprehensive introduction to Digital Marketing concepts, tools, and strategies used in modern business environments. It covers search engine marketing, social media marketing, mobile marketing, digital advertising, analytics, automation, and emerging trends. The course equips students with practical knowledge to design, implement, and evaluate digital marketing campaigns in real-world scenarios.

Course Objectives:

1. To understand the fundamentals and evolution of digital marketing.
2. To learn various digital marketing channels including SEO, SEM, social media, and email marketing.
3. To analyze digital marketing performance using analytics tools and KPIs.
4. To design integrated digital marketing strategies for business growth.
5. To understand ethical, legal, and emerging technological aspects of digital marketing.

Course Outcomes:

CO1: Understand and explain key concepts, tools, and channels in digital marketing.

CO2: Apply SEO, SEM, content and social media strategies to develop digital campaigns.

CO3: Analyze marketing performance using web analytics and optimization techniques.

CO4: Design integrated digital marketing strategies aligned with business objectives.

CO5: Evaluate ethical, legal, and emerging technological trends in digital marketing.

CO–PO Mapping Matrix

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

Syllabus: BTCS25OE305A Digital Marketing Fundamentals

Unit I: Introduction to Digital Marketing (08 Hours)

Introduction to Marketing and Digital Marketing, Evolution of Digital Marketing, Traditional Marketing vs Digital Marketing, Digital Marketing Ecosystem, Customer Journey and Digital Touch points, Digital Marketing Strategy and Planning, Overview of Digital Marketing Channels.

Unit II: Search Engine Marketing and Content Marketing (08 Hours)

Introduction to Search Engines, Search Engine Optimization (SEO): On-page and Off-page SEO, Keyword Research and Analysis, Search Engine Marketing (SEM) and Paid Advertising, Content Marketing: Strategy and Types, Blogging, Video Marketing, and Influencer Content, CMS.

Unit III: Social Media and Mobile Marketing (08 Hours)

Social Media Marketing: Concepts and Platforms, Social Media Strategy and Campaign Planning, Paid Social Media Advertising, Mobile Marketing and App-Based Marketing, Email Marketing: Tools and Techniques, WhatsApp and Messenger Marketing, Online Reputation Management (ORM).

Unit IV: Digital Advertising, Analytics, and Automation (08 Hours)

Display Advertising and Programmatic Ads, Affiliate Marketing, Remarketing and Retargeting, Web Analytics and Key Performance Indicators (KPIs), Google Analytics: Overview and Metrics, Marketing Automation Tools, Conversion Rate Optimization (CRO).

Unit V: Digital Marketing Strategy, Ethics, and Future Trends (08 Hours)

Integrated Digital Marketing Strategy, Digital Branding and Customer Engagement, Legal and Ethical Issues in Digital Marketing, Data Privacy and Cyber Laws, Digital Marketing in E-Commerce, Use of AI and Big Data in Digital Marketing, Emerging Trends and Career Opportunities.

Text Books:

1. **Digital Marketing** *Seema Gupta*, McGraw Hill Education
2. **Digital Marketing: Strategy, Implementation and Practice** *Dave Chaffey & Fiona Ellis-Chadwick*, Pearson Education

Reference Books:

1. **Marketing 5.0: Technology for Humanity** *Philip Kotler*, Wiley.
2. **Internet Marketing: Integrating Online and Offline Strategies** *Mary Lou Roberts*, Cengage Learning.
3. **Digital Marketing for Dummies** *Ryan Deiss & Russ Henneberry*, Wiley.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE305B	Business Communication	3	-	-	20	20	60	100	3

Course Description:

This course focuses on developing effective communication skills required in professional and business environments. It covers fundamental communication concepts, intercultural communication, interpersonal and organizational communication, leadership, negotiation, and ethical considerations. The course aims to enhance students' verbal, non-verbal, written, and cross-cultural communication competencies necessary for global business contexts.

Course Objectives:

1. To understand the fundamental concepts and processes of communication.
2. To develop effective interpersonal, organizational, and intercultural communication skills.
3. To identify and overcome barriers to communication.
4. To enhance negotiation, leadership, and persuasive communication abilities.
5. To understand ethical and technological aspects of communication in international business.

Course Outcomes:

CO1: Understand and apply fundamental communication concepts in professional contexts.

CO2: Demonstrate effective interpersonal, intercultural, and organizational communication skills.

CO3: Identify communication barriers and apply strategies to improve listening and interaction.

CO4: Apply negotiation, leadership, and persuasive communication techniques in business situations.

CO5: Demonstrate ethical and effective written communication skills in global and technology-driven environments.

CO–PO Mapping Matrix

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

Syllabus: BTCS25OE305B Business Communication
Unit I **(09 Hours)** Definitions, Concepts, Communicative Competence.
Unit II **(09 Hours)** Intercultural Communication, Nonverbal Communication, Thought and Speech, Translation as Problematic Discourse.
Unit III **(09 Hours)** Barriers to Communication, Listening, Communication Rules, Communication Style.
Unit IV **(09 Hours)** Interpersonal Communication, Relational Communication, Organizational Communication, Collaboration, Communication in Groups and Teams, Persuasive Communication.
Unit V **(09 Hours)** Negotiation and Conflict Management, Leadership, Written Communication in International Business, Role of Technology in International Business Communication, Moving to Another Culture, Crisis Communication, Ethics in Business Communication.
Text Books: 1. **Essentials of Business Communication**, Sixth Edition – Mary Ellen Guffey, South-Western College Publishing. 2. **Excellence in Business Communication**, 8th International Edition – John V. Thill and Courtland L. Bovée, Pearson Education International.
Reference Books: 1. **Business Communication Today** – Courtland Bovee, John Thill, and Mukesh Chaturvedi, Dorling Kindersley, Delhi. 2. **Business Communication** – Asha Kaul, Prentice-Hall of India, Delhi. 3. **Business Communication Strategies** – Matthukutty M. Monippally, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 4. **Communication Skills for Engineers and Scientists** – Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd., New Delhi.
NPTEL Course: International Business Communication, IIT Kharagpur**,** Prof. A Malik. Link : https://nptel.ac.in/courses/110105052

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE305C	Computer Graphics	3	-	-	20	20	60	100	3

Course Description:

This course introduces the fundamental concepts, algorithms, and techniques used in Computer Graphics. It covers graphics hardware, drawing algorithms, geometric transformations, clipping, curves and surfaces, visible surface detection, illumination models, shading techniques, and emerging applications such as virtual and augmented reality. The course emphasizes both theoretical foundations and practical implementation aspects of graphical systems.

Course Objectives:

To understand the basic principles and applications of computer graphics systems.

To learn and implement fundamental drawing and filling algorithms.

To apply geometric transformations and viewing techniques in 2D and 3D graphics.

To understand curve, surface modeling, and visible surface detection methods.

To explore advanced topics such as illumination models, shading, animation, and emerging trends.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1: Understand the fundamentals of computer graphics systems and graphics pipeline.

CO2: Implement line, circle, and polygon drawing algorithms with appropriate attributes.

CO3: Apply 2D and 3D transformations, clipping, and viewing techniques in graphical applications.

CO4: Analyze and implement curve modeling and visible surface detection algorithms.

CO5: Apply illumination models, shading techniques, and explore advanced graphics applications.

CO–PO Mapping Matrix

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

Syllabus : BTCS25OE305C Computer Graphics

Unit I: Introduction to Computer Graphics **(09 Hours)**

Introduction to Computer Graphics, Applications of Computer Graphics, Graphics Hardware: Display Devices (CRT, LCD, LED), Raster Scan and Random Scan Systems, Graphics Software and Standards, Coordinate Systems, Overview of Graphics Pipeline.

Unit II: Drawing Algorithms and Attributes **(09 Hours)**

Line Drawing Algorithms: DDA, Bresenham's Line Algorithm, Circle and Ellipse Drawing Algorithms, Polygon Representation and Filling, Boundary Fill and Flood Fill Algorithms, Line Attributes: Style, Width, Color, Area Fill Attributes, Character and Text Attributes.

Unit III: Geometric Transformations and Viewing **(09 Hours)**

2D Transformations: Translation, Scaling, Rotation, Homogeneous Coordinates, Composite Transformations, Window-to-Viewport Mapping, Clipping Algorithms: Line Clipping (Cohen–Sutherland), Polygon Clipping, Introduction to 3D Graphics, 3D Transformations.

Unit IV: Curves, Surfaces, and Visible Surface Detection **(09 Hours)**

Introduction to Curves and Surfaces, Bezier Curves, B-Spline Curves, Surface Representation Techniques, Visible Surface Detection Concepts, Hidden Line and Hidden Surface Algorithms, Depth Buffer (Z-buffer) Algorithm.

Unit V: Advanced Topics and Applications **(09 Hours)**

Illumination Models: Ambient, Diffuse, Specular, Shading Techniques: Flat, Gouraud, Phong, Color Models: RGB, CMY, HSV, Introduction to Animation, Computer Graphics in Multimedia, Virtual Reality and Augmented Reality (Overview), Recent Trends in Computer Graphics

Text Books:

1. **Computer Graphics with OpenGL** – Donald Hearn and M. Pauline Baker, Pearson Education.
2. **Computer Graphics: A Programming Approach** – Steven Harrington, McGraw-Hill.

Reference Books:

1. **Computer Graphics: Principles and Practice** – Foley, van Dam, Feiner, and Hughes, Addison-Wesley.
2. **Introduction to Computer Graphics** – Zhigang Xiang, McGraw-Hill.
3. **Computer Graphics Using OpenGL** – Hill and Kelley, Pearson.
4. **Procedural Elements for Computer Graphics** – Rogers, McGraw-Hill.

NPTEL Course : Introduction to Computer Graphics, IIT Delhi, Prof. Prem K Kalra

Link : https://nptel.ac.in/courses/106102065

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE305D	Digital Electronics and Computer Architecture	3	-	-	20	20	60	100	3

Syllabus : BTCS25OE305D Digital Electronics and Computer Architecture

Course Description:

This course provides fundamental knowledge of digital logic design and computer organization. It covers number systems, Boolean algebra, combinational and sequential circuits, and the internal structure of computer systems including CPU organization, memory hierarchy, and input–output mechanisms. The course also introduces advanced architectural concepts such as pipelining, parallel processing, and modern processor design. The emphasis is on understanding the building blocks of digital systems and their integration into complete computer systems.

Course Objectives:

To understand number systems, Boolean algebra, and logic gate fundamentals.

To design and analyze combinational and sequential digital circuits.

To understand the basic structure and functional units of a computer system.

To analyze memory organization and input–output mechanisms.

To explore advanced computer architecture concepts and performance evaluation techniques

Course Outcomes:

CO1: Apply number systems, Boolean algebra, and logic simplification techniques in digital circuits

CO2: Design and analyze combinational and sequential circuits using standard methods.

CO3: Explain the functional units and internal organization of a computer system.

CO4: Analyze memory hierarchy and input–output organization in computer systems.

CO5: Evaluate advanced computer architecture concepts such as pipelining, parallel processing, and processor performance.

CO–PO Mapping Matrix

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

Syllabus : BTCS25OE305D Digital Electronics and Computer Architecture

Unit I: Digital Logic Fundamentals (09 Hours)

Number systems: Binary, Octal, Decimal, Hexadecimal, Number system conversions, Binary arithmetic: addition, subtraction (1's and 2's complement), Binary codes: BCD, Gray, ASCII, Excess-3, Boolean algebra and logic gates, Boolean laws and theorems, Simplification of Boolean expressions.

Unit II: Combinational and Sequential Circuits (09 Hours)

Standard representations for logic functions, K-map representation of logic functions, Minimization of logical functions for min-terms and max-terms (up to four variables) and don't care conditions, Combinational logic circuits: adders and subtractors, multiplexers and Demultiplexer, encoders and decoders, Sequential circuits, Flip-flops: SR, JK, D, T, Registers and shift registers, Counters.

Unit III: Introduction to Computer Architecture (09 Hours)

Basic structure of a computer system, Functional units of a computer, Instruction cycle and machine cycle, Instruction formats, Addressing modes, CPU organization, Register organization, Arithmetic Logic Unit (ALU).

Unit IV: Memory Organization and Input–Output Systems (09 Hours)

Memory hierarchy, Primary memory: RAM, ROM, cache memory, Secondary storage devices, Cache memory mapping techniques, Virtual memory and paging, Input–Output organization, I/O interfaces, Interrupts and DMA.

Unit V: Advanced Computer Architecture Concepts (09 Hours)

Pipelining and pipeline hazards, RISC and CISC architectures, Parallel processing concepts, Flynn's classification, Multiprocessor systems, Introduction to modern processors, Performance evaluation of computer systems.

Text Books:

1. **Digital Logic and Computer Design**, M. Morris Mano, Pearson Education.
2. **Computer Organization and Architecture**, William Stallings, Pearson Education.

Reference Books:

1. **Modern Digital Electronics** – R. P. Jain, McGraw-Hill Education.
2. **Computer Organization** – Carl Hamacher, Zvonko Vranesic, and Safwat Zaky, McGraw-Hill.
3. **Computer Organization and Design** – David A. Patterson & John L. Hennessy, Morgan Kaufmann.
4. **Structured Computer Organization** – Andrew S. Tanenbaum, Pearson Education.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC306L	Data Structures and Algorithms Lab	-	-	2	50	-	50	100	1

Syllabus - BTCS25PC306L Data Structures and Algorithms Lab

List of Experiments:-

1. Implementation of stack using array
2. Conversion of infix to postfix expression.
3. Implementation of circular queue using array
4. Implementation of singly linked list.
5. Implementation of Double linked list.
6. Implementation of circular linked list.
7. Program to implement hashing with Open addressing methods
8. Program to implement Insertion Sort Algorithm
9. Programs for implementation of graph traversals by applying BFS
10. Programs for implementation of graph traversals by applying DFS

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC307L	Object Oriented Programming in Lab	-	-	2	50	-	50	100	1

Syllabus - BTCS25PC307L Object Oriented Programming in Lab

List of Experiments:-

1.Write a Java program to demonstrate the **basic structure of a Java program**, compilation and execution process, and explain **Object-Oriented Programming concepts** and features of Java and JVM.

2.Write Java programs using **data types, variables, operators, and control statements** (if–else, switch, for, while, do-while) to perform simple computations.

3.Write a Java program to perform operations on **arrays and strings** such as searching, sorting, reversing, and string manipulation.

4.Write a Java program to create a **class and object**, demonstrating member variables and methods using a real-world example (Student / Employee).

5.Write a Java program using **Java I/O streams** to perform **file handling operations** such as creating, reading, and writing files using byte and character streams.

6.Write a Java program to demonstrate **encapsulation** using access specifiers, data hiding, and **getter and setter methods.**

7.Write a Java program to implement **inheritance**, method overriding, use of super keyword, and demonstrate **polymorphism.**

8.Write a Java program to demonstrate **exception handling** using try–catch–finally blocks and **user-defined exceptions.**

9.Write a Java program to demonstrate **multithreading**, thread creation methods, thread lifecycle, and synchronization.

10. Write a Java program to demonstrate **any one** of the following:

- **GUI programming** using AWT/Swing with event handling
- **Interfaces and packages** in Java

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE308AL	Digital Marketing Fundamentals Lab	-	-	2	50	-	50	100	1

List of Experiments/Activities/Case Studies:-

1. Compare **Traditional Marketing vs Digital Marketing**
2. Keyword research using free SEO tools
3. Design a **basic SEO plan** for a website
4. Create a **social media marketing campaign** for a product
5. Analyze a **digital advertisement** and its effectiveness
6. Case study on **successful digital marketing campaigns**
7. Hands-on exercise using **Google Analytics demo account.**
8. Mini-project on **integrated digital marketing strategy**

(Experiments are activity-based and may include surveys, discussions, case studies, presentations, or reports.)

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE308BL	Business Communication Lab	-	-	2	50	-	50	100	1

List of Experiments/Activities/Case Studies:-

1. Study and demonstration of Basic Communication Process and Communicative Competence

Activities: Sender–receiver model, feedback loop, short self-introduction.

2. Analysis of Intercultural and Nonverbal Communication

Activities: Case studies, gestures across cultures, role-play showing cultural differences.

3. Exercise on Thought–Speech Relationship and Translation Challenges

Activities: Thought framing, speech delivery, simple translation task highlighting barriers.

4. Identification and Removal of Barriers to Communication

Activities: Noise, psychological barriers, listening errors; group discussion and examples.

5. Practice of Effective Listening and Communication Styles

Activities: Active listening test, formal vs informal communication, feedback evaluation.

6. Role-play on Interpersonal, Relational, and Organizational Communication

Activities: Manager–employee interaction, team communication, workplace scenarios.

7. Group Activity on Persuasive Communication, Leadership, and Team Collaboration

Activities: Group discussion, leadership role assignment, persuasive speech.

8. Case Study on Negotiation, Conflict Management, Ethics, and Technology in Business Communication

Activities: Negotiation role-play, ethical dilemma discussion, use of digital tools.

(Experiments are activity-based and may include surveys, discussions, case studies, presentations, or reports.)

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE308CL	Computer Graphics Lab	-	-	2	50	-	50	100	1

List of Experiments/Activities:-

1. Study of basic computer graphics concepts and graphics system
2. Implementation of **DDA Line Drawing Algorithm**
3. Implementation of **Bresenham's Line Drawing Algorithm**
4. Implementation of **Circle Drawing Algorithm**
5. Implementation of **Polygon Filling Algorithm**
6. Implementation of **2D Transformations** (Translation, Scaling, Rotation)
7. Implementation of **Line Clipping Algorithm**
8. Generation of **Bezier Curve**
9. Implementation of **Hidden Surface Removal (Z-buffer Algorithm)**
10. Simple animation using basic computer graphics techniques

(Experiments can be implemented using C / C++ with graphics libraries or any suitable graphics tool.)

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE308DL	Digital Electronics and Computer Architecture Lab	-	-	2	50	-	50	100	1

Syllabus – BTCS25OE308DL Digital Electronics and Computer Architecture Lab

List of Experiments:-

1. Study of gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR
2. Verification of Boolean Theorems using basic gates.
3. Design a circuit to convert a binary number to its two's complement representation.
4. Design and realize a given function using K-maps and verify its performance.
5. Verify a. Demorgan's Theorem for 2 variables. b. The sum-of product and product-of-sum expressions using universal gates.
6. Design and implement a. Full Adder using basic logic gates. b. Full subtractor using basic logic gates.
7. Implementation of 4x1 multiplexer using Logic Gates.
8. To verify the truth tables of S-R; J-K; T and D type flip flops.
9. Design, and Verify the 4- Bit Synchronous Counter.
10. Design, and Verify the 4-Bit Asynchronous Counter.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
HSSM	BTCS25HM309	Case Study /EDP Programme/ Start up Activity.	-	-	4	50	-	-	50	2

BTCS25HM309 - Case Study /EDP Programme/ Start up Activity.

Guidelines for Case Study / EDP Programme / Start-up Activity (Second Year Engineering)

1. The activity aims to develop analytical thinking, entrepreneurial mindset, and practical problem-solving skills among second-year engineering students.
2. Students may choose either a Case Study, Entrepreneurship Development Programme (EDP) activity, or a Start-up based project.
3. The topic should be finalized in consultation with a faculty mentor within the first four weeks of the semester.
4. Case studies should focus on real-world engineering problems, industry practices, emerging technologies, or innovative business models.
5. EDP activities may include market survey, business plan preparation, feasibility analysis, cost estimation, and risk assessment.
6. Start-up activities should identify a real-life problem and propose a technically feasible and economically viable solution.
7. Students may work individually or in teams of 2–4 members.
8. Industry interaction, field visits, or interviews with entrepreneurs are encouraged wherever possible.
9. A brief proposal (2–3 pages) must be submitted outlining objectives, methodology, and expected outcomes.
10. Periodic progress reviews will be conducted by the assigned faculty mentor.
11. Students must submit a final report including problem statement, analysis, solution approach, financial aspects (if applicable), and conclusions.
12. The activity should culminate in a presentation and viva-voce examination.
13. Evaluation will be based on innovation, analytical depth, feasibility, documentation quality, and presentation skills.
14. Students are encouraged to explore opportunities for prototype development, patent filing, or incubation support where applicable.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
HSSM	BTCS25HM310	Basics of Human Rights	1	-	-	50	-	-	50	1

Course Description

This course introduces students to the concept, evolution, and significance of human rights at national and international levels. It examines constitutional provisions, international conventions, contemporary human rights issues in India, and mechanisms for protection and promotion of human rights. The course aims to develop awareness, ethical responsibility, and sensitivity toward human dignity and social justice.

Course Objectives

1. To understand the meaning, history, and importance of human rights.
2. To examine the constitutional and legal framework for protection of human rights in India.
3. To study international human rights instruments and global efforts.
4. To analyze major human rights issues in India.
5. To understand mechanisms for protection and promotion of human rights.

Course Outcomes

CO1: Explain the concept, features, and evolution of human rights.

CO2: Describe the constitutional and legal safeguards for human rights in India.

CO3: Summarize major international human rights instruments and conventions.

CO4: Analyze contemporary human rights issues in India.

CO5: Evaluate mechanisms and institutional efforts for protection and promotion of human rights.

CO–PO Mapping Matrix

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

Syllabus : BTCS25HM310 Basics of Human Rights

UNIT I: Introduction to Human Rights **(03 Hours)**

Definition and Meaning of Human Rights, Historical Development of Human Rights, Significance and Features of Human Rights, Universal Declaration of Human Rights, Types of Human Rights including Civil, Political, Economic, Social and Cultural Rights.

UNIT II: Constitutional and Legal Framework **(03 Hours)**

Indian Constitution and Human Rights, Fundamental Rights and Duties, Directive Principles of State Policy, National Human Rights Commission, Role of Judiciary in Protection of Human Rights.

UNIT III: International Human Rights **(03 Hours)**

United Nations and Human Rights, International Covenants and Treaties, Convention on the Rights of the Child, Convention on the Elimination of All Forms of Discrimination Against Women, Human Rights Violations and Global Efforts.

UNIT IV: Human Rights Issues in India **(03 Hours)**

Gender-based Discrimination and Women's Rights, Child Labour and Rights of Children, Rights of Minorities and Marginalized Communities, Human Trafficking and Exploitation, Environmental Rights and Sustainable Development.

UNIT V: Protection and Promotion of Human Rights **(03 Hours)**

Mechanisms for Human Rights Protection, Role of NGOs and Civil Society, Role of Media and Awareness Campaigns, Human Rights Education in Schools and Colleges, Case Studies including Landmark Human Rights Judgments in India.

Text Books:

1. **Human Rights under International Law and Indian Law**, S. K. Kapoor, Central Law Publications
2. **Human Rights in India**, R. C. Sharma, Deep & Deep Publications

Reference Books:

1. **Human Rights and the Law** – Justice M. Jagannadha Rao, Universal Law Publishing.
2. **Human Rights in India** – B. G. Verghese, Orient BlackSwan.
3. **National Human Rights Commission (NHRC) Reports** – National Human Rights Commission.
4. **United Nations Human Rights Documents** – United Nations.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VEC	BTCS25VEC311	Indian Constitution-Value Education	1	-	-	50	-	-	50	1

Course Description:

This course introduces students to the Indian Constitution, its values, and ethical principles in public life. It covers the fundamental rights and duties of citizens, directive principles of state policy, structure of government, governance, professional responsibility, and the role of ethics in engineering and society. Through this course, students develop an understanding of constitutional values, democratic principles, and ethical decision-making in professional contexts.

Course Objectives:

1. To understand the structure, significance, and core values of the Indian Constitution.
2. To explain Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy.
3. To comprehend the structure and functioning of Union and State Governments.
4. To develop ethical awareness and a sense of democratic responsibility in personal and social life.
5. To analyze governance, constitutional morality, and professional responsibilities in a civic context.

Course Outcomes (COs)

CO1: Explain the structure, significance, and values of the Indian Constitution.

CO2: Describe Fundamental Rights, Duties, and Directive Principles.

CO3: Understand the structure and functioning of Union and State Governments.

CO4: Apply ethical principles and democratic responsibilities in life.

CO5: Analyze governance, constitutional morality, and professional responsibilities.

CO–PO Mapping Matrix

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

Syllabus - BTCS25VEC311 Indian Constitution- Value Education

UNIT I: Introduction to the Indian Constitution (03 Hours)

Covers the meaning and importance of the Constitution, historical background, making of the Indian Constitution, sources, salient features, and the Preamble including its philosophy, objectives, and values. Discusses constitutional values such as justice, liberty, equality, and fraternity.

UNIT II: Fundamental Rights and Duties (03 Hours)

Introduces Fundamental Rights, including Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, and Right to Constitutional Remedies. Also covers Fundamental Duties and their importance in civic life.

UNIT III: Directive Principles and Structure of Government (03 Hours)

Covers Directive Principles of State Policy (DPSPs) and their relationship with Fundamental Rights. Examines the structure of Union and State Governments including Executive, Legislature, and Judiciary. Discusses the federal structure of India and separation of powers.

UNIT IV: Values, Ethics, and Citizenship (03 Hours)

Focuses on values and ethics in public life, secularism, socialism, democracy, rule of law, equality, and social justice. Discusses the role of citizens in democracy and the rights of women, children, and marginalized sections.

UNIT V: Constitution, Governance, and Professional Responsibility (03 Hours)

Covers good governance, constitutional morality, anti-corruption measures, and the role of civil services and independent institutions. Discusses ethical issues in public administration, role of engineers in nation-building, and case studies related to constitutional values and ethics.

Textbooks

1. **An Introduction to the Constitution of India,** M. V. Pylee, Vikas Publishing House.
2. **Introduction to the Constitution of India,** D. D. Basu, LexisNexis.

Reference Books

1. **Introduction to the Constitution of India** – Brij Kishore Sharma, PHI Learning.
2. **The Indian Constitution: Cornerstone of a Nation** – Granville Austin, Oxford University Press.
3. **Our Constitution: An Introduction to India's Constitution and Constitutional Law** – Subhash Kashyap, National Book Trust.
4. **The Constitution of India (Bare Act)** – Government of India.

NPTEL Course: NOC: Constitution Law and Public Administration in India, IIT Madras By Prof. Sairam Bhat.
Link: https://nptel.ac.in/courses/129106411

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
CEP	BTCS25CEP312	Field Visit/Special Study/Internship/Social Activity Project/ Community Initiative.	-	-	4	50	-	-	50	2

Guidelines for Students Undertaking an Field Visit/Special Study/Internship/Social Activity Project/ Community Initiative

1. Purpose

- The internship is an integral part of the academic program.
- It aims to provide **practical exposure**, develop professional skills, and connect theory with real-world practice.

2. Field Visit/Special Study/Internship/Social Activity Project/ Community Initiative Duration

- Students must complete the internship for the **approved duration** as prescribed by the institution.

3. Professional Conduct

- Follow the rules, policies, and working hours of the host organization.
- Maintain professionalism in behavior, communication, and appearance.
- Show punctuality, discipline, and respect toward supervisors, colleagues, and clients.

4. Roles and Responsibilities

- Perform assigned tasks sincerely and to the best of your ability.
- Take initiative, ask questions, and be open to learning.
- Complete tasks within given deadlines.

5. Confidentiality and Ethics

- Maintain strict confidentiality of organizational data and information.
- Do not share internal documents or sensitive details without permission.
- Follow ethical standards and institutional guidelines at all times.

6. Reporting and Documentation

- Maintain a **daily/weekly internship log or diary**.
- Prepare and submit the internship report in the prescribed format.
- Obtain required certificates, evaluations, and signatures from the organization.

7. Communication with the Institution

- Keep the faculty coordinator informed about internship progress.
- Report any issues or challenges promptly.

8. Safety and Responsibility

- Follow safety rules and workplace guidelines.
- The institution is not responsible for personal misconduct or negligence during the internship.
- Students must take responsibility for their actions.

9. Assessment and Evaluation

- Internship performance will be evaluated based on Work performance and Internship report
- Failure to comply with guidelines may affect academic evaluation.

10. Completion of Field Visit/Special Study/Internship/Social Activity Project/ Community Initiative.

- Submit all required documents within the given deadline.
- Internship completion is mandatory for course fulfillment.

Semester–IV Detailed Syllabus

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC401	Design and Analysis of Algorithms	3	-	-	20	20	60	100	3

Syllabus - BTCS25PC401 Design and Analysis of Algorithms

Course Description

This course introduces fundamental concepts of algorithm design and analysis. It covers various algorithmic paradigms including Divide and Conquer, Greedy Method, Backtracking, Branch and Bound, and Dynamic Programming. The course emphasizes asymptotic analysis, complexity classes, and problem-solving strategies for computationally intensive problems. Students will learn to analyze time and space complexity and apply appropriate techniques to design efficient algorithms.

Course Objectives

1. To understand the fundamentals of algorithms and their analysis.
2. To study different algorithm design techniques such as Divide and Conquer, Greedy, Backtracking, and Dynamic Programming.
3. To analyze the time and space complexity of algorithms using asymptotic notations.
4. To understand complexity classes P and NP and the concept of NP-Completeness.
5. To develop problem-solving skills using advanced algorithmic techniques.

Course Outcomes

CO1: Analyze the performance of algorithms using asymptotic notations.

CO2: Apply Divide and Conquer strategy to solve computational problems.

CO3: Design solutions using Greedy, Backtracking, and Branch and Bound techniques.

CO4: Solve optimization problems using Dynamic Programming.

CO5: Understand complexity classes P, NP, and the concept of NP-Completeness.

CO–PO Mapping Matrix

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

Syllabus

(Unit 1) Introduction to Algorithms **(09 Hours)**

Definition and Properties of Algorithms, Expressing Algorithm, Flowchart, Algorithm Design Techniques, Performance Analysis of Algorithms, Types of Algorithm Analysis, Order of Growth, Asymptotic Notations, Recursion, Introduction to Recurrence Relations, Substitution Method, Master Theorem, Heap Sort.

(Unit 2) Divide and Conquer **(09 Hours)**

Introduction, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix Multiplication.

(Unit 3) Backtracking **(09 Hours)**

Backtracking Concept, N–Queens Problem, Four–Queens Problem, Eight–Queens Problem, Hamiltonian Cycle, Sum of Subsets Problem, Branch and Bound: Introduction, Travelling Salesperson Problem, 15–Puzzle Problem.

(Unit 4) Greedy Algorithms **(09 Hours)**

Introduction to Greedy Technique, Greedy Method, Optimal Merge Patterns, Huffman Coding, Knapsack Problem, Activity Selection Problem, Minimum Spanning Tree.

(Unit 5) Dynamic Programming **(09 Hours)**

Introduction, Characteristics of Dynamic Programming, Components of Dynamic Programming, Comparison of Divide-and-Conquer and Dynamic Programming Techniques, Longest Common Subsequence, Shortest Paths: Bellman Ford, Floyd Warshall, Applications of Dynamic Programming, NP Completeness: Introduction, The Complexity Class P, The Complexity Class NP.

Text Book:

1. **Introduction to Algorithms** -T. Cormen, PHI Publication, 2nd Edition, 2002.

2. **Fundamentals of Computer Algorithms** - Ellise Horowitz, SartajSahni, S. Rajasekaran, , University Press (India) Private Ltd, 2nd Edition, 2008.

Reference Books:

1. **Data Structure and Algorithms** -Aho, Ullman, , Addison-Wesley Publication, 1st Edition,1983.

2. **Algorithm Design – Foundation, Analysis & Internet Examples,**-Michel Goodrich, Roberto Tamassia, Wiley Publication, 2nd Edition,2006.

3. **Algorithms in a Nutshell, A Practical Guide**,-George T. Heineman, Gary Pollice, Stanley Selkow, O'Reilly Media, 2nd Edition, 2016.

4. **Computer algorithms: Introduction to Design and Analysis** -Sara Base, , Addison-Wesley Publication, 2nd Edition, 1988

NPTEL Course : Introduction to Algorithms and Analysis By Prof. Sourav Mukhopadhyay, IIT Kharagpur
Link - https://onlinecourses.nptel.ac.in/noc25_cs150/preview

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC402	Operating System	3	-	-	20	20	60	100	3

Syllabus : BTCS25PC402 Operating System

Course Description

This course introduces the fundamental concepts of Operating Systems including process management, memory management, synchronization, deadlocks, file systems, and disk management. It provides an understanding of how operating systems manage hardware resources and provide services to application programs. The course emphasizes practical concepts and case studies relevant to modern operating systems such as Linux/UNIX.

Course Objectives

1. To understand the basic structure and functions of operating systems.
2. To study process management and CPU scheduling algorithms.
3. To analyze synchronization mechanisms and deadlock handling techniques.
4. To understand memory management and virtual memory concepts.
5. To explore file systems, I/O systems, and disk scheduling techniques.

Course Outcomes

CO1: Explain the structure and functions of operating systems.

CO2: Apply CPU scheduling and process management techniques.

CO3: Analyze synchronization problems and deadlock handling methods.

CO4: Evaluate memory management and page replacement algorithms.

CO5: Describe file system organization, I/O management, and disk scheduling algorithms.

CO–PO Mapping Matrix

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

Syllabus

Unit I: Introduction to Operating Systems **(09 Hours)**

Introduction to Operating Systems, Objectives and Functions of an Operating System, Evolution of Operating Systems, Types of Operating Systems: Batch, Multiprogramming, Time-Sharing, Real-Time, Distributed, Embedded OS, Operating System Structures: Monolithic, Layered, Microkernel, System Calls and OS Services, User and Kernel Mode.

Unit II: Process Management and CPU Scheduling **(09 Hours)**

Process Concept, Process States and State Transitions, Process Control Block (PCB), Threads and Multithreading Models, CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority, Round Robin, Inter-Process Communication (IPC), Introduction to Synchronization.

Unit III: Process Synchronization and Deadlocks **(09 Hours)**

Critical Section Problem, Synchronization Hardware, Semaphores and Classical Problems, Monitors, Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention, Avoidance (Banker's Algorithm), Deadlock Detection and Recovery.

Unit IV: Memory Management **(09 Hours)**

Memory Management Concepts, Logical vs Physical Address Space, Contiguous Memory Allocation, Paging and Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms: FIFO, LRU, Optimal, Thrashing.

Unit V: File System, I/O & Disk Management **(09 Hours)**

File Concept and Access Methods, File System Structure, Directory Structure and Implementation, File Allocation Methods, Free Space Management, I/O Systems, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, Case Study: Linux / UNIX File System (Overview).

Text Books

1. **Operating System Concepts-** Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Wiley, Latest Edition.
2. **Operating Systems: Internals and Design Principles** -William Stallings, Pearson Education.

Reference Books

1. **Modern Operating Systems** -Andrew S. Tanenbaum, Pearson Education.
2. **Operating Systems** – A Concept-Based Approach-D. M. Dhamdhere, Tata McGraw-Hill.
3. **Operating Systems**-Harvey M. Deitel, Pearson Education.

NPTEL Course : Operating System Fundamentals, Prof. Santanu Chattopadhyay , IIT Kharagpur, Link- https://onlinecourses.nptel.ac.in/noc21_cs88/preview

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC	BTCS25PC403	Artificial Intelligence and Neural Networks	2	-	-	20	20	60	100	2

Syllabus - BTCS25PC403- Artificial Intelligence and Neural Networks

Course Description

This course introduces the fundamental concepts of Artificial Intelligence and Neural Networks. It covers problem-solving techniques, search strategies, knowledge representation methods, learning through neural networks, natural language processing, and expert systems. The course aims to provide both theoretical foundations and practical approaches to building intelligent systems.

Course Objectives

1. To understand the basic concepts and foundations of Artificial Intelligence.
2. To study various search and heuristic techniques used in AI problem solving.
3. To explore knowledge representation methods including predicate logic and fuzzy logic.
4. To understand neural networks and their applications.
5. To introduce natural language processing and expert systems.

Course Outcomes

CO1: Explain fundamental concepts and problem-solving approaches in AI

CO2: Apply heuristic search algorithms such as A* and AO* to solve AI problems

CO3: Represent knowledge using logic, semantic networks, frames, and scripts

CO4: Understand neural network architectures and NLP techniques

CO5: Analyze expert systems and game playing strategies.

CO–PO Mapping Matrix

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

Syllabus

Unit 1 Introduction to Artificial Intelligence **(06 Hours)**

Introduction to Artificial Intelligence: Definition, AI Problems, Physical Symbol System Hypothesis, AI Techniques, Turing Test, Problem as a State Space Search, Production System, Problem Characteristics, Breadth First Search, Depth First Search.

Unit 2 Knowledge Representation and Heuristic Search **(06 Hours)**

AI Representation, Properties of Internal Representation, Heuristic Search Techniques, Best First Search, A* and AO* Algorithms, Means-End Analysis.

Unit 3 Advanced Knowledge Representation Techniques **(06 Hours)**

Knowledge Representation using Predicate Logic: Predicate Calculus, Predicates and Arguments, ISA Hierarchy, Frame Notation, Resolution, Natural Deduction, Knowledge Representation using Fuzzy Logic, Semantic Nets, Frames, Scripts, Conceptual Dependency.

Unit 4 Neural Networks and Natural Language Processing **(06 Hours)**

Learning by Training Neural Networks, Introduction to Neural Networks, Neural Network Architecture and Applications, Natural Language Processing and Understanding, Pragmatic, Syntactic and Semantic Analysis, Finite State Machine, ATN, Understanding Sentences.

Unit 5 Expert Systems and Game Playing Techniques **(06 Hours)**

Expert Systems: Utilization and Functionality, Architecture of Expert Systems, Knowledge Representation in Expert Systems, Game Playing: Minimax Search Procedure, Alpha-Beta Cutoffs, Waiting for Quiescence, Secondary Search.

Text Books:

1. **Machine Learning** – Tom Mitchell, First Edition, McGraw Hill, 1997.
2. **Artificial Intelligence** – Elaine Rich, Kevin Knight, and Shiva Shankar B. Nair, 3rd Edition, TMH..

Reference Books:

1. **Introduction to Machine Learning** – Ethem Alpaydin, 2nd Edition.
2. **Artificial Neural Networks** – B. Yegnanarayana, PHI.
3. **Artificial Intelligence** – Elaine Rich and Kevin Knight, TMH.
4. **Introduction to Artificial Intelligence and Expert Systems** – Dan W. Patterson, PHI.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE405A	Data Communication and Networks	2	-	-	20	20	60	100	2

Syllabus : BTCS25OE405A Data Communication and Networks

Course Description

This course introduces the fundamental concepts of data communication and computer networks. It covers layered network architecture, transmission media, data link control, routing algorithms, transport protocols, application layer services, and basic network security mechanisms. The course provides both theoretical understanding and practical insights into modern networking technologies and protocols used in real-world communication systems.

Course Objectives

1. To understand the fundamentals of data communication and networking models.
2. To study transmission media, switching techniques, and physical layer concepts.
3. To analyze data link and network layer protocols including error control and routing.
4. To understand transport layer protocols and congestion control mechanisms.
5. To explore application layer protocols and basic network security concepts.

Course Outcomes

CO1: Explain layered network architecture and physical layer concepts.

CO2: Apply data link layer mechanisms such as framing, error control, and access control.

CO3: Analyze IP addressing schemes and routing algorithms.

CO4: Understand transport layer protocols and congestion control techniques.

CO5: Describe application layer protocols and basic network security mechanisms.

CO–PO Mapping Matrix

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

Syllabus

UNIT I: Introduction & Physical Layer **(06 Hours)**

Data Communication Components, Data Flow, Network Topologies, OSI Model and TCP/IP Model comparison, Transmission Media (Guided and Unguided), Switching Techniques (Circuit Switching and Packet Switching), Digital Transmission, Modulation Techniques.

UNIT II: Data Link Layer **(06 Hours)**

Framing Techniques, Error Control (CRC, Checksum), Flow Control (Stop-and-Wait, Sliding Window), Access Control Protocols: ALOHA, CSMA/CD, Ethernet Standards (IEEE 802.3), Wi-Fi (IEEE 802.11), Switching Concepts and VLANs.

UNIT III: Network Layer **(06 Hours)**

Logical Addressing (IPv4 and IPv6), Subnetting, Supernetting, Routing Algorithms (Distance Vector, Link State, OSPF, BGP), ARP, RARP, ICMP, DHCP.

UNIT IV: Transport Layer **(06 Hours)**

Process-to-Process Delivery, UDP (User Datagram Protocol), TCP (Transmission Control Protocol) – Segment Structure, Three-Way Handshake, Flow Control, Congestion Control (Leaky Bucket and Token Bucket).

UNIT V: Application Layer **(06 Hours)**

Domain Name System (DNS), HTTP/HTTPS, FTP, SMTP, POP3, Network Security Basics: Cryptography, Digital Signatures, Firewalls.

Text Books:

1. **Data Communications and Networking** – Behrouz A. Forouzan, McGraw Hill.
2. **Computer Networks** – Andrew S. Tanenbaum, Pearson.

Reference Books:

1. **Data and Computer Communications** – William Stallings, Pearson.
2. **Computer Networking: A Top-Down Approach** – James F. Kurose and Keith W. Ross.

NPTEL Course: Computer Networks and Internet Protocol, IIT Kharagpur , Prof. Soumya Kanti Ghosh Prof. Sandip Chakraborty,Link- https://onlinecourses.nptel.ac.in/noc26_cs35/preview

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE405B	E-Business	2	-	-	20	20	60	100	2

Syllabus : BTCS25OE405B E-Business

Course Description

This course introduces the concepts, technologies, strategies, and managerial aspects of E-Business. It covers electronic markets, online payment systems, digital marketing, CRM, SCM, ERP, legal and ethical issues, and emerging technologies in E-Business. The course provides an understanding of how businesses operate in the digital environment and adapt to global electronic markets.

Course Objectives

1. To understand the fundamentals and evolution of E-Business models.
2. To study infrastructure technologies supporting E-Business.
3. To analyze electronic markets and digital payment systems.
4. To explore E-Business strategies and enterprise applications.
5. To understand legal, ethical, and global issues in E-Business.

Course Outcomes

CO1: Explain the concepts, models, and components of E-Business.

CO2: Understand infrastructure technologies and emerging trends in E-Business.

CO3: Analyze electronic markets and digital payment systems.

CO4: Apply E-Business strategies and enterprise applications such as CRM and SCM.

CO5: Evaluate legal, ethical, and managerial issues in E-Business.

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

Syllabus

UNIT I: Introduction to E-Business **(06 Hours)**

Introduction to E-Business and E-Commerce, Evolution of E-Business, Traditional Business vs E-Business, Components of E-Business, E-Business Models: B2B, B2C, C2C, C2B, G2C, Benefits and Limitations of E-Business.

UNIT II: E-Business Infrastructure and Technologies **(06 Hours)**

Internet, Intranet, and Extranet, Web Technologies: WWW, Web Servers, Browsers, E-Business Architecture, Mobile Commerce (M-Commerce), Cloud Computing and its Role in E-Business, Emerging Technologies in E-Business.

UNIT III: Electronic Markets and Payment Systems **(06 Hours)**

Electronic Markets and Marketplaces, Online Auctions and Dynamic Pricing, Digital Products and Services, Electronic Payment Systems including Credit/Debit Cards, Internet Banking, Digital Wallets, UPI and Payment Gateways, Security Issues in E-Payments.

UNIT IV: E-Business Strategy and Applications **(06 Hours)**

E-Business Strategy Formulation, E-Marketing and Digital Marketing, Customer Relationship Management (CRM), Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Social Media and E-Business.

UNIT V: Legal, Ethical, and Managerial Issues in E-Business **(06 Hours)**

Legal Issues in E-Business, Intellectual Property Rights (IPR), Cyber Laws and IT Act, Ethical Issues in E-Business, Privacy and Data Protection, E-Business in Global Environment, Future Trends in E-Business.

Text Books

1. **E-Commerce 2021–2022: Business, Technology, Society** – Kenneth C. Laudon & Carol G. Traver, Pearson Education.
2. **E-Business Roadmap for Success** – Dr. Ravi Kalakota & Marcia Robinson, Addison-Wesley.

Reference Books

1. **Electronic Commerce: A Managerial Perspective** – Efraim Turban et al., Pearson Education.
2. **E-Commerce: Strategy, Technologies and Applications** – David Whiteley, McGraw-Hill.
3. **Introduction to E-Commerce** – Niranjanamurthy & Chahar, Springer.

NPTEL Course : E-Business, IIT Kharagpur Prof. Mamata Jenamani

Link- https://nptel.ac.in/courses/110105083

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE405C	Introduction to Financial Accounting	2	-	-	20	20	60	100	2

Syllabus : BTCS25OE405C Introduction to Financial Accounting

Course Description

This course introduces the fundamental principles and concepts of financial accounting. It focuses on the accounting cycle, preparation of financial statements, double-entry system, ledger posting, trial balance, final accounts, ratio analysis, and break-even analysis. The course enables students to understand accounting as an information system for decision-making and financial performance evaluation.

Course Objectives

1. To understand the basic concepts and principles of financial accounting.
2. To study the accounting equation and double-entry bookkeeping system.
3. To prepare ledger accounts, trial balance, and final accounts.
4. To analyze financial statements using ratios and break-even analysis.
5. To understand cash flow statements and financial decision-making.

Course Outcomes

CO1: Explain the fundamentals of accounting and accounting terminology.

CO2: Apply accounting equation and double-entry system to record transactions.

CO3: Prepare ledger accounts and trial balance.

CO4: Prepare and analyze final accounts including Trading and Profit & Loss Account.

.CO5: Interpret financial statements using ratio analysis, cash flows, and break-even analysis.

CO–PO Mapping Matrix

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

Syllabus

UNIT 1: A Primer on Business Organizations and Need for Accounting (06 Hours)

Introduction to Financial Accounting, Definition of Accounting, Preparation of Financial Statements and Accounting Cycle, Decision Making using Financial Statements, Accounting as an Information System, Stakeholders of a Business, Key Accounting Terms including Assets, Liabilities, Income and Expenses, Sources of Funds, Use of Funds, Types of Assets, Types of Liabilities, Types of Incomes, Types of Expenses.

UNIT 2: Accounting Equation, GAAP Principles & Fundamental of Double Entry System (06 Hours)

Accounting Equation, Walkthrough of Balance Sheet, Walkthrough of Income Statement, Generally Accepted Accounting Principles I and II, Types of Accounts, Debit and Credit, Rules of Debit and Credit, Entering Transactions in Journal, Assets Purchased or Sold, Liabilities Raised or Paid Back, Expenses Paid or Due and Incomes Received or Accrued.

UNIT 3: Ledger (06 Hours)

Introduction to Ledger, Process of Ledger Posting, Balancing the Accounts, Debit and Credit Balances, Identifying Balances, Practice Problems.

UNIT 4: Trial Balance and Final Accounts (06 Hours)

Introduction to Trial Balance, Preparation of Trial Balance, Errors in Trial Balance, Format of Final Accounts and Balance Sheet, Identifying Direct and Indirect Expenses, Mapping Expenses and Incomes, Profit and Loss Account, Preparation of Final Accounts including Trading Account and P&L Account, Need for Break Even Analysis.

UNIT 5: Final Accounts and Inventory Control (06 Hours)

Validation of Balance Sheet and Income Statement Preparation, Liquidity Ratios, Solvency Ratios, Profitability Ratios, Efficiency Ratios, Types of Cash Flows, Cash Flows from Operating Activities, Investing Activities, Provision of Tax and Dividend, Application of Break Even Analysis, Contribution Margin, Break Even Point, Sales and Capacity.

Text Books:

1. **Financial Accounting –** A Managerial Perspective – R. Narayanaswamy
2. **Financial Accounting – P. C. Tulsian**

References Books

1. **Financial Accounting – A Managerial Perspective** – R. Narayanaswamy, PHI, latest edition.
2. **Financial Accounting** – P. C. Tulsian, Tata McGraw Hill, latest edition.

NPTEL Course: Financial Accounting By Prof. Puran Singh IIT Mandi

Link : https://onlinecourses.nptel.ac.in/noc23_mg65/preview

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
OE	BTCS25OE405D	Microprocessor and Microcontroller	2	-	-	20	20	60	100	2

Syllabus : BTCS25OE405D Microprocessor and Microcontroller

Course Description

This course provides a comprehensive understanding of 8086 microprocessor architecture, instruction set, programming, and interfacing techniques. It also covers peripheral devices, interrupt systems, 8051 microcontroller architecture and programming, real-time control applications, and an introduction to ARM processor fundamentals. The course emphasizes both hardware interfacing and software development aspects for embedded system applications.

Course Objectives

1. To understand the architecture and organization of 8086 microprocessor.
2. To learn instruction set, addressing modes, and assembly language programming.
3. To study interfacing of memory and peripheral devices with 8086.
4. To understand the architecture and programming of 8051 microcontroller.
5. To introduce ARM processor fundamentals and interrupt mechanisms.

Course Outcomes

CO1: Explain the architecture and signal functions of 8086 microprocessor.

CO2: Develop assembly language programs using various instructions and addressing modes.

CO3: Interface memory and I/O devices with 8086 and analyze interrupt handling.

CO4: Demonstrate programming and interfacing of 8051 microcontroller.

CO5: Describe ARM processor fundamentals, registers, pipeline, and interrupt structure

CO–PO Mapping

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

Syllabus

UNIT I 8086 Microprocessor Architecture and System Organization (06 Hours)

Architecture of 8086, Register Organization, Programming Model, Memory Addresses, Memory Segmentation, Physical Memory Organization, Signal Descriptions of 8086 including Common Function Signals, Minimum and Maximum Mode Signals, Timing Diagrams.

UNIT II 8086 Assembly Language Programming and Instruction Set (06 Hours)

Instruction Formats, Addressing Modes, Instruction Set, Assembler Directives, Procedures, Macros, Simple Programs involving Logical Instructions, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

UNIT III Interfacing Techniques and Peripheral Devices with 8086 (06 Hours)

8255 Programmable Peripheral Interface, D/A and A/D Converters, Stepper Motor Interfacing, Interfacing of DMA Controller 8257, Memory Interfacing to 8086, Various Modes of Operation and Interfacing to 8086, Vector Interrupt Table, Interrupt Service Routine, Architecture of 8259, Communication Interface including Serial Communication Standards and Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT IV 8051 Microcontroller Architecture and Programming (06 Hours)

Overview of 8051 Microcontroller, Interpersonal Communication, Architecture, I/O Ports, Addressing Modes and Instruction Set of 8051, Simple Programs, Memory Interfacing to 8051.

UNIT V Advanced 8051 Applications and ARM Processor Fundamentals (06 Hours)

8051 Real Time Control, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming Serial Communication Interrupts, Programming 8051 Timers and Counters, ARM Processor Fundamentals, Registers, Current Program Status Register, Pipeline, Interrupt and Vector Table.

Text Books:

1. **Microprocessors and Interfacing –** D. V. Hall, TMGH, 2nd Edition, 2006.

2. **The 8051 Microcontroller –** Kenneth J. Ayala, Cengage Learning, 3rd Edition.

3. **ARM System Developer's Guide: Designing and Optimizing System Software –** Andrew N. Sloss, Dominic Symes, and Chris Wright, Elsevier Inc., 2007.

Reference Books:

1. **Advanced Microprocessors and Peripherals –** A. K. Ray and K.M. Bhurchandani, TMH,

2nd Edition 2006.

2. **The 8051Microcontrollers, Architecture and Programming and Applications** -K.Uma Rao, Andhe Pallavi, Pearson, 2009.

3. **Micro Computer System 8086/8088 Family Architecture, Programming and Design** - Liu and GA Gibson, PHI, 2nd Ed.

4. **Microcontrollers and Application -** Ajay. V. Deshmukh, TMGH, 2005.

NPTEL Course: **Microprocessors and Interfacing By Prof. Shaik Rafi Ahamed | IIT Guwahati**

Link:- **https://onlinecourses.nptel.ac.in/noc20_ee11/preview**

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
AEC	BTCS25AE406L	Design and Analysis of Algorithms Lab	-	-	2	50	-	50	100	1

Syllabus : BTCS25AE406L Design and Analysis of Algorithms Lab

Pre-requisites

- Proficiency in C, Python programming, Java Programming.
- Fundamental knowledge of Data Structure

List of Experiments:-

1. Write a program to find the factorial of a number using recursion.
2. Write a program to generate the Fibonacci series using recursion.
3. Write a program to sort numbers using Heap Sort.
4. Write a program to search an element using Binary Search.
5. Write a program to sort numbers using Merge Sort.
6. Write a program to sort numbers using Quick Sort.
7. Write a program to solve the 4-Queens problem using backtracking.
8. Write a program to solve the Travelling Salesperson Problem (TSP) using a simple method.
9. Write a program to solve the Knapsack problem using a greedy approach.
10. Write a program to find the Longest Common Subsequence (LCS) using dynamic programming.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
AEC	BTCS25AE407L	Operating System Lab	-	-	2	50	-	50	100	1

Syllabus : BTCS25AE407L Operating System Lab

Pre-requisites

- Proficiency in C, Python programming, Java Programming.
- Fundamental knowledge of Operating Systems (Linux/Windows command line).

List of Experiments:-

1. Study basic functions of an Operating System and different types of Operating Systems.
2. Write a simple program to show system calls like process ID and process creation.
3. Write a program to create a process and show parent and child process.
4. Write a program for FCFS CPU scheduling.
5. Write a program for Round Robin CPU scheduling.
6. Write a simple program to show process synchronization using a semaphore.
7. Write a program to show deadlock avoidance using Banker's Algorithm.
8. Write a program for FIFO page replacement.
9. Write a program for LRU page replacement.
10. Write a program for disk scheduling using FCFS or SSTF.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VSEC	BTCS25VSE408AL	Data Communication and Networks Lab	-	-	2	50	-	50	100	1

Syllabus : BTCS25VSE408AL Data Communication and Networks Lab

Pre-requisites

- Basic understanding of Digital Electronics and Binary Arithmetic.
- Proficiency in C, C++, or Python programming.
- Fundamental knowledge of Operating Systems (Linux/Windows command line).

List of Experiments:-

1. **Cabling & Configuration:** Study of crimping (Straight/Cross-over cables) and basic network command line tools (ping, ipconfig, tracert, netstat, nslookup).
2. **Socket Programming (TCP):** Implement a Client-Server chat application using TCP sockets where multiple clients can chat with the server.
3. **Socket Programming (UDP):** Implement a connectionless Echo server using UDP sockets.
4. **Error Detection:** Write a program to implement the Cyclic Redundancy Check (CRC) algorithm for error detection.
5. **Flow Control Protocols:** Simulate Stop-and-Wait and Sliding Window (Go-Back-N) protocols to understand reliable data transfer.
6. **Routing Protocols:** Configure RIP (Routing Information Protocol) and OSPF (Open Shortest Path First) in a network simulation tool.
7. **VLAN Configuration:** Setup Virtual LANs (VLANs) and Inter-VLAN routing to segment network traffic.
8. **Packet Analysis:** Capture and analyze HTTP, TCP, and ICMP packets using **Wireshark** (analyze the TCP Three-way handshake).
9. **Network Simulation:** Simulate a simple LAN topology using NS-3 and measure network performance metrics like throughput and latency.
10. **Network Security:** Implement a simple encryption/decryption algorithm (e.g., Substitution Cipher or RSA basics) for secure data transfer.

3. Web Resources

- **Virtual Labs (IIT Kharagpur):**vlabs.iitkgp.ac.in/ant/
- **Cisco Networking Academy:**netacad.com
- **Wireshark Documentation:**wireshark.org/docs

4. Softwares Required

- Wireshark
- Cisco Packet Tracer
- NS-3 (Network Simulator)
- C/C++ Compiler (GCC) or Python (3.8+)

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VSEC	BTCS25VSE408BL	E-Business	-	-	2	50	-	50	100	1

Syllabus : BTCS25VSE408BL E-Business

List of Experiments/Activities:-

1. Study and comparison of **Traditional Business vs E-Business**
2. Case study on **successful E-Business companies** (Amazon, Flipkart, etc.)
3. Design a **basic E-Business model** for a startup
4. Analysis of **online payment systems** used in India
5. Identify **security threats** in E-Business transactions
6. Mini-project on **Digital Marketing strategies**
7. Case study on **legal and ethical issues in E-Business**
8. Seminar / presentation on **future trends in E-Business**

(Experiments are activity-based and may include surveys, discussions, case studies, presentations, or reports.)

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VSEC	BTCS25VSE408CL	Introduction to Financial Accounting Lab	-	-	2	50	-	50	100	1

Syllabus : BTCS25VSE408CL Introduction to Financial Accounting Lab

List of Experiments/Activities/Case Studies:-

Students do Case studies on following related topics

1. Identifying the category and sub category of various accounting terms .
2. Walkthrough of Balance Sheet
3. Types of Accounting and practices
4. Preparation of Final Accounts
5. Preparation of P&L Account
6. Preparation of Balance Sheet
7. Practice Problem: Liquidity Position , Solvency , Profitability
8. Cash flows from Operating Activities
9. Changes in working capital
10. Visualizing the Break Even Point
11. Break Even Analysis

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VSEC	BTCS25VSE408DL	Microprocessor & Microcontroller Lab	-	-	2	50	-	50	100	1

Syllabus : BTCS25VSE408DL Microprocessor & Microcontroller Lab

List of Experiments:-

1. Introduction to MASM
2. 16-bit Arithmetic Operations
3. Sorting of Array for 8086
4. Searching for Character in a String
5. String Manipulations for 8086
6. Arithmetic, Logical and Bit Manipulation Instructions of 8051
7. Timer/Counters in 8051
8. Interrupt Handling in 8051
9. UART Operation in 8051
10. Interfacing LCD to 8051

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VSEC	BTCS25VSE409	Workshop/Skill Activity/Course/Seminar	-	-	2	50	-	-	50	1

Syllabus : BTCS25VSE409 Workshop/Skill Activity/Course/Seminar

Guidelines for Workshop/Skill Activity/Course/Seminar preparation and presentation.

1. Select a **relevant and recent technical topic** related to your branch.
2. Understand the topic clearly before preparing slides or notes.
3. Collect information from **reliable sources** such as textbooks, journals, and trusted websites.
4. Prepare a **well-structured** Workshop/Skill Activity/Course/Seminar with introduction, main content, and conclusion.
5. Limit the presentation to **10–15 slides** with minimum text.
6. Use **simple language, diagrams, and flowcharts** to explain concepts.
7. Maintain **proper font size, color, and alignment** in slides.
8. Practice the Workshop/Skill Activity/Course/Seminar to **manage time effectively**.
9. Use examples to make the topic **easy to understand**.
10. Be prepared to **answer questions** after the presentation.
11. Follow the **time limit** given by the department.
12. End the Workshop/Skill Activity/Course/Seminar with a **brief conclusion and future scope**.
13. Submit the Workshop/Skill Activity/Course/Seminar **report** in the prescribed format on time.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VEC	BTCS25VEC410	Universal Human Values-II	3	-	-	20	20	60	100	3

Syllabus – BTCS25VEC410 Universal Human Values-II

Course Description:

This course introduces students to Universal Human Values and their relevance in personal, social, and professional life. It aims to develop a holistic perspective towards life, fostering harmony within oneself, in family, society, and nature. The course emphasizes self-exploration, ethical conduct, social responsibility, and sustainable development, enabling future engineers to make value-based decisions in their professional practice.

Course Objectives:

1. To understand the importance of value education in technical and professional life.
2. To develop self-awareness and harmony within oneself.
3. To promote harmony in family, society, and professional relationships.
4. To understand the interrelationship between human beings and nature.
5. To cultivate ethical responsibility and holistic vision in engineering practice.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1:Understand the significance of Universal Human Values and self-exploration.

CO2:Develop harmony within self by understanding human aspirations and needs.

CO3:Promote ethical and harmonious relationships in family and society.

CO4:Recognize the importance of sustainable development and environmental responsibility.

CO5: Apply ethical principles and holistic thinking in professional and personal life.

CO–PO Mapping Matrix

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

Syllabus

Unit I : Introduction to Value Education **(09 Hours)**

Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity, the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity, Current Scenario, Method to Fulfill the Basic Human Aspirations.

Unit II: Harmony in the Human Being (Self) **(09 Hours)**

Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to Ensure self-regulation and Health.

Unit III: Harmony in the Family and Society **(09 Hours)**

Family as the basic unit of human interaction, Values in human-human relationships: Trust, Respect, Affection, Care, Guidance, Gratitude, Justice and equality in society, Mutual happiness and mutual prosperity, Social responsibility of engineers.

Unit IV: Harmony with Nature and Existence **(09 Hours)**

Understanding nature as coexistence, Interconnectedness of human beings, society, and nature, Sustainable development, Ethical use of natural resources, Environmental responsibility of engineers, Role of technology in ecological balance.

Unit V: Holistic Vision of Life and Profession **(09 Hours)**

Ethical responsibility in engineering profession, Value-based decision making, Professional ethics and social accountability, Holistic vision of life, Role of engineers in nation building, Case studies related to ethics and values.

Text Books:

1. **A Foundation Course in Human Values and Professional Ethics** – R. R. Gaur, R. Asthana, and G. P. Bagaria, Excel Books, New Delhi.
2. **Human Values** – A. N. Tripathi, New Age International Publishers.

Reference Books:

1. **Human Values and Professional Ethics** – M. K. Dixit, Vikas Publishing House.
2. **Value Education** – S. B. Lall & N. N. Tripathi, Vikas Publishing House.
3. **Ethics in Engineering** – Subhash Sharma, Galgotia Publications.
4. **Handbook on Universal Human Values** – AICTE.

NPTEL Course : Exploring Human Values: Visions of Happiness and Perfect Society, IIT Kanpur, by Prof. A.K. Sharma.

Link : https://nptel.ac.in/courses/109104068

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
HSSM	BTCS25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	-	-	4	50	-	-	50	2

Syllabus - BTCS25HM411 Mini Project/ Case Study/EDP Programme/ Start Up Activity

Guidelines for Writing a Case Study /EDP Programme/ Start up Activity.

1. Understand the Case Study /EDP Programme/ Start up Activity.

Read the case carefully at least twice.

- Identify the **main issue(s)** or problem(s).
- Note important facts, stakeholders, and context.

2. Define the Problem Clearly

- State the core problem in your own words.
- Avoid jumping to solutions too early.
- Support the problem statement with evidence from the case.

3. Analyze the Case Study /EDP Programme/ Start up Activity.

Use relevant **theories, concepts, or models** from the course.

- Examine causes, impacts, and relationships between key factors.
- Consider different perspectives where applicable.

4. Develop Possible Solutions

- Propose two or more realistic alternatives.
- Explain the advantages and disadvantages of each option.
- Ensure solutions are practical and supported by analysis.

5. Recommend the Best Solution

- Choose the most appropriate solution.
- Justify your recommendation with clear reasoning and evidence.
- Explain how it addresses the main problem.

6. Implementation Plan (if required)

- Outline steps for putting the solution into action.
- Mention resources, timeline, and responsibilities.
- Anticipate potential challenges and how to manage them.

7. Conclusion

- Summarize key findings and recommendations.
- Do not introduce new information here.

8. Presentation and Referencing

- Write clearly and concisely.
- Follow the required format (font, spacing, word limit).
- Cite sources properly using the specified referencing style.
- Proofread for grammar and clarity.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VEC	BTCS25VEC412	Life of Shri Sant Gadge Baba	1	-	-	0	-	-	0	AU

Syllabus : BTCS25VEC412 Life of Shri Sant Gadge Baba

Course Description

This course presents the life, philosophy, and social contributions of Shri Sant Gadge Baba, a renowned social reformer of Maharashtra. It explores his early life, spiritual journey, reform movements, campaigns for cleanliness and education, and his efforts toward social equality. The course highlights his moral teachings and their relevance to modern society, particularly for students and young professionals.

Course Objectives

1. To understand the life and historical background of Shri Sant Gadge Baba.
2. To study his social reforms and methods of mass communication.
3. To analyze his contributions toward social equality, education, and cleanliness.
4. To examine his philosophy and moral teachings.
5. To appreciate his legacy and relevance in contemporary society.

Course Outcomes

CO1: Describe the early life and social background of Shri Sant Gadge Baba.

CO2: Explain his social reform movements and preaching methods.

CO3: Analyze his contributions to rural development, education, and social harmony.

CO4: Interpret the philosophical and ethical values from his teachings.

CO5: Evaluate his legacy and apply his values in professional and social life.

CO–PO Mapping Matrix

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

Syllabus

UNIT I: Early Life and Education **(03 Hours)**

Birth and Family Background, Childhood and Early Influences, Spiritual Inclinations and Education, Social Environment in Maharashtra during his Time.

UNIT II: Social Reforms and Preaching **(03 Hours)**

Beginnings of Social Work, Preaching about Cleanliness, Education and Social Harmony, Methods of Reaching the Masses, Simple Stories and Folk Language for Mass Communication.

UNIT III: Contributions to Society **(03 Hours)**

Campaigns for Cleanliness and Hygiene, Promoting Education and Literacy, Advocacy against Caste Discrimination and Superstitions, Influence on Rural Communities.

UNIT IV: Philosophy and Teachings **(03 Hours)**

Core Principles of Life and Work, Emphasis on Selfless Service and Humanity, Spiritual Messages in Daily Life, Moral and Ethical Values from Gadge Baba's Teachings.

UNIT V: Legacy and Recognition **(03 Hours)**

Establishment of Gadge Baba Sansthan, Awards and Honors Received, Influence on Modern Social Work and Education, Lessons for Young Engineers and Students.

Text Books:

1. **Shri Sant Gadge Baba: Jeevan ani Karya** – Maharashtra State Textbook Bureau (Marathi).
2. **Life and Teachings of Shri Sant Gadge Baba** – Dr. S. S. Salunkhe.

Reference Books:

1. **Gadge Baba: Social Reformer of Maharashtra** – V. R. Pandit.
2. **Sant Gadge Baba: Jeevan Darshan** – N. S. Pawar.
3. **Maharashtra State Government Publications on Sant Gadge Baba** – Government of Maharashtra.

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
VEC	BTCS25VEC413	Moral and Ethical Development	1	-	-	50	-	-	50	1

Syllabus : BTCS25VEC413 Moral and Ethical Development

Course Description

This course focuses on the development of moral reasoning, ethical awareness, and character building in personal and professional life. It introduces major theories of moral development, core ethical principles, and contemporary ethical challenges in education, technology, environment, and professional practice. The course emphasizes ethical decision-making, leadership responsibility, and the formulation of a personal code of ethics.

Course Objectives

1. To understand the concepts of morality and ethics and their significance.
2. To study major theories of moral and ethical development.
3. To examine fundamental principles guiding ethical life and decision-making.
4. To analyze ethical challenges in modern technological and professional contexts.
5. To develop ethical reasoning skills and a personal code of conduct.

Course Outcomes

CO1: Explain the concepts of morality, ethics, and their relationship with law and society.

CO2: Describe major theories of moral and ethical development and their applications.

CO3: Apply ethical principles in personal and professional decision-making.

CO4: Analyze contemporary ethical challenges in engineering, technology, and society.

CO5: Demonstrate ethical leadership and formulate a personal code of ethics.

CO–PO Mapping Matrix

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

Syllabus

UNIT I: Introduction to Morality and Ethics **(03 Hours)**

Definition of Morality and Ethics, Importance of Moral Values in Personal and Professional Life, Sources of Ethical Values including Family, Society, Religion and Education, Relationship between Morality, Ethics and Law.

UNIT II: Theories of Moral and Ethical Development **(03 Hours)**

Kohlberg's Theory of Moral Development, Piaget's Theory of Moral Judgment, Gilligan's Ethics of Care, Virtue Ethics and Character Building, Application of Theories in Daily Life

UNIT III: Principles of Moral and Ethical Life **(03 Hours)**

Truthfulness, Honesty and Integrity, Responsibility and Accountability, Respect, Compassion and Empathy, Justice and Fairness, Role of Ethics in Decision Making.

UNIT IV: Moral and Ethical Challenges in Modern Life **(03 Hours)**

Ethical Issues in Education and Professional Life, Technology and Ethics including Privacy, Cybersecurity and Artificial Intelligence, Environmental Ethics and Sustainable Living, Corruption, Dishonesty and Social Responsibility, Strategies to Overcome Ethical Dilemmas.

UNIT V: Application and Case Studies **(03 Hours)**

Moral Decision-Making in Real-Life Situations, Case Studies on Ethical Dilemmas in Engineering and Technology, Leadership and Ethical Responsibility, Role of NGOs and Social Organizations in Promoting Ethics, Developing a Personal Code of Ethics

Text Books:

1. **Moral and Ethical Development** – F. L. Goodwin, Routledge Publications.
2. **Professional Ethics and Human Values** – R. Subramanian, Oxford University Press.

Reference Books:

1. **Ethics in Engineering and Technology** – M. Govindarajan, Prentice Hall.
2. **Human Values and Professional Ethics** – R. S. Naagarazan, New Age International.
3. **Essays on Moral Development** – L. Kohlberg, Harper & Row.
4. **In a Different Voice** – M. Gilligan, Harvard University Press.

NPTEL Course: Ethics, IIT Madras Prof. Sreekumar Nellickapilly

Link:- **https://nptel.ac.in/courses/109106117**

MULTIDISCIPLINARY,

HONOR's

&

ADDITIONAL CRITERIA FOR DOUBLE MINOR

MULTIDISCIPLINARY COURSES OF COMPUTER SCIENCE & ENGINEERING OFFERED TO THE OTHER DEPARTMENTS										
Category	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
MDM	BTCS25MD304A	Data Structures and Algorithms	3	-	-	20	20	60	100	3
	BTCS25MD304B	Computer Organization and Architecture	3	-	-	20	20	60	100	3
MDM	BTCS 25MD404A	Data Communication and Networks	3	-	-	20	20	60	100	3
	BTCS 25MD404B	Object Oriented Programming in Java	3	-	-	20	20	60	100	3
MDM	BTCS 25MD505A	Database Management System	3	-	-	20	20	60	100	3
	BTCS 25MD505AL	Database Management System Laboratory	-	-	2	50	-	50	100	1
	BTCS 25MD505B	Operating System	3	-	-	20	20	60	100	3
	BTCS 25MD505B	Operating System Laboratory	-	-	2	50	-	50	100	1
MDM	BTCS 25MD606A	Data Warehouse and Mining	2	-	-	20	20	60	100	2
	BTCS 25MD606B	Artificial Intelligence and Machine Learning	2	-	-	20	20	60	100	2
MDM	BTCS 25MD705A	Big Data Analytics	2	-	-	20	20	60	100	2
	BTCS 25MD705B	Cloud Computing	2	-	-	20	20	60	100	2

LIST OF COURSES

B.Tech Honors - COMPUTER SCIENCE AND ENGINEERING

****[Swayam / NPTEL]**

Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
HO	BTCS25HO333	Artificial Intelligence: Concepts and Techniques https://nptel.ac.in/courses/106108705	3	-	-	20	20	60	100	3
HO	BTCS 25HO444	Introduction to Machine Learning https://nptel.ac.in/courses/106106139	3	-	-	20	20	60	100	3
HO	BTCS25HO555	Reinforcement Learning https://onlinecourses.nptel.ac.in/noc19_cs55/preview	3	-	-	20	20	60	100	3
HO	BTCS25HO666	Data Analytics with Python https://nptel.ac.in/courses/106107220	3	-	-	20	20	60	100	3
HO	BTCS25HO777	Business Intelligence & Analytics https://onlinecourses.nptel.ac.in/noc26_cs64/preview	3	-	-	20	20	60	100	3
HO	BTCS25HO888	Software Project Management https://onlinecourses.nptel.ac.in/noc19_cs70/preview	3	-	-	20	20	60	100	3

ADDITIONAL CRITERIA FOR DOUBLE MINOR (SPECIALIZATION)										
Category under NEP	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
DMS	BTCS25DMS333	Introduction to Algorithms and Analysis	3	-	-	20	20	60	100	3
DMS	BTCS25DMS444	Probability Theory for Data Science	3	-	-	20	20	60	100	3
DMS	BTCS25DMS555	Data Analytics with Python	3	-	-	20	20	60	100	3
DMS	BTCS25DMS666	Introduction to Large Language Models	3	-	-	20	20	60	100	3
DMS	BTCS25DMS777	Machine Learning for Engineering and Science Applications	3	-	-	20	20	60	100	3
DMS	BTCS25DMS888	Statistical Foundation of Big Data Analysis	3	-	-	20	20	60	100	3