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Pimpri Chinchwad Education Trust's

Pimpri Chinchwad University

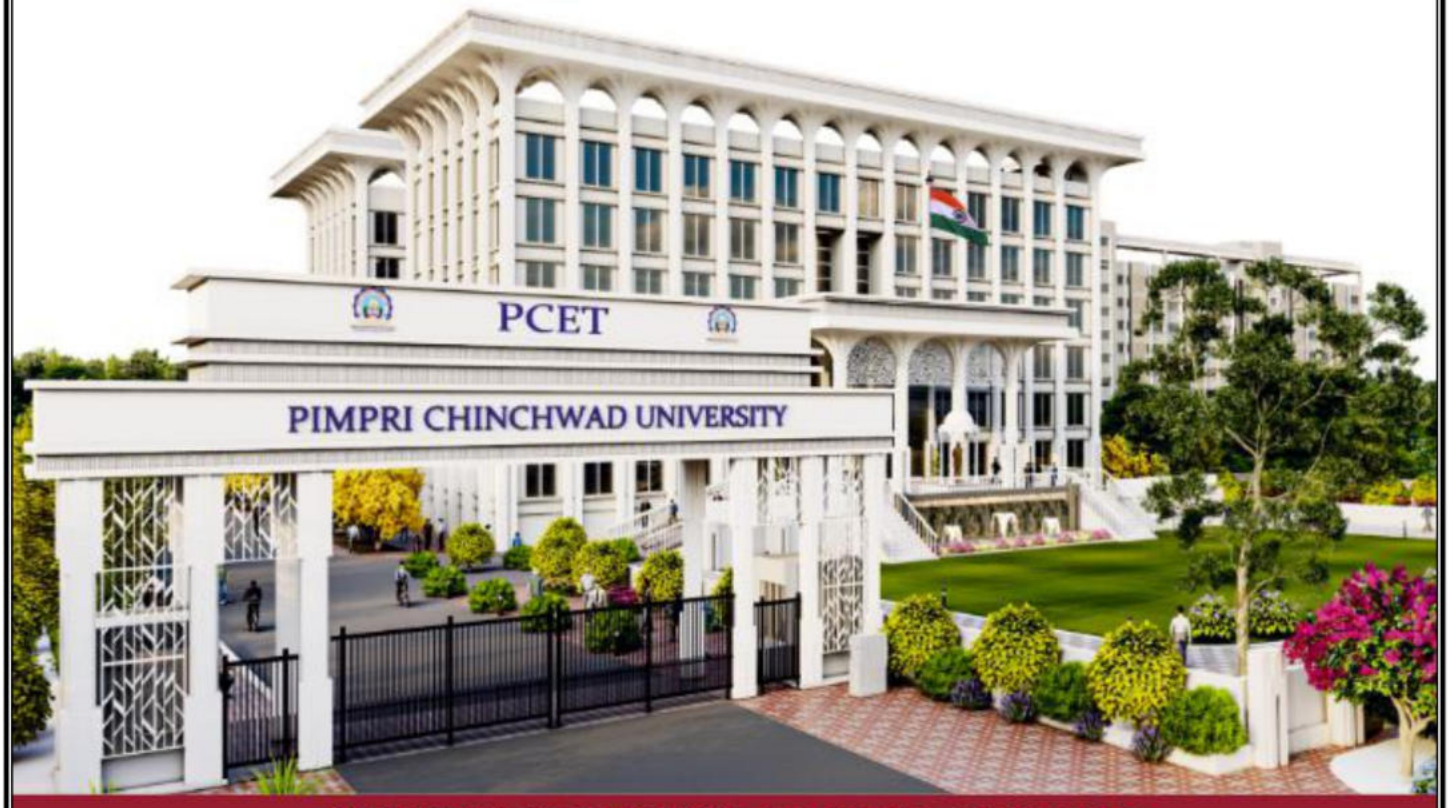
SCHOOL OF ENGINEERING AND TECHNOLOGY

(Established under Maharashtra Act No V of 2023)
Sate, Pune - 412 106. Maharashtra, India

B. TECH

Computer Science and Engineering (Artificial Intelligence and Data Science)

(PATTERN 2024-2028)



EFFECTIVE FROM 2024-25 ACADEMIC YEAR

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Sate, Pune – 412106

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Curriculum Structure

B. TECH
COMPUTER SCIENCE & ENGINEERING
(ARTIFICIAL INTELLIGENCE AND DATA SCIENCE)

(Batch-2024-2028)

School of Engineering and Technology

Effective from

Academic Year 2024-25

Program Structure

Preamble:

The curriculum of B.Tech. Computer Science and Engineering (Artificial Intelligence & Data Science) program offered by the Department of Computer Science Engineering & Technology under Academic Regulation of NEP 2020 is prepared in accordance with the curriculum framework of AICTE, UGC and Maharashtra State Council of Higher Education, National Higher Education Qualifications Framework (NHEQF) and National Credit Framework (NCrF). Further this Outcome Based Curriculum (OBC) is designed with Choice Based Credit and Semester System (CBCSS) enabling the learners to gain professional competency with multi-disciplinary approach catering the minimum requirement (Program Specific Criteria) of Lead Societies like AICTE, ACM and other Professional Bodies as per the Engineering Accreditation Commission (EAC) of ABET and NBA. In addition, the curriculum and syllabi are designed in a structured approach by deploying Feedback Mechanism on Curriculum from various stakeholders viz. Industry, Potential Employers, Alumni, Academia, Professional Bodies, Research Organizations and Parents to capture their voice of the respective stakeholders. The Curriculum design, delivery, and assessment, the three major pillars of academic system is completely aligned in line with Outcome Based Education (OBE) to assess and evaluate the learning outcomes to facilitate the learners to achieve their Professional and Career Accomplishments.

After due deliberations, the scheme and syllabus have been formulated. Salient features of this model curriculum are enumerated as under:

1. Reduced number of credits.
2. Well defined learning objectives & outcomes for each course.
3. Inclusion of courses on socially relevant topics.
4. Built-in flexibility to the students in terms of professional elective and open elective courses and minor course.
5. Mandatory internship to equip the students with practical knowledge and provide them exposure to real time industrial environments.
6. Mapping of Courses to its equivalent NPTEL/SWAYAM Course.

Vision and Mission of Program:

Vision:

To develop engineers well versed with Critical Theory and Practical's (problem solving ability); and sensitive to National and Global challenges from Inter-disciplinary perspective. To create Industry ready; socially and ethically strong professionals.

Mission:

PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering 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 engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed 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 societal 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 engineering practice.
PO9	**Individual and team work:** 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.

Our mission is

- To develop the Computer Professionals by imparting computer engineering knowledge with professional ethics.
- To provide the service to the communities to which we belong at local and national levels, combined with a deep awareness of our ethical responsibilities to our profession and to society.

Program Educational Objectives:

Program Educational Objectives (PEOs) for a BTECH in Artificial Intelligence & Data Science program are as follows:

- **PEO 1:** To provide students with knowledge and skills to become leading experts in the field of computer science engineering.
- **PEO 2:** To provide an innovative and comprehensive curriculum that integrates theoretical knowledge with practical experience, research opportunities, and professional development
- **PEO 3:** To groom the student's overall personality for professional growth.
- **PEO 4:** To inculcate values and ethics among the students and making them aware about their social commitments.

Program Outcome

Program Outcomes (Pos) At the end of program, students should be able to

Program Specific Object

Program Specific Outcomes (PSOs) At the end of program, students should be able to

PSO1	Use knowledge to write programs and integrate them with the hardware/software products in the domains of artificial Intelligent systems, data Science, networking and web technology.
PSO2	Participate in planning and implement solutions to cater to business specific requirements, displaying team dynamics and professional ethics.

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INDEX

Sr. No.	Type of course	Abbreviations
1	Basic Science Course (BSC)	**BSC**
2	Engineering Science Course (ESC)	**ESC**
3	Programme Core Course (PCC)	**PCC**
4	Programme Elective Course (PEC)	**PEC**
5	Multidisciplinary Minor (MD M)	**MIN**
6	Open Elective (OE) Other than a particular program	**OE**
7	"Vocational and Skill Enhancement Course (VSEC)"	**VSEC**
8	Ability Enhancement Course (AEC -01, AEC-02)	**AEC**
9	Entrepreneurship/Economics/ Management Courses	**MGMT**
10	Indian Knowledge System (IKS)	**IKS**
11	Value Education Course (VEC)	**VEC**
12	Research Methodology	**RM**
13	Comm. Engg. Project (CEP)/Field Project (FP)	**CEP/FP**
14	Project	**PROJ**
15	Internship/ OJT	**OJT**
16	Co-curricular Courses (CC)	**CC**
17	Massive Open Online Courses (MOOC)	**MOOC**

Sr. No.	Type of course	No. of Courses	Total Credits	
			No	%
1	Basic Science Course (BSC)	04	16	9.9
2	Engineering Science Course(ESC)	05	14	8.6
3	Programme Core Course (PCC)	29	62	38.2
4	Programme Elective Course (PEC)	10	25	15.4
5	Multidisciplinary Minor (MD M)	05	11	6.8
6	Open Elective (OE) Other than a particular program	04	08	5
7	"Vocational and Skill Enhancement Course (VSEC)"	02	03	2
8	Ability Enhancement Courses / Co-curricular Courses (CC) (AEC -01, AEC-02)	02	04	2.5
9	Indian Knowledge System (IKS)	02	-	-
10	Value Education Course (VEC)	02	-	-
11	Research Methodology	01	02	1.2
12	Comm. Engg. Project (CEP)/Field Project (FP)	02	03	2
13	Project	03	05	3
14	Internship/ OJT	01	06	-
15	Massive Open Online Courses (MOOC)	03	03	-
	Total	72	162	-

CREDIT DISTRIBUTION: SEMESTER WISE

Sr. No.	Type of course	No. of Credits/Semester								Total
		1	2	3	4	5	6	7	8	
1	Basic Science Course (BSC)	08	08							**16**
2	Engineering Science Course (ESC)	07	07							**14**
3	Programme Core Course (PCC)	03	03	14	11	13	10	4	4	**62**
4	Programme Elective Course (PEC)					5	8	4	8	**25**
5	Multidisciplinary Minor (MD M)				02	3	2	2	2	**11**
6	Open Elective (OE) Other than a particular program			04	04					**08**
7	"Vocational and Skill Enhancement Course (VSEC)"	01	01		01					**03**
8	Ability Enhancement Course (AEC -01, AEC-02)	02	02							**04**
9	Entrepreneurship/Economics/ Management Courses									
10	Indian Knowledge System (IKS)									
11	Value Education Course (VEC)									
12	Research Methodology								2	**02**
13	Comm. Engg. Project (CEP)/Field Project (FP)			02	01					**03**
14	Project					01		2	2	**05**
15	Internship/ OJT							6		**06**
16	Co-curricular Courses (CC)									
17	Massive Open Online Courses (MOOC)						01	01	01	**03**
Total		21	21	20	19	22	21	19	19	162

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SCHOOL OF ENGINERRING & TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND DATA SCIENCE)

As per Guidelines of NEP-2020 to be implemented

w.r.f. from Academic Year 2024-25

Choice Based Credit System (CBCS)

(2024 Pattern)

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SEMESTER - III

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	Total
UBTCE201	PCC	Data Structures and Algorithms	3	-	-	3	3	40	60	-	100
UBTCE202	PCC	Data Structures and Algorithms Laboratory	-	1	-	1	2	25	-	25	50
UBTCE203	PCC	Python Programming	3	-	-	3	3	40	60	-	100
UBTCE204	PCC	Python Programming Laboratory	-	1	-	1	2	25	-	25	50
UBTCE205 A /UBTCE205 B	OE	Open Elective-I	3	-	-	3	3	40	60	-	100
UBTCE206 A / UBTCE206 B	OE	Open Elective-I Lab	-	1	-	1	2	25	-	25	50
UBTCE207	PCC	Discrete Mathematics	2		1	3	3	40	60	-	100
UBTCE208	PCC	Operating System	3	-	-	3	3	40	60	-	100
UBTCE209	CEP	Community Engineering Project	-	2	-	2	4	25	-	25	50
UFL201	AEC	Foreign Language I	2	-	-	-	2	50	-	-	50
ACUHV201/ACCOI 201	AC	UHV II :Understanding Harmony/ Constitution of India	2	-	-	-	2	50	-	-	50
		Total	**18**	**5**	**1**	**20**	**29**	**400**	**300**	**100**	**800**

List of Open Elective -I : Semester-III

Course Code	Elective-A	Course Code	Elective-B
UBTCE205 OE-Open Elective-I			
UBTCE205 A	Digital Logic& Microprocessor	UBTCE205 B	Signals System
UBTCE206 OE-Open Elective-I Lab			
UBTCE206 A	Digital Logic& Microprocessor Lab	UBTCE206 B	Signals System Lab

Foreign Language–I for Semester-III

Course Code	International Language 1
UFL201 FL-I	
UFL201 A	Foreign Language-I : German
UFL201 B	Foreign Language-I : Japanese

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SEMESTER - IV

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	Total
UBTCE210	PCC	Database Management System	3	-	-	3	3	40	60	-	100
UBTCE211	PCC	Database Management System Laboratory	-	1	-	1	2	25	-	25	50
UBTCE212	PCC	Java Programming	2	-	-	2	2	20	30	-	50
UBTCE213	PCC	Computer Organisation and Architecture	2	-	-	2	2	20	30	-	50
UBTCE214	PCC	Applied Statistical Techniques	2	-	1	3	3	40	60	-	100
UBTCE215 A / UBTCE215 B	OE	Open Elective-II	3	-	-	3	3	40	60	-	100
UBTCE216 A / UBTCE216 B	OE	Open Elective-II Lab	-	1	-	1	2	25	-	25	50
UBTCE217	VSEC	Java Laboratory	-	1	-	1	2	25	-	25	50
UFL202	AEC	Foreign Language II	2	-	-	-	2	50	-	-	50
	MIN	Minor 1	2	-	-	2	2	20	30	-	50
ACUHV201/ ACCOI 201	AC	UHV: Understanding Harmony/ Constitution of India	2	-	-	-	2	50	-	-	50
UBTCE219	CEP	Project Based on Digital and Technological Solutions.	-	1	-	1	2	25	-	25	50
		Total	**18**	**4**	**1**	**19**	**27**	**380**	**270**	**100**	**750**

List of Open Elective II: Semester-IV

Course Code	Elective-A	Course Code	Elective-B
UBTCE205 OE-OPEN ELECTIVE-II			
UBTCE215 A	IoT	UBTCE215 B	Digital Image Processing
UBTCE206 OE-OPEN ELECTIVE-II LAB			
UBTCE216 A	IoT Lab	UBTCE216 B	Digital Image Processing Lab

Foreign Language –II for Semester-IV

Course Code	International Language II
UFL201 FL-II	

UFL202 A	Foreign Language-II: German
UFL202 B	Foreign Language-II: Japanese

SEMESTER - V

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	TOTAL
UBTCE301	PCC	Theory of Computation	2	-	1	3	3	40	60	-	100
UBTCE302	PCC	Computer Network	3	-	-	3	3	40	60	-	100
UBTCE303	PCC	Computer Network Lab	-	1	-	1	2	25	-	25	50
UBTDS301	PCC	Data Science and Analytics	3		-	3	3	40	60	-	100
UBTDS302	PCC	Data Science and Analytics Lab	-	1	-	1	2	25	-	25	50
UBTML301 A / UBTCE 304 B	PEC	Programme Elective I	3		-	3	3	40	60	-	100
UBTML302 A / UBTCE 305 B	PEC	Programme Elective I Lab	-	1	-	1	2	25	-	25	50
	MIN	Minor-2	2	-	-	2	2	20	30	-	50
UBTCE308	PCC	Software Engineering and Project Management	2	-	-	2	2	20	30	-	50
UBTCE309	PROJ	Technical Seminar	-	-	1	1	1	25	-	25	50
UFL301	VSEC	Foreign Language III	2	-		-	2	50	-	-	50
ACALR301/ ACCEVS301	AC	Aptitude and logical Reasoning /Environmental Studies	2	-	-	-	2	50	-	-	50
		Total	**19**	**3**	**2**	**20**	**27**	**400**	**300**	**100**	**800**

List of Programme Elective Course I: Semester-V

Course Code	Programme Elective Courses	Course Code	Programme Elective Courses
Program Elective Course I: THEORY			
UBTML301 A	Artificial Intelligence	UBTCE 304 B	Advanced Web Programming
Program Elective Course I: LAB			
UBTML302A	Artificial Intelligence Lab	UBTCE305 B	Advanced Web Programming Lab

Foreign Languages –III for Semester-V

Course Code	Foreign Language- III
UFL301 FL-III	
UFL301 A	Foreign Language-III: German
UFL301 B	Foreign Language-III: Japanese

SEMESTER - VI

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	TOTAL
UBTDS303	PCC	Data Visualization Techniques	3	-	-	3	3	40	60	-	100
UBTDS304	PCC	Data Visualization Techniques Lab	-	1	-	1	2	25	-	25	50
UBTCE312	PCC	System Software	2	-	-	2	2	20	30	-	50
UBTCE313	PCC	Design and Analysis of Algorithms	3	-	-	3	3	40	60	-	100
UBTCE314	PCC	Design and Analysis of Algorithms Lab	-	1	-	1	2	25	-	25	50
UBTML303A /UBTML305 A	PEC	Programme Elective Course-II	3	-	-	3	3	40	60	-	100
UBTML304 B /UBTML306 B	PEC	Programme Elective Course- II Lab	-S	1	-	1	2	25	-	25	50
UBTDS305 A/ UBTCE310 A	PEC	Programme Elective Course - III	3	-	-	3	3	40	60	-	100
UBTDS306 B/ UBTCE 311 B	PEC	Programme Elective Course-III Lab	-	1	-	1	2	25	-	25	50
	MIN	Minor 3	2		-	2	2	20	30	-	50
VSE302	VSEC	International Language - IV	2	-		-	2	50	-	-	50
MOOCDS301	MOOC	MOOC II (Data Visualization using R programming/Advanced Full stack development/PHP)	-	-	1	1	2	25	-	-	25
ACALR301/ ACCEVS301	AC	Aptitude and logical Reasoning /Environmental Studies	2	-	-	-	2	50	-	-	50
		Total	**20**	**4**	**1**	**21**	**30**	**425**	**300**	**100**	**825**

List of Program Elective Course II & III : Semester-VI

Course Code	Programme Elective Courses	Course Code	Programme Elective Courses
Program Elective Course-II: PEC Theory			
UBTML303 A	Machine Learning	UBTML305A	Pattern Recognition and Optimization
Program Elective Course-II: PEC Lab			
UBTML304 B	Machine Learning Lab	UBTML306 B	Pattern Recognition and Optimization Lab
Program Elective Course-III: PEC Theory			
UBTDS305 B	Big Data Analytics	UBTCE 310 B	STQA

UBTDS306 B	Big Data Analytics lab	UBTCE 311 B	STQA lab

Foreign Languages –IV for Semester-VI

Course Code	Foreign Language-IV
UFL201 FL-IV	
UFL302 A	Foreign Language-IV: German
UFL302 B	Foreign Language-IV: Japanese

SEMESTER - VII

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	TOTAL
UBTDS401	PCC	Generative and XAI	3	-	-	3	3	40	60	-	100
UBTDS402	PCC	Generative and XAI Lab	-	1	-	1	2	25	-	25	50
UBTML401 /UBTML403	PEC	Programme Elective- IV	3	-	-	3	3	20	30	-	50
UBTML402/ UBTML404	PEC	Programme Elective IV Lab	-	1	-	1	2	25	-	25	50
	MIN	Minor 4	2	-	-	2	2	20	30	-	50
UBTDS403	INT/OJT	Industry/International/Research INTERNSHIP	-	6	-	6	12	100	-	150	250
UBTDS404	PROJ	Major Project – IAIDS	-	2	-	2	4	25	-	100	125
MOOCDS401	MOOC	MOOC III(Networking and Cyber Security/ARVR Certification)	-	-	1	1	2	25	-	-	25
		Total	**8**	**10**	**1**	**21**	**30**	**280**	**120**	**300**	**700**

List of Program Elective Course IV: Semester-VII

Course Code	Programme Elective Courses	CourseCode	Programme Elective Courses
Program Elective Course-IV: PEC Theory			
UBTML401 A	Deep Learning	UBTML403 B	Natural Language Processing
Program Elective Course-IV: PEC Lab			
UBTML402A	Deep Learning Lab	UBTML404B	Natural Language Processing Lab

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SEMESTER - VIII

Course Code	Course Type	Course Name	TEACHING SCHEME					ASSESSMENT			
			THY	PR	TU	CREDITS	HRS.	CIA	ESA	PR /OR	TOTAL
UBTDS405	PCC	Business Analytics	3		-	3	3	40	60		100
UBTDS406	PCC	Business Analytics Lab		1	-	1	2	25	-	25	50
UBTDS407 A/UBTML407 B	PEC	Programme Elective V	3		-	3	3	40	60		100
UBTDS408 A/UBTML 408 B	PEC	Programme Elective V Lab	3		-	3	3	40	60		100
UBTDS409 A /UBTCE 306 B	PEC	Programme Elective VI	2			2	2	20	30		50
UBTCE409	RM	Research Methodology & IPR	2		-	2	2	20	30		50
	MIN	Minor 5	2			2	2	20	30		50
UBTDS410	PROJ	Major Project - II		2	-	2	4	100	-	125	225
MOOCDS402	MOOC	MOOC 3 Virtual Reality/ Data Mining/ UAV			1	1	2	25			25
		Total	**15**	**3**	**1**	**19**	**23**	**255**	**270**	**150**	**750**

List of Program Elective Course V& VI: Semester-VIII

Course Code	Programme Elective Courses	Course Code	Programme Elective Courses
Program Elective Courses-V: PEC Theory			
UBTDS407 A	Robotic Process Automation	UBTML407 B	Computer Vision and Video Processing
Program Elective Course-V: PEC Theory			
UBTDS408 A	Robotic Process Automation Lab	UBTML408 B	Computer Vision and Video Processing Lab
Program Elective Course-VI: PEC Theory			
UBTDS409 A	Quantum Computing	UBTCE306 B	Cloud Computing

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Internship Schemes

	Scheme A	Scheme B	Scheme C
Semester	6 Sem Summer	7 Sem	8 Sem
Mode	Offline	Online /Offline	Online /Offline
Duration	3-4 Months	3-4 Months	3-4 Months
Outcome	Project	Project	Project
Online Course	Not Required	50% Online MOOC Courses and remaining courses to be completed offline	50% Online MOOC Courses and remaining courses to be completed offline

COURSE SYLLABUS
SYBTECH
SEMESTER-III

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Course Name	Data Structures and Algorithms	Course Code/Course Type	UBTCE201 /PCC

Name of the Program:	Course Pattern 2024 BTECH CSE AIDS			Version: 3		Level: UG	
Teaching Scheme					Assessment Scheme		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/ Oral**
3	-	-	**3**	**3**	**40**	**60**	-
Pre-Requisite: Knowledge of C Programming							
Course Objectives (CO):	The objectives of Data Structures and Algorithms are: 1. To gain the knowledge about the concept of stack, queue and linked list. 2. To categorize the use of searching and sorting techniques. 3. Learn programming methodology for capability building. 4. Apply programming concepts to solve real life problem. 5. Implement Non-Linear Data Structures like Trees and graphs using programming language.						
Course Learning Outcomes (CLO):	Students would be able to: **1.** Apply and analyze use of stacks, queues and linked lists with their applications. **2.** Apply and analyze use of searching and sorting techniques with their applications 3. Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures. 4. Apply advanced data structure strategies to solve real world problems. 5. Apply concepts learned in various domains like DBMS, compiler						

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to data structures, representing stacks and queues in C using arrays, linked lists: operations Stack and Queue implementation using Linked list, infix to post fix conversion, postfix expression evaluation, doubly linked lists, circular lists, polynomial representation & operations.	**CLO 1**	**9**
UNIT II		
Linear and binary search methods, sorting – Bubble sort, Selection sort, Insertion sort, Quick sort and Merge Sort. Input and output – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations.	**CLO 2**	**9**
UNIT III		
Linear Data Structure Array: Representation of arrays, Applications of arrays, sparse matrix and its representation., Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi, Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue, Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.	**CLO 3**	**9**
UNIT IV		
Nonlinear Data Structure: Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees to Binary Trees, Applications of Trees-Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-Matrix Representation of Graphs, Elementary Graph operations, (Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree).	**CLO 4**	**9**
UNITV		
Hashing And File Structures: Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, indexing structure for index files, hashing for direct files, multi-key file organization and access methods.	**CLO 5**	**9**
Total Hours		**45**

Learning Resources

Text Books:

1. Herbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 2003.
2. John R. Hubbard, "Data Structures with C++", Schaum's Outlines, Tata McGraw Hill Education, 2000.

Reference Books:

1. Michael T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", Wiley India Pvt. Ltd., 2004.
2. Seymour Lipschutz, "Data Structures", Schaum's Outlines, Tata McGraw Hill Education, 2006

Online Resources/E-Learning Resources:

1. https://nptel.ac.in/courses/106102064 Data Structures and Algorithms, IIT Delhi Prof. Naveen Garg Date of Reference 18-4-2024
2. https://nptel.ac.in/courses/106103069 Date of Reference 18-4-2024

Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG
Course Name	Data Structures and Algorithms Laboratory	Course Code/Course Type	UBTCE202/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25

Pre-Requisite: Knowledge of C Programming

Course Objectives (CO):	The objectives of this course are: 1. To gain the knowledge about the concept of stack, queue and linked list. 2. To categorize the use of searching and sorting techniques. 3. To Learn programming methodology for capability building. 4. To Apply programming concepts to solve real life problem. 5. To Implement Non-Linear Data Structures like Trees and graphs using programming language.
Course Learning Outcomes (CLO):	Students would be able to: **1.** Apply and analyze use of stacks, queues and linked lists with their applications. **2.** Apply and analyze use of searching and sorting techniques with their applications 3. Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures. 4. Apply advanced data structure strategies to solve real world problems. 5. Apply concepts learned in various domains like DBMS, compiler

Course Contents/Syllabus:

Assignment/ Practical/ Activity Number	Assignment/ Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1:	Week 1	WAP to demonstrate push, pop, traverse operations performed on stack.	CLO1	2
2	Practical 2:	Week 2	WAP to implement linear / circular queue using array.	CLO1	2
3	Practical 3:	Week 3	WAP to perform insertion and deletion in a single and double linked list	CLO2	2
4	Practical 4:	Week 4	WAP to sort an array of N elements using Selection sort.	CLO2	2
5		Week 5	WAP to sort an array of N elements using Selection sort.	CLO2	2
6	Practical 5:	Week 6	WAP to sort an array of N elements using Insertion sort	CLO3	2
7	Practical 6:	Week 7	WAP to sort an array of N elements using Quick sort	CLO3	2
8	Practical 7:	Week 8	WAP to sort an array of N elements using Merge sort.	CLO4	2
9	Practical 8:	Week 9	Write a program that uses both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers: i. Linear search ii. Binary search	CLO4	2
10	Practical 9:	Week 10	Write a program to perform the following operations: 1.Insert an element into a binary search tree. 2.Delete an element from a binary search tree.	CLO5	2

			3.Search for a key element in a binary search tree.		
11	Practical 10:	Week 11	To implement Depth First Search / Breadth First Search Algorithm	CLO5	2
12		Week 12	To implement Depth First Search / Breadth First Search Algorithm		2
13	Mini Project /Task	Week 13/14/15	Mini Project /Task	CLO1 /2/3/4/ 5	6

Learning Resources

Text Books:

1. Herbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 2003.
2. John R. Hubbard, "Data Structures with C++", Schaum's Outlines, Tata McGraw Hill Education, 2000.

Reference Books:

1. Michael T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", Wiley India Pvt. Ltd., 2004.
2. Seymour Lipschutz, "Data Structures", Schaum's Outlines, Tata McGraw Hill Education, 20

Online Resources/E-Learning Resources:

1. https://nptel.ac.in/courses/106102064, Data Structures and Algorithms, IIT Delhi Prof. Naveen Garg, Date of Reference 18-4-2024
2. https://nptel.ac.in/courses/106103069 Data Structures and Program Methodology, IIT Guwahati Dr. S.V. Rao, Dr. Pradip K Das, Date of Reference 18-4-2024

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Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG

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Course Name	Python Programming				Course Code/ Course Type	UBTCE203/PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-
Pre-Requisite: Basic knowledge of Programming in C							

Course Objectives (CO):	The objectives of Python Programming are: 1. To learn the fundamentals of the Python programming language. 2. To create Python lists, tuples to represent compound data. 3. To write and execute simple as well as complex Python programs. 4. To analyze the concepts of procedural as well as object-oriented Python programs. 5. To perform files handling operations and handle exceptions using Python.
Course Learning Outcomes (CLO):	Students would be able to: 1. Elaborate the features of Python programming language. 2. Apply the conditional and looping constructs using python. 3. Use the multidimensional array and string operations using python. 4. Analyze and apply the object-oriented concepts using python programming. 5. Apply the file handling and exception handling using python programming.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Python:	**CLO 1**	**9**

Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, and Set - Type Conversion- Operators. Execution of a Python, Program, Writing Our First Python Program, Statements Precedence of Operators.		
UNIT II		
Decision Making and looping: Conditional (if), Alternative (if-else), Chained Conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Math and Random number functions.	**CLO 2**	**9**
UNIT III		
Array and String: Arrays in Python, Strings and Characters. Strings: String Slices, Immutability, String Functions and Methods, String Module; Lists as Arrays, Sum an Array of Numbers, Linear Search, Binary Search.	**CLO 3**	**9**
UNIT IV		
Function and OOPs concept: User defined functions - function arguments & its types, OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance.	**CLO 4**	**9**
UNIT V		
Files and Exception: Text Files, Reading and Writing Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.	**CLO 5**	**9**
Total Hours		**45**

Learning Resources

Textbooks:

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2012.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Python", O'Reilly, 2nd Edition, 2018.

Reference Books:

1. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006
2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009

Online Resources/E-Learning Resources:

1. https://www.w3schools.com/python/
2. https://www.learnpython.org/

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Name of the Program:	BTECH CSE AIDS				Semester: 3	Level: UG	
Course Name	Python Programming Laboratory				Course Code/ Course Type	UBTCE204 /PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25

Pre-Requisite:

1. Basic knowledge of Programming in C

Course Objectives (CO):	The objectives of Python Programming are: 1. To learn the python graphical user interface and editors to implement Python programming language. 2. To create Python lists, tuples to represent compound data. 3. To write simple as well as complex Python programs. 4. To analyze the concepts of procedural as well as object-oriented Python programs. 5. To perform files handling operations and handle exceptions using Python.
Course Learning Outcomes (CLO):	Students would be able to: 1. Create data structures using Python programming language. 2. Apply the conditional and looping constructs using python. 3. Use the multidimensional array and string operations using python. 4. Analyze and apply the object-oriented concepts using python programming. 5. Apply the file handling and exception handling using python programming.

ourse Contents/Syllabus:

Practical Plan

Assignment/Practical/ Activity Number	Assignment/Practical/ Activity Title	Week Number / Turn	Details	CLO	Hours
1	Practical 1: Command Line Argument	Week 1/Turn 1	To write a python program that takes in command line arguments as input and print the number of arguments.	CLO1	2
2	Practical 2: Data structure	Week 2/Turn 1 Week 3/Turn 1 Week 4/Turn 1	To write a python program to perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, and Set.	CLO1	6
3	Practical 3: Control Statements	Week 5/Turn 1 Week 6/Turn 1	To write a python program to Solve problems using decision and looping statements.	CLO2	4
4	Practical 4: Linear Search	Week 7/Turn 1	To write a python program to perform linear search.	CLO2	2
5	Practical 5: Binary Search	Week 8/Turn 1	To write a python program to perform Binary search using strings.	CLO3	2
6	Practical 6: Numerical Operations	Week 9/Turn 1	To write a python program to handle numerical operations using math and random number functions.	CLO3	2
7	Practical 7: User Defined Functions	Week 10 /Turn 1, Week 11 /Turn 1	To write a python program to Create user-defined functions with different types of function arguments.	CLO4	4
8	Practical 8: Packages and Modules	Week 12 /Turn 1	To write a python program to Create packages and import modules from packages.	CLO4	2
9	Practical 9: File	Week 13	To write a python program to perform File manipulations- open,	CLO5	2

	Handling Operations	/Turn 1	close, read, write, append and copy from one file to another.		
10	Practical 10: Exception Handling Operations	Week 14 /Turn 1 Week 15 /Turn 1	To write a python program to handle Exceptions using Python Built-in Exceptions.	CLO5	4
Total Hours					**30**

Learning Resources

Textbooks:

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2012.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Python", O'Reilly, 2nd Edition, 2018.

Reference Books:

1. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006
2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009

Online Resources/E-Learning Resources:

1. https://www.w3schools.com/python/
2. https://www.learnpython.org/

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Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG

Course Contents/Syllabus:

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Course Name	Digital Logic and Microprocessor				Course Code/Course Type	UBTCE205A /OE1	
Descriptors/Topics						CLO	Hours
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	NA	NA	3	3	40	60	NA
Pre-Requisite: XIIth Science /Diploma (Engineering)							

Course Objectives (CO):	The objective of Digital Electronics & Logic Design is: 1. To understand the basics of Digital fundamentals, Boolean algebra, its applications and combinational logic circuits in digital systems. 2. Study, analysis and design of clocked sequential circuits. 3. To get acquaint students with the asynchronous Sequential Circuits and Design of Hazard free circuits. 4. To learn the architecture and pin configuration of 8086 Microprocessor.
Course Learning Outcomes (CLO):	At the end of the course: 1. Use digital electronics in the present contemporary world. 2. Design various combinational digital circuits using logic gates. 3. Do the analysis and design procedures for synchronous and asynchronous sequential circuits. 4. Use the semiconductor memories and related technology. 5. To identify the architecture and pin configuration of 8086 Microprocessor.

UNIT I		
Digital Fundamentals : Number Systems –Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes –Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine.	**CLO 1**	**9**
UNIT II		
Combinational Circuit Design Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder –Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.	**CLO 2**	**9**
UNIT III		
Synchronous Sequential Circuits: Flip flops –SR, JK, T, D, Master/Slave FF –operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits –Design –Moore/Mealy models, state minimization, state assignment, circuit implementation –Design of Counters-Ripple Counters, Ring Counters, Shift registers, Universal Shift Register	**CLO 3**	**9**
UNIT IV		
Asynchronous Sequential Circuits: Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.	**CLO 4**	**9**
UNIT V		
8086 MICROPROCESSOR: Introduction to 8086 – architecture – pin description – External memory interfacing – bus cycle –some important companion chips - Maximum mode bus cycle-memory interfacing - Minimum mode System configuration- Maximum mode system configuration – Interrupts processing – 8087 Numeric data processor - data types – architecture - instruction set.	**CLO 5**	**9**
Total Hours		**45**

Learning Resources:-

Text Books:

1. Digital Logic And Computer Design By M. Morris Mano (2nd Edition), PHI
2. Modern Digital Electronics By R.P. Jain, Mc Graw Hill
3. Digital Electronics By MalvinoLeach, McGraw Hill
4. Krishna Kant, "Microprocessors and Microcontrollers", Prentice Hall of India, 2013.

Reference Books:

1. Thomas. L. Floyd ,"Digital Fundamentals" , Pearson ,11th Edition.
2. Digital Systems: Principles and Applications, Book by Ronald J Tocci
3. DoughlasV.Hall, —Microprocessors and Interfacing, Programming and Hardware, TMH,2012.

Online resources:

1. https://www.udemy.com/topic/digital-electronic/ dated 16/04/24
2. https://www.classcentral.com/course/youtube-digital-electronics-48205 dated 16/04/24
3. https://onlinecourses.nptel.ac.in/noc22_ee55/preview dated 16/04/24
4. https://onlinecourses.nptel.ac.in/noc22_ee12/preview

Course Contents/Syllabus:

Assignment/ Practical/Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours

Name of the Program:	BTECH CSE AIDS	Semester : 3	Level: UG
Course Name	Digital Electronics & Microprocessor Lab	Course Code/Course Type	UBTCE206A/OE1
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
NA	1	NA	1	2	25	NA	25

Pre-Requisite: XIIth Science /Diploma (Engineering

Course Objectives (CO):	The objective of Digital Electronics & Logic Design are: 1. To understand the basics of Digital fundamentals, Boolean algebra, its applications and combinational logic circuits in digital systems. 2. Study, analysis and design of clocked sequential circuits. 3. To get acquaint students with the asynchronous Sequential Circuits and Design of Hazard free circuits. 4. To learn the architecture and pin configuration of 8086 Microprocessor.
Course Learning Outcomes (CLO):	At the end of the course: 1. Use digital electronics in the present contemporary world. 2. Design various combinational digital circuits using logic gates. 3. Do the analysis and design procedures for synchronous and asynchronous sequential circuits. 4. Use the semiconductor memories and related technology. 5. To identify the architecture and pin configuration of 8086 Microprocessor.

1	Practical 1:	Week 1	Practical 1: Introduction: Study of logic gates.	CLO1	2
2	Practical2:	Week 2	Practical2: Simplification, Realization of Boolean expressions using Logic gates / Universalgates. 1.Realization of half/full adder using logic gates 2.Realization of half/full Subtractor using logic gates	CLO1	2
3	Practical 3:	Week 3	Practical 3: 1.Realization of parallel adder /Subtractor using 7483 chip 2.BCD to Ex-3 code conversion and vice versaa.Realization of parallel adder /Subtractor using 7483 chipb.BCD to Ex-3 code conversion and vice versa	CLO2	2
4	Practical 4:	Week 4	Practical 4: Realization of Binary to Gray code converter & vice versa	CLO 2	2
5	Practical 5:	Week 5	Practical 5: 1.MUX using 74153 for Arithmetic circuits 2.DEMUX using 74139 for code converter		2
6	Practical 6:	Week 6	Practical 6: Realization of one/two bit comparator & study of 7485 magnitude Comparator. Realization of one/two bit comparator & study of 7485 magnitude Comparator.	CLO3	2
7	Practical 7:	Week 7	Practical 7: 1.Use of decoder chip to drive LED/LCD display 2.Priority Encoder	CLO3	2
8	Practical 8:	Week 8	Practical 8: Truth table verification of flip-flops 1.JK master slave 2.T-type 3. D type	CLO4	2
9	Practical 9:	Week 9	Practical 9: To study 8086 microprocessor system.	CLO5	2
10	Practical 10:	Week 10	Practical 10: Assembly language program using 8086 MASM software and 8086	CLO5	2

			microprocessor kit- Addition, subtraction, multiplication, division		
Total Hours					**20**

Learning Resources:-

Text Books:

1. Digital Logic And Computer Design By M. Morris Mano (2nd Edition), PHI
2. Modern Digital Electronics By R.P. Jain, Mc Graw Hill
3. Digital Electronics By MalvinoLeach, Mc Graw Hill

Reference Books:

1. Thomas.L.Floyd ,"Digital Fundamentals" , Pearson ,11th Edition.
2. Digital Systems: Principles and Applications, Book by Ronald J Tocci

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Name of the Program:	BTECH CSE AIDS	Semester : 3	Level: UG

Course Name	Signal System	Course Code/ Course Type	UBTCE205B/OE1
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-

Pre-Requisite: Signal theory, Mathematics

Course Objectives (CO):	The objectives of Signals and Systems are: 1. To recall the basic knowledge about the different type of signals 2. To recognize the system analysis in frequency domain. 3. To apply the knowledge of Fourier and Laplace transform. 4. To analyze correlation and spectral density. 5. To evaluate probability, random variables & signals.
Course Learning Outcomes (CLO):	Students would be able to: 1. Identify different type of signals. 2. Explain the system analysis in frequency domain. 3. Apply knowledge of Fourier and Laplace transform. 4. Analyze correlation and spectral density 5. Evaluate the probability, random variables & signals.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Signals and Systems: Definition of signals and systems, communication and control systems as examples, Classification of signals: Continuous time and discrete time, even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power. Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration (accumulator for DT), time scaling, time shifting and folding, precedence rule. Elementary signals: exponential, sine, step, impulse and its properties, ramp, rectangular, triangular, signum, sinc. Systems: Definition, Classification: linear and nonlinear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible.	**CLO 1**	**9**
UNIT II		
System Analysis: System modeling: Input output relation, impulse response, block diagram, integro-differential equation and state-space representation. Definition of impulse response, convolution integral, convolution sum, computation of convolution integral using graphical method for unit step to unit step, unit step to exponential, exponential to exponential and unit step to rectangular, rectangular to rectangular only. Computation of convolution sum by all methods. Properties of convolution, system interconnection, system properties in terms of impulse response, step response in terms of impulse response.	**CLO 2**	**9**
UNIT III		
System Analysis in Frequency Domain using Fourier Transform & Laplace Transform: Definition and necessity of CT and DT Fourier series and Fourier transforms. Analogy between CTFS, DTFS and CTFT, DTFT. CT Fourier series, CT Fourier transform and its properties, problem solving using properties, amplitude spectrum, phase spectrum of the signal and system. Interplay between time and frequency domain using sinc and rectangular signals. Limitations of FT and need of LT and ZT, ROC and pole zero concept. Application of Laplace transforms to the LTI system analysis. Inversion using duality, numerical based on properties. Signal analysis using LT.	**CLO 3**	**10**
UNIT IV		
Correlation and Spectral Density: Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation	**CLO 4**	**9**

and spectral density.		
UNIT V		
Probability, Random Variables and Random Signals: Experiment, sample space, event, probability, conditional probability and statistical independence. Random variables: Continuous and Discrete random variables, cumulative distributive function, Probability density function, properties of CDF and PDF. Statistical averages, mean, moments and expectations, standard deviation and variance. Probability models: Uniform, Gaussian, Binomial. Evolution and definition of random signal through probability via random variable.	**CLO 5**	**8**
Total Hours		**45**

Course Contents/ Syllabus:

Learning Resources:

Textbooks:

1. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley India.

2. Simon Haykins, "Introduction to Analog and Digital Communications", Wiley India.

Reference Books:

1. B.P. Lathi, "Linear Systems and Signals", 2nd Edition, Oxford University Press, 2004.

2. Charles Phillips, "Signals, Systems and Transforms", 3rd Edition, Pearson Education.

3. Peyton Peebles, "Probability, Random Variable, Random Processes", 4th Edition, Tata Mc Graw Hill.

Online Resources/E-Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ee28/preview dated 19/4/2024
2. https://www.coursera.org/courses?query=signals%20and%20systems

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Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG

Course Name		Signal System Laboratory		Course Code/ Course Type		UBTCE206 B/OE1	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25
Pre-Requisite: Fourier transform & Laplace transform.							
Course Objectives (CO):		The objectives of Signals and Systems Laboratory are: 1. To recall the basic knowledge about the different type of signals 2. To recognize the system analysis in frequency domain. 3. To apply the knowledge of Fourier and Laplace transform. 4. To analyze correlation and spectral density. 5. To evaluate probability, random variables & signals.					
Course Learning Outcomes (CLO):		Students would be able to: 1. Identify different type of signals. 2. Explain the system analysis in frequency domain. 3. Apply knowledge of Fourier and Laplace transform. 4. Analyze correlation and spectral density 5. Evaluate the probability, random variables & signals.					

Course Contents/Syllabus:

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1:	Week 1/ Week 2	Sketch and write defining mathematical expression for the following signals in CTand DT using MATLAB- Unit step, rectangular, exponential, signum, sine, sinC, triangular, unit impulse, unit ramp.	CLO1	4
2.	Practical 2:	Week 3/ Week 4	Take any two CT and DT signals and perform the following operation Amplitude scaling, addition, multiplication, differentiation, integration (accumulator for DT), time scaling, time shifting and folding	CLO1	4
3.	Practical 3:	Week 5/ Week 6	Express any two system mathematical expressions in input output relation form and determine whether each one of them is, Memory less, Causal, Linear, Stable, Time in variant, Invertible	CLO2	4
4.	Practical 4:	Week 7/ Week 8	Express any two system mathematical expressions in impulse response form and determine whether each one of them is, Memory less, Causal, Linear, Stable, Time in variant, Invertible	CLO 3	4
5.	Practical 5:	Week 9/ Week 10	State and prove the properties of Fourier Transform. Take rectangular and sinc signal as examples and demonstrate the applications of CTFT properties. And also demonstrate the interplay between the time and frequency domain.	CLO 4	4
6.	Practical 6:	Week 11/ Week 12	State and prove the properties of Laplace Transform. Take any example of a system in time domain and demonstrate the application of LT in system analysis	CLO 4	4
7.	Practical 7:	Week 13/ Week 14	Find the following for the given energy signal- Autocorrelation, Energy from Autocorrelation, Energy from definition, Energy Spectral Density directly.	CLO 5	4
8.	Practical 8:	Week 15	List and explain the properties of CDF & PDF, suppose a certain random variable has the CDF	CLO 5	2
Total Hours					30

Learning Resources:

Textbooks:

1. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley India.
2. Simon Haykins, "Introduction to Analog and Digital Communications", Wiley India.

Reference Books:

1. B.P. Lathi, "Linear Systems and Signals", 2nd Edition, Oxford University Press, 2004.

2. Charles Phillips, "Signals, Systems and Transforms", 3rd Edition, Pearson Education.

3. Peyton Peebles, "Probability, Random Variable, Random Processes", 4th Edition, Tata Mc Graw Hill.

Online Resources/E-Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ee28/preview dated 19/4/2024
2. https://www.coursera.org/courses?query=signals%20and%20systems dated 19/4/2024

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COURSE CURRICULM

Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG
Course Name	Discrete Mathematics	Course Code/ Course Type	UBTCE207/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	0	1	3	3	40	60	--

Prerequisite: Determinants, Matrices, Limits, continuity, Differentiation

Course Objectives (CO):	The objectives of (Discrete Mathematics) are: 1. To familiarize the students with the concepts and techniques of logics & sets. 2. To recognize relations and its real-life application. 3. To comprehend Algebraic structure and its application. 4. To acquire the knowledge of graph theory 5. To acquire the knowledge of trees to understand the concepts of different types of algorithms and its applications that would enhance analytical thinking power.
Course Learning Outcomes (CLO):	Students would be able to: 1. Explain the logic, normal forms and its application. 2. Comprehend the relations & functions. 3. Comprehend the algebraic structures. 4. Comprehend & apply the knowledge of graph theory in data structure and other core subjects. 5. Solve traversing problems, searching by using the concept of Trees.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I Logic		
Propositions and Connectives, Truth table, laws of Propositions, Logical Equivalence, Normal Forms: DNF, CNF, PCNF & PDNF	CLO 1	9

Logical implication, Rules of Inference, Validity and satisfiability, Compactness and resolution, Quantifiers, Application of Propositional logic.		
UNIT II Relation & Functions		
Relation and Functions:-Relation, representation of relation, types, n- array relation and their application, Equivalence relation, Equivalence class, Partitions, Partial ordering relation, Hasse diagram, Lattice, chain and antichain, Function and types of Functions.	**CLO 2**	**9**
UNIT III Algebraic structures	**CLO 3**	
Algebraic structures, Semi group, Monoid, Group, abelian group, cyclic group, Coding Theory.		**9**
UNIT IV Graph and Applications		
Introduction, Graph models, Hand shaking lemma, Types of graphs, Matrix representation of Graphs, adjacency and incidence Matrix, Isomorphism, Connectivity, Eulerian and Hamiltonian Graphs, Shortest path, Travelling Salesman Problem, Dijkstra's algorithm, Planar graph and Euler formula, coloring of graph, Chromatic number –Dual of Graph, Clique number	**CLO 4**	**9**
UNIT V Trees		
Introduction, properties, Rooted tree, Tree Traversal, path length, weighted tree, prefix code, Huffman coding, Binary search tree, spanning tree, Minimal spanning tree, Kruskal algorithm, Prim's algorithm, cut set, The Max flow- Min cut Theorem (Transport Network) Application of tree.	**CLO 5**	**9**
Total Hours	**…**	**45**

Learning Resource:

Text Books:

1. C. L. Liu, "Elements of Discrete Mathematics", Tata McGraw-Hill, 4th Edition, 2017, ISBN 978- 1259006395.

Reference Books:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw-Hill, 8th Edition, 2018, ISBN 978- 1259676512.
2. Dr. K. D. Joshi, "Foundations of Discrete Mathematics", New Age International Limited Publishers, 2nd Edition, January 2014, ISBN-13: 978-8122435986

Online Resources/E-Learning Resources:

1. https://www.classcentral.com/subject/discrete-mathematics
2. https://www.coursera.org/courses?query=discrete%20mathematics

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Name of the Program:	BTECH CSE AIDS				Semester: 3	Level: UG	
Course Name	Operating System				Course Code/Course Type	UBTCE208/PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-

Pre-Requisite:

1. Computer Organization and Architecture
2. Fundamentals of Data Structures

Course Objectives (CO):	The objectives of (Operating System) are: 1. To introduce basic concepts and functions of modern operating systems. 2. To comprehend the concept of process, thread management and scheduling. 3. To learn the concept of concurrency control. 4. To study various Memory Management techniques. 5. To know the concept of I/O and File management
Course Learning Outcomes (CLO):	Students would be able to: 1. Comprehend the role of Modern Operating Systems. 2. Apply the concepts of process and thread scheduling. 3. Apply the concept of process synchronization, mutual exclusion and the deadlock. 4. Apply the concepts of various memory management techniques. 5. Make use of concept of I/O management and File system.

Descriptors/Topics	CLO	Hours
Descriptors/Topics	**CLO**	**Hours**
UNIT I		
OVERVIEW OF OPERATING SYSTEM Operating System Objectives and Functions, The Evolution of Operating Systems, Developments Leading to Modern Operating Systems, Virtual Machines, Introduction to Linux OS, BASH Shell scripting: Basic shell commands.	**CLO 1**	**9**
UNIT II		
PROCESS MANAGEMENT: Process: Concept of a Process, Process States, Process Description, Process Control Threads: Processes and Threads, Concept of Multithreading, Types of Threads, Thread programming Using Pthreads. Scheduling: Types of Scheduling, Scheduling Algorithms, First Come First Served, Shortest Job First, Priority, Round Robin	**CLO 2**	**9**
UNIT III		
CONCURRENCY CONTROL: Process/thread Synchronization and Mutual Exclusion: Principles of Concurrency, Requirements for Mutual Exclusion, Mutual Exclusion: Operating System Support (Semaphores and Mutex). Classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem, Inter-process communication (Pipes, Shared Memory). Deadlock: Principles of Deadlock, Deadlock Modeling, and Strategies to deal with deadlock: Prevention, Avoidance, Detection and Recovery. Example: Dining Philosophers Problem / Banker's Algorithm.	**CLO 3**	**9**
UNIT IV		
MEMORY MANAGEMENT: Memory Management: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Page table structure, Segmentation Virtual Memory: Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal), Allocation of frames, Thrashing.	**CLO 4**	**9**

UNIT V		
INPUT/OUTPUT AND FILE MANAGEMENT: I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, I/O Buffering, Disk Scheduling (FIFO, SSTF, SCAN, C-SCAN, LOOK, C-LOOK). File Management: Overview-Files and File Systems, File structure. File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management.	**CLO 5**	**9**
Total Hours		**45**

Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG
Course Name	Community Engineering Project	Course Code/Course Type	UBTCE209/ CEP
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	2	-	2	4	25		25

Pre-Requisite: 1. Basic knowledge of English

Course Objectives (CO):	The objectives of (Community Engineering Project) are: 1. Develop an understanding of the role of engineering in addressing community needs and promoting sustainable development. 2. Apply engineering design processes and methodologies to identify, analyze, and prioritize community challenges. 3. Collaborate with community stakeholders to co-create solutions that are culturally sensitive, socially equitable, and environmentally sustainable. 4. Gain practical experience in project management, budgeting, and resource allocation for community engineering projects. 5. Communicate effectively with diverse audiences through written reports, oral presentations, and multimedia platforms.
Course Learning Outcomes (CLO):	Students would be able to: 1. Develop an understanding of the role of engineering in addressing community needs and promoting sustainable development. 2. Apply engineering design processes and methodologies to identify, analyze, and prioritize community challenges. 3. Collaborate with community stakeholders to co-create solutions that are culturally sensitive, socially equitable, and environmentally sustainable. 4. Gain practical experience in project management, budgeting, and resource allocation for community

	engineering projects. 5. Communicate effectively with diverse audiences through written reports, oral presentations, and multimedia platforms.

Text Books:

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition,2014, ISBN-10: 0133805913 • ISBN-13: 9780133805918
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, Inc., 9th Edition,2012, ISBN 978-1-118-06333-0
3. Das, Sumitabha, UNIX Concepts and Applications, TMH, ISBN-10: 0070635463, ISBN-13: 978- 0070635463, 4th Edition.

Reference Books:

1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, ISBN- 10: 0596009526, ISBN-13: 978-0596009526
2. Andrew S. Tanenbaum & Herbert Bos, Modern Operating System, Pearson, ISBN-13: 9780133592221, 4th Edition.

Online Resources/E-Learning Resources:

1. https://www.coursera.org/courses?query=operating%20system
2. https://www.scaler.com/topics/course/free-operating-system-course/

Descriptors/Topics	CLO	Hours
1. Introduction to Community Engineering • Overview of course objectives, expectations, and project guidelines • Introduction to community-based participatory research and design principles • Case studies of successful community engineering projects 2. Needs Assessment and Stakeholder Engagement • Methods for conducting community needs assessments and asset mapping • Techniques for engaging diverse stakeholders in the design process • Ethical considerations in working with communities 3. Project Planning and Design • Project scoping, goal setting, and defining success criteria • Engineering design processes and methodologies • Incorporating sustainability principles into project design 4. Implementation and Collaboration • Project management techniques, including scheduling, budgeting, and resource allocation • Interdisciplinary collaboration and team dynamics • Effective communication with community partners and project stakeholders 5. Project Execution and Monitoring • Prototyping and testing of project solutions • Monitoring project progress and making adjustments as needed • Documentation and record-keeping for project evaluation 6. Impact Evaluation and Reflection • Methods for assessing the social, economic, and environmental impact of community engineering projects • Reflective practices and peer feedback	**CLO1 to CLO5**	**60**

Assessment:

1. Project Proposal: Written proposal outlining the project scope, objectives, and methodology (20%)
2. Project Implementation: Development and implementation of the digital solution, including documentation and code repository (30%)

3. Final Report: Written report summarizing the project process, outcomes, and impact assessment (30%)
4. Presentation: Oral presentation of project findings and demonstration of the digital solution (20%)

Name of the Program:	**BTECH CSE AIDS**	**Semester: 3**	**Level: UG/PG**
Course Name	**Foreign Language German A1.1**	**Course Code/ Course Type**	**UFL201A/AEC**
Course Pattern	**2024**	**Version**	1.0

Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/ Oral**
2	-	-	-	2	50	-	-

Pre-Requisite:	
Course Objectives (CO):	The objectives of (German A1.1) are: 1. To remember new words and their spellings. 2. To analyze the new concepts. 3. To apply the basic vocab and grammar concepts. 4. To comprehend the German text. 5. To create basic sentences in German.
Course Learning Outcomes (CLO):	Students would be able to: 1. Spell simple words in German 2. Can understand everyday expressions. 3. Able to frame simple sentences in German language. 4. Can introduce themselves and others. 5. Can answer questions about themselves.

Course Contents/Syllabus:

Descriptors/Topics	**CLO**	**Hours**
UNIT I		
Guten Tag Speak about yourself and others, Speak about Countries and	**CLO 1**	**6**

Languages Grammar – Sentence formation and verbs usage		
UNIT II		
Freunde, Kollegen und Ich Speak about your Hobbys, To fix a meeting, Speak about work and Profession, To creat a profile on Internet Grammar – How to use 'The' in german, Singular and plural forms of Nouns.	**CLO 2**	**6**
UNIT III		
In der Stadt To get to know about Cities and Places, how to find way and understand directions, learn international words Grammar – Negations (how to use NO in german), Definite articles, indefinite articles	**CLO3**	**6**
UNIT IV		
Guten Appetit To speak about food and food habits, to have a discussion about shopping Grammar – introduction of cases	**CLO4**	**6**
UNIT V		
Tag für Tag & Zeit mitFreunden Clock timings, To speak about family and friends, Daily routine To speak about free time activity, to understand the specific information from the text, to order and to pay in a restaurant Grammar – Possessivarticle, Modalverbs, use of on,at,from, till, Seprable verbs and past tence	**CLO5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Netzwerk A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.
2. Studio d A1, Cornelesen Verlag & Goyal Publishers & Distributors Pvt. Ltd.
3. Netzwerk Neu A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd

Reference Books:

1. Hallo Deutsch A1,Ernst Klett Verlag, Goyal Publishers & Distributors Pvt. Ltd
2. ThemenAktuell 1, Hueber verlag
3. Maximal Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.

Online Resources/E-Learning Resources:

1. Youtube : https://youtube.com/@LearnGermanwithAnja?si=BkJYDPi7TS0fT4lr

   https://youtube.com/@deutschlernenmitheidi?si=TkICIabzioaU0roZ

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Name of the Program:	BTECH CSE AIDS	Semester : 3	Level: UG/PG
Course Name	Basic Japanese language skill	Course Code/Course Type	UFL201B/AEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	--	--	2	2	50	--	--

Pre-Requisite: Desire to get acquainted with the Japanese language.

Course Objectives (CO):	The objectives of Basic Japanese language skill are: 1. To meet the needs of ever-growing industry, with respect to language support. 2. To get introduced to Japanese society and culture through language. 3. To acquire competitive edge in career choices. 4. To participate effectively & responsibly in a multi-cultural world. 5. To enable learners to communicate effectively in Japanese language.
Course Learning Outcomes (CLO):	After learning the course, the students will be able to: 1. Read and Write Hiragana script. 2. Write and Speak basic sentences. 3. Comprehend and speak about time, hobbies, likes and dislikes. 4. Write basic kanji. 5. Use the Hiragana script in discussion.

2. Instagram : instagram.com/learngermanwithanja

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Japanese Language – Introduction of script, culture, History of script ,Speaking : Self introduction, listening : short video skit on self-introduction	**CLO 1**	**6**
UNIT II		
Introduction of Hiragana Script - Writing : Hiragana script, Speak : Basic sentences, General vocabulary : Months , Days of the week ,Basic numbers, colours	**CLO 2**	**6**
UNIT III		
Basic Sentence formation - Basic sentence structure : Affirmative and Negative , General vocabulary: about family,	**CLO 3**	**6**
UNIT IV		
Time and verbs – Speaking : Talking about routine, Writing: routine using verbs and time, reading : A clock	**CLO 4**	**6**
UNIT V		
Introduction of Katakana and basic kanji – Reading : English words, country names Writing : Basic Kanji	**CLO 5**	**6**
Total Hours		**30**

Learning resources:

Textbook:

1. Minna no Nihongo , " Japanese for everyone" ,Elementary Main Textbook , Goyal Publishers & Distributors Pvt. Ltd.

Reference books:

1. Shyoho Volume 1.
2. Genki Japan
3. Haru Vol. 1 & 2

Online Resources/E-Learning Resources:

1. YouTube links

https://www.youtube.com/watch?v=shdlEapDsP4
https://youtu.be/K-nw5EUxDz0?feature=shared

Apps:

A) Learn Japanese - Hiragana APP available on Google play.
B) Hiragana Pro

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Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG
Course Name	UHV-II: Understanding Harmony	Course Code/ Course Type	ACUHV201/AC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	-	2	50	-	-

Pre-Requisite:	
Course Objectives (CO):	The objectives of Universal Human Value-Understanding Harmony are: 1. To train the student for Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. 2. To comprehend (or develop clarity) the harmony in the human being, family, society and nature/existence 3. To strengthen self-reflection. 4. To infuse a sense of commitment and courage to act 5. To understand Holistic Understanding of Harmony on Professional Ethics
Course Learning Outcomes (CLO):	Students would be able to: 1. Analyze the most important requirement for any human being 2. Apply correct appraisal of Physical needs, meaning of Prosperity in detail 3. Analyze salient values in relationship, Friends and Foes, Empathy, False Prestige. 4. Develop holistic perception of harmony at all levels of existence 5. Apply the Holistic Understanding of Harmony on Professional Ethics

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I 2. Self-Exploration–what is it? - Its content and process; Personality Traits- Self Excellence, Natural Acceptance" and Experiential Validation- as the process for self-exploration, Adaptability, Belief and Understanding- Self discipline 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario **6.** Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	**CLO 1**	**8**
UNIT II		
Understanding Harmony in the Human Being - Harmony in Myself: 1. Understanding human being as a co-existence of the sentient „I" and the material „Body" 2. Understanding the needs of Self („I") and „Body" - happiness and physical facility 3. Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)- Habits and Hobbies, SWOT Analysis (Activity) 4. Understanding the characteristics and activities of „I" and harmony in „I" – Dalai Lamas" Tibetan Personality Test – Dr. Menninger"s Psychometric Test. 5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail	**CLO 2**	**5**
UNIT III		
Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship: 1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship 2. Understanding the meaning of Trust; Difference between intention and competence **3.** Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in	**CLO 3**	**5**

relationship, Friends and Foes, Empathy, False Prestige.		
UNIT IV		
Understanding Harmony in the Nature and Existence - Whole existence as Coexistence: 1. Understanding the harmony in the Nature and its Equanimity, Respect for all, Nature as Teacher 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature 3. Understanding Existence as Co-existence of mutually interacting units in all- pervasive space 4. Holistic perception of harmony at all levels of existence.	**CLO 4**	**5**
UNIT V		
Implications of the above Holistic Understanding of Harmony on Professional Ethics: 1. Natural acceptance of human values 2. Definitiveness of Ethical Human Conduct 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 4. Vision for the Holistic alternatives, UHVs for entrepreneurship	**CLO 5**	**7**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Reference Books:

1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
3. Small is Beautiful - E. F Schumacher
4. Slow is Beautiful - Cecile Andrews

Online Resources/E-Learning Resources:

1. https://www.studocu.com/in/document/jss-science-and-technology-university/human-values/uhv-handout-2-harmony-in-the-human-being/
2. https://vvce.ac.in/wp-content/uploads/2021/04/Realising-Aspirations-of-NEP2020-UHV.pdf
3. https://vemu.org/uploads/lecture_notes/22_12_2022_1850871704.pdf

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Name of the Program:	BTECH CSE AIDS	Semester: 3	Level: UG
Course Name	Constitution of India	Course Code/ Course Type	ACCOI201/AC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

Pre-Requisite:

Course Objectives (CO):	The objectives of Constitution of India are: 1. To familiarize the students with the key elements of the Indian constitution. 2. To enable students to grasp the constitutional provisions and values. 3. To acquaint the students with the powers and functions of various constitutional offices and institutions. 4. To make students understand the basic premises of Indian politics. 5. To make students understand the role of constitution and citizen-oriented measures in a democracy
Course Learning Outcomes (CLO):	Students would be able to: 1. Analyze the basic structure of Indian Constitution. 2. Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. 3. know about our Union Government, political structure & codes, procedures. 4. Elaborate our State Executive & Elections system of India. 5. Access the Amendments and Emergency Provisions, other important provisions given by the constitution

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.	**CLO 1**	**8**
UNIT II		
FR's, FD's and DPSP's: Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building	**CLO 2**	**5**
UNIT III		
Governance and Constitution: Federalism in India - Features, Local Government -Panchayats –Powers and functions; 73rd and 74th amendments, Election Commission – Composition, Powers and Functions; Electoral Reforms, Citizen oriented measures – RTI and PIL – Provisions and significance.	**CLO 3**	**5**
UNIT IV		
Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.	**CLO 4**	**5**
UNIT V		
State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.	**CLO 5**	**7**
Total Hours		**30**

Learning Resources:

Text Books:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Engineering Ethics", M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Prentice – Hall, 2004

Reference Books:

1. "SamvidhanaOdu" - for Students & Youths by Justice HN NagamohanDhas, Sahayana, kerekon.
2. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
3. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.
4. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.

Online Resources/E-Learning Resources:

1.https://opportunitycell.com/online-course-on-the-indian-constitution-by- ministry-of-law-justice/#google_vignette dated 19/4/2024
2.https://onlinecourses.nptel.ac.in/noc20_lw03/preview dated 19/4/2024

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COURSE SYLLABUS
TY BTECH
SEMESTER-IV

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Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG
Course Name	Database Management System	Course Code/Course Type	UBTCE210 /PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-

Pre-Requisite: Knowledge of C Programming and DSA

Course Objectives (CO):	The objectives of database management system are: 1. Develop understanding concepts of Relational Database design and query languages. 2. Demonstrate effective Query processing and Transaction Processing. 3. Apply normalization for the development of application software's 4. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data 5. Ability to identify the data models for relevant problems
Course Learning Outcomes (CLO):	Students would be able to: 1. An ability to design ER Model for any application 2. To Decompose any Schema by applying normal forms 3. To construct SQL queries for any requirement. 4. To Understand the Query Evaluation and Execution processes. 5. To write Trigger, Cursor, PL/SQL Programs and to design object oriented, extended relational schemas

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models –Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base Architecture – Storage Manager – the Query Processor Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design for University Enterprise. Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams	**CLO 1**	**9**
UNIT II		
Relational Query Languages, Relational Operations. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus. Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers.	**CLO 2**	**9**
UNIT III		
Normalization – Introduction, non-loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyee/Codd normal form. Higher Normal Forms - Introduction, Multi-valued dependencies and fourth normal form, Join dependencies and fifth normal form	**CLO 3**	**9**
UNIT IV		
Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.	**CLO 4**	**9**
UNITV		
File organization: – File organization – various kinds of indexes. Query Processing – Measures of query cost - Selection operation – Projection operation, - Join operation – set operation and aggregate operation – Relational Query Optimization – Transacting SQL queries – Estimating the cost – Equivalence Rules	**CLO 5**	**9**
Total Hours		**45**

Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG
Course Name	Database Management System Laboratory	Course Code/Course Type	UBTCE211 /PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25

Pre-Requisite: Knowledge of C Programming and DSA

Course Objectives (CO):	The objectives of Database Management System Laboratory are: 1. Develop understanding concepts of Relational Database design and query languages. 2. Demonstrate effective Query processing and Transaction Processing. 3. Apply normalization for the development of application software's 4. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data 5. Ability to identify the data models for relevant problems
Course Learning Outcomes (CLO):	Students would be able to: 1. An ability to design ER Model for any application 2. To Decompose any Schema by applying normal forms 3. To construct SQL queries for any requirement. 4. To Understand the Query Evaluation and Execution processes. 5. To write Trigger, Cursor, PL/SQL Programs and to design object oriented, extended relational schemas.

Learning Resources:

Text Books:

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book" - Pearson Education, 2002.

Reference Books:

1. Silberschatz, H. Korth and S. Sudarshan, "Database System Concepts", 4rth Edition, McGraw-Hill International, 2002.
2. R. Elmasri and Shamakant B. Navathe, "Fundamentals of Database Systems", 3rd Edition, AddisionWesley , 2000.

Online Resources/E-Learning Resources

1. http://www.cs.helsinki.fi/u/laine/tikape/k03/material03.html dated 19/4/2024
2. http://infolab.stanford.edu/~ullman/dscb.html dated 19/4/2024
3. http://cs.nyu.edu/courses/spring06/G22.2433-001/dated 19/4/2024

Course Contents/Syllabus:

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number /Turn	Details	CLO	Hours
1	Practical 1:	Week 1	Practical 1: Analyze the problem and come with the entities in it. Identify what Data has to be persisted in the databases.	CLO1	2
2	Practical 2:	Week 2	Practical 2: Installation of MySQL and practicing DDL & DML commands.	CLO1	2
3	Practical3 :	Week 3	Practical3: Practice queries using ANY, ALL, IN, EXISTS, UNION, INTERSECT Union: The union operator returns all distinct rows selected by two or more queries.	CLO2	2
4	Practical 4:	Week 4	Practical 4: Practice Queries using Aggregate functions, Group By, Having Clause and Order Clause.	CLO 2	2
5		Week 5	Practical 4: Practice Queries using Aggregate functions, Group By, Having Clause and Order Clause.	CLO 2	2
6	Practical5 :	Week 6	Practical5: Implement Indexes: An index is an ordered list of the contents of a column, (or a group of columns) of a table.	CLO3	2
7	Practical6 :	Week 7	Practical6: Implement Exception handling	CLO3	2
8	Practical 7:	Week 8	Practical 7: Implement Triggers	CLO4	2
9	Practical 8:	Week 9	Practical 8: Implement Cursors	CLO4	2

10	Practical 9:	Week 10	Implementing Operations on relations using PL / SQL.	CLO5	2
11	Practical 10:	Week 11	Implementing Operations on relations using PL / SQL.	CLO5	2
12		Week 12	: Implementing Operations on relations using PL / SQL.	CLO5	2
13	Mini Project /Task	Week 13/14/15	Mini Project /Task	CLO1/ 2/3/4/5	6
Total Hours					**30**

Learning Resources:

Text Books:

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book" - Pearson Education, 2002.

Reference Books:

1. Silberschatz, H. Korth and S. Sudarshan, "Database System Concepts", 4rth Edition,McGraw-Hill International, 2002.
2. R. Elmasri and Shamakant B. Navathe, "Fundamentals of Database Systems", 3rd Edition, AddisionWesley , 2000.

Online Resources/E-Learning Resources:

1. http://www.cs.helsinki.fi/u/laine/tikape/k03/material03.html
2. http://infolab.stanford.edu/~ullman/dscb.html
3. http://cs.nyu.edu/courses/spring06/G22.2433-001/

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Name of the Program:	BTECH CSE AIDS				Semester: 4	Level: UG	
Course Name	Java Programming				Course Code/ Course Type	UBTCE212/PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	20	30	-

Pre-Requisite:

1. Basic knowledge of Programming in C and C++

Course Objectives (CO):	The objectives of Java Programming are: 1. To learn the fundamentals of the Java programming language. 2. To learn object-oriented principles like abstraction, encapsulation, inheritance, and polymorphism and apply them in solving problems using java. 3. To apply the concepts of exception handling, multithreading and collection classes using java. 4. To develop software applications using JDBC connectivity. 5. To design the Graphical User Interface using applets and swing controls.
Course Learning Outcomes (CLO):	Students would be able to: 1. To grasp the fundamentals programming concepts of Java programming language. 2. To apply object-oriented principles like abstraction, encapsulation, inheritance, polymorphism in solving problems using java. 3. To perform exception handling, multithreading code using java. 4. To develop software applications using JDBC connectivity. 5. To design the Graphical User Interface

	using event handling.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Java Programming: Java Programming- History of Java, comments, Java Buzz words, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, arrays, simple java standalone programs, class, object, and its methods constructors, methods, static fields and methods, access control, this reference, overloading constructors, recursion, exploring string class, garbage collection.	CLO 1	6
UNIT II		
Inheritance: Inheritance – Inheritance types, super keyword, preventing inheritance: final classes and methods. Polymorphism – method overloading and method overriding, abstract classes and methods. Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface, inner class. Packages- Defining, creating and accessing a package, importing packages.	CLO 2	6
UNIT III		
Exception Handling and Multithreading: Exception handling-Benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception subclasses. Multithreading – Differences between multiple processes and multiple threads, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer problem	CLO 3	6
UNIT IV		
Database Management: Collection Framework in Java – Introduction to java collections, Overview of java collection framework, commonly used collection	CLO 4	6

classes- Array List, Vector, Hash table, Stack, Lambda Expressions. Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, File management using File class. Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC, Data Access Object (DAO).		
UNIT V		
Event Handling: GUI Programming with Swing - The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow Event Handling- Events, Event sources, Event classes, Event	**CLO 5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1. "Java Fundamentals a Comprehensive Introduction" HerbertSchildt and DaleSkrien,TMH
2. "Head First Java: Your Brain on Java - A Learner's Guide", 1st Edition, by Bert Bates, Kathy Sierra

Reference Books:

1. "Java: the complete reference" by Herbert Schildt and DaleSkrien, TMH
2. "Java For Dummies (For Dummies" (Computer/Tech)) 8th Edition by Barry Burd.

Online Resources/E-learning Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs58/preview Programming in Java by Prof. Debasis Samanta | IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc2

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Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG

Course Name	Computer Organization and Architecture	Course Code/ Course Type	UBTCE213/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	20	30	-

Pre-Requisite	
Course Objectives (CO):	The objectives of Computer Organization are: 1. To recognize the components of Computer 2.To articulate the principles of computer organization and the basic architectural concepts. 3. To learn simple register transfer language to specify various computer operations. 4. To interpret and summarize the pipelining concept and multiprocessor systems. 5. To design, and program a simple digital computer ALU operation.
Course Learning Outcomes (CLO):	Students would be able to: 1. Student will learn the concepts of computer organization for several engineering applications. 2. Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems. 3. An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principle 4. To impart the knowledge on micro programming 5. Comprehend the concepts of advanced pipelining techniques.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I FUNDAMENTALS OF COMPUTERS		
FUNDAMENTALS OF COMPUTERS: Basic Functional units of Computers: Types and generation of computers, Functional units, basic Operational concepts, Bus structures. Software, Performance, Architecture: Von Neumann and Harvard architecture Data Representation: Signed number representation, fixed and floating-point representations. Computer Arithmetic**:** Addition and subtraction, multiplication. Booth's Algorithm, Division Restoring Algorithm, Non-Restoring algorithm	**CLO 1**	**9**
UNIT II THE MEMORY SYSTEM		
THE MEMORY SYSTEM Basic concepts of semiconductor RAM memories, Memory Hierarchy; Primary memory, Secondary Memory: Magnetic Tape, Magnetic Disk, Optical disk, magnet-optical disk; Concepts of auxiliary, Associative, Cache, Cache coherence and Virtual Memory. Paging Replacement algorithm Introduction to RAID and JBOD, DMA, DMA Transfer modes, sequential access, and direct access storage devices.	**CLO 2**	**9**
UNIT III REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS		
REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS: Register Transfer Language and Micro Operations: RTL-Registers, Register transfers, Bus and memory transfers. Micro operations: Arithmetic, Logic, and Shift micro-operations, Arithmetic logic shift unit. Instructions and Instruction types and Instruction Cycle Computer instructions, Instruction cycle, Instruction codes, Timing and Control, Types of Instructions: Memory Reference Instructions, Input–Output and Interrupt.	**CLO3**	**9**
UNIT IV CENTRAL PROCESSING UNIT ORGANIZATION:		
CENTRAL PROCESSING UNIT ORGANIZATION: General Register Organization, Stack organization, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors Control unit design: Design approaches, Control memory, Address sequencing, Micro Programmed Control. Input–Output Organization: Peripheral devices, Input-output subsystems, I/O device interface, I/O Processor, I/O transfers–Program controlled, Interrupt driven, and interrupts	**CLO4**	**9**

and exceptions. Instruction-level Parallelism Throughput and Speedup.		
UNIT V MULTI-PROCESSOR ORGANIZATION		
MULTI-PROCESSOR ORGANIZATION Input –Output Organization: Peripheral devices, Input-output subsystems, I/O device interface, I/O Processor, I/O transfers–Program controlled, Interrupt driven, and DMA, Interrupts and exceptions. I/O device interfaces – SCII, USB **Pipelining and Vector Processing:** Basic concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Time Space Diagram, Hazards instruction Pipelining, Arithmetic Pipelining.	**CLO 5**	**9**
Total Hours		**45**

LearningResources:

Text Books:

1.Computer Organization – Carl Hamacher, ZvonksVranesic, Safea Zaky, Vth Edition, McGraw Hill.

2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

Reference Books:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier

Online Resources/E-Learning Resources:

1. https://www.classcentral.com/course/swayam-principles-of-communication-systems-i-7963 dated 16/04/2024
2. https://onlinecourses.nptel.ac.in/noc22_ee05/preview dated 16/04/2024

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Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG
Course Name	Applied Statistical Techniques	Course Code/ Course Type	UBTCE214/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	1	3	3	40	60	

Prerequisite: Basicstatistical concepts.

Course Objectives (CO):	The objectives of (Applied Statistical Techniques) are: 1. To familiarize the students with advanced techniques in Statistics 2. To acquire knowledge of techniques of advanced level of sampling & estimation 3. To apply tests of hypothetical techniques and its applications that would enhance analytical thinking power. 4. To learn the where and how to apply parametric & non-parametric tests with applications. 5. Compare parametric and non-parametric inference.
Course Learning Outcomes (CLO):	Students would be able to: 1. identify the advanced terms in statistics. 2. Explain the estimation & its techniques. 3. Apply knowledge of hypothesis techniques to test large and small samples. 4. Apply non-parametric tests on practical situations. 5. Analyze parametric and non-parametric inference.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I Sampling Techniques		
Random sampling, Sampling from finite and infinite populations, with and without replacement, central limit theorem, Standard error of sampling, Sampling distribution of sample mean and proportion, stratified random sampling.	CLO 1	9
UNIT II Estimation		
Introduction, Types of estimation, Interval estimation, Point estimation: Maximum likelihood function, Method of moments, Criteria for good estimates: Unbiasedness, Consistency, Sufficiency by Neyman factorization theorem and Efficiency , their applications in estimation.	CLO 2	9
UNIT III Test of Hypothesis-I		
Introduction, Hypothesis, Simple and composite hypothesis, Type I and Type II errors, Level of significance, Critical region, Student's-t test, Z-test,	CLO 3	9
UNIT IV Test of Hypothesis-II		
Test of hypothesis for small & large sample by Chi-Square distribution, Student's-t distributions, F-distributions. Degree of freedom, Analysis of variance (ANOVA): one-way, two-way (without interactions), P-Value.	CLO 4	9
UNIT V Nonparametric Inference		
Non-parametric Inference, Comparison with parametric inference, order statistics, Tolerance region, Sign test, Mann-Whitney test, Wilcoxon signed rank test, Run test, Kolmogorov-Smirnov test. Spearman's rank correlation test, Kendall's tau test, Chi-square test.	CLO 5	9
Total Hours	...	45

Learning Resources:

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2014.
2. Hugh Neill, Trigonometry: A complete Introduction, John Murray Learning, 2018.
3. George B. Thomas, Jr and Ross L. Finney, Calculus and Analytical Geometry, 9th Edition, 1998

Reference Book(s):

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEdition, 2010.
2. Ron Larson, Trigonometry, Brooks/Cole, 9th Edition, 2013.
3. Robert E, Moyer, Trigonometry, Mc. Graw Hill, Addision-Wesely, 4th Edition, 2009.

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Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG
Course Name	Internet of Things	Course Code/ Course Type	UBTCE215A /OE-II
Course Pattern	2024	Version	1.0
Teaching Scheme		Assessment Scheme	

Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-

Pre-Requisite: : Computer Networks and Security

Course Objectives (CO):	The objectives of IOT are: 1. To comprehend fundamentals of Internet of Things (IoT) 2. To learn advances in IOT. 3. To learn methodologies for IoT application development 4. To learn the IoT protocols, cloud platforms and security issues in IoT 5. To learn real world application scenarios of IoT along with its societal and economic impact using case studies and real time examples
Course Learning Outcomes (CLO):	Students would be able to: 1. Comprehend the fundamentals and need of IOT. 2. Apply IoT enabling technologies for developing IoT systems 3. Apply design methodology for designing and implementing IoT applications 4. Analyze IoT protocols for making IoT devices communication 5. Design cloud based IoT systems

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Internet of Things: Concepts: Introduction to Internet of Things (IoT): Definition, Characteristics of IoT, Vision, Trends in Adoption of IoT, IoT Devices, IoT Devices Vs Computers, Societal Benefits of IoT, Technical Building Blocks. Physical Design of IoT: Things in IoT, Interoperability of IoT Devices, Sensors and Actuators, Need of Analog / Digital Conversion. Logical Design of IoT: IoT functional blocks, IoT enabling technologies, IoT levels and deployment templates, Applications in IoT.	**CLO 1**	**10**
UNIT II		
IoT: Design Methodology: IoT Design Methodology: Steps, Basics of IoT Networking, Networking Components, Internet Structure, Connectivity Technologies, IoT Communication Models and IoT Communication APIs, Sensor Networks, Four pillars of IoT: M2M, SCADA, WSN, RFID.	**CLO 2**	**9**
UNIT III		
IoT Protocols: Protocol Standardization for IoT, M2M and WSN Protocols, RFID Protocol, Modbus Protocol, Zigbee Architecture. IP based Protocols: MQTT (Secure), 6LoWPAN, LoRa.	**CLO 3**	**9**
UNIT IV		
Cloud Platforms for IoT: Software Defined Networking, Introduction to Cloud Storage Models, Communication API. WAMP: AutoBahn for IoT, Xively Cloud for IoT. Python Web Application Framework: Django Architecture and application development with Django, Amazon Web Services for IoT, SkyNet IoT Messaging Platform, RESTful Web Service, GRPC,SOAP.	**CLO 4**	**9**
UNIT V		
Security in IoT: Introduction, Vulnerabilities of IoT, Security Requirements, Challenges for Secure IoT, Threat Modeling. Key elements of IoT Security: Identity establishment, Access control, Data and message security, Non-repudiation and availability, Security model for IoT, Challenges in designing IOT applications, lightweight cryptography.	**CLO 5**	**8**
Total Hours		**45**

Learning Resources:

Textbooks:

Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515

2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", 2nd Edition,Wiley Publication, ISBN: 978-1-119-99435-0

Reference Books:

1. Dawoud Shenouda Dawoud, Peter Dawoud, "Microcontroller and Smart Home Networks", ISBN: 9788770221566, e-ISBN: 9788770221559
2. 2. Charles Crowell, "IoT-Internet of Things for Beginners: An Easy-to-Understand Introduction to IoT",ISBN-13 : 979-8613100194
3. 3. David Hanes, Gonzalo Salgueiro, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", Cisco Press, ISBN-13: 978-1-58714-456-1 ISBN-10: 1-58714-456-5

Online Resources/E-Learning Resources

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://nptel.ac.in/courses/108/108/108108098/

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Course Name		Internet of Things Laboratory		Course Code/ Course Type		UBTCE216 B/OE-II	
Course Pattern		2024		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25
Pre-Requisite: Computer Networks and Security lab							
Course Objectives (CO):		The objectives of IOT are: 1. To comprehend fundamentals of Internet of Things (IoT) 2. To learn advances in IOT. 3. To learn methodologies for IoT application development 4. To learn the IoT protocols, cloud platforms and security issues in IoT 5. To learn real world application scenarios of IoT along with its societal and economic impact using case studies and real time examples					
Course Learning Outcomes (CLO):		Students would be able to: 1. Analyze the fundamentals and need of IOT. 2. Apply IoT enabling technologies for developing IoT systems 3. Apply design methodology for designing and implementing IoT applications 4. Analyze IoT protocols for making IoT devices communication 5. Design cloud based IoT systems					

Course Contents/Syllabus:

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1:	Week 1/ Week 2	Connection of an Arduino board with ESP8266 wifi module.	CLO1	4
2.	Practical 2:	Week 3/ Week 4	IoT based control of an LED using Arduino.	CLO2	4
3.	Practical 3:	Week 5/ Week 6	IoT and cloud-based data logger using LM35 and Arduino.	CLO3	4
4.	Practical 4:	Week 7/ Week 8/Week 9	IoT based home automation using Arduino.	CLO 4	6
5.	Practical 5:	Week 10/ Week 11/ Week 12	IoT based street light control using Arduino.	CLO 5	6
6.	Practical 6:	Week 13/ Week 14/ Week15	IoT based DC motor speed control using Arduino.	CLO 5	6
Total Hours					30

Learning Resources:

Textbooks:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", 2nd Edition,Wiley Publication, ISBN: 978-1-119-99435-0

Reference Books:

1. Dawoud Shenouda Dawoud, Peter Dawoud, "Microcontroller and Smart Home Networks", ISBN: 9788770221566, e-ISBN: 9788770221559
2. Charles Crowell, "IoT-Internet of Things for Beginners: An Easy-to-Understand Introduction to IoT",ISBN-13 : 979-8613100194
3. David Hanes, Gonzalo Salgueiro, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", Cisco Press, ISBN-13: 978-1-58714-456-1 ISBN-10: 1-58714-456-5

Online Resources/E-Learning Resources

1. https://nptel.ac.in/courses/106/105/106105166/

2. https://nptel.ac.in/courses/108/108/108108098/

Name of the Program:	BTECH CSE AIDS				Semester :4	Level: UG	
Course Name	Digital Image Processing				Course Code/ Course Type	UBTCE215B/OE-II	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	NA	NA	3	3	40	60	NA

Pre-Requisite:

1. Digital Signal Processing

Course Objectives (CO):	The objectives of Digital Image Processing are: 1. To become familiar with digital image fundamentals 2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain. 3. To learn concepts of degradation function and restoration techniques. 4. To study the image segmentation and representation techniques. 5. To become familiar with image compression and recognition methods
Course Learning Outcomes (CLO):	Students would be able to: 1. Learn the basics and fundamentals of digital image processing, such as Digitization, sampling, quantization, and 2D-transforms. 2. Operate on images using the techniques of smoothing, sharpening and enhancement in spatial Domain. 3. Learn the basics of compression digital image and their different types. 4. Analyze the restoration concepts and filtering techniques. 5. Explore the basics of segmentation & features extraction techniques.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Digital Image Processing: - Introduction Fundamental Steps in Digital Image Processing, Components of an	**CLO 1**	**9**

Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relations, Human visual system, Sampling & quantization, Representing digital images, Spatial &graylevel resolution, Image file formats, Basic relationships between pixels, Distance Measures. Basic operations on images-image addition, subtraction, logical operations, scaling, translation, rotation. Image Histogram. Color fundamentals & models – RGB, HSI YIQ.		
UNIT II		
Image Enhancement in Spatial Domain:- Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Spatial domain enhancement: Point operations-Log transformation, Power-law transformation, Piecewise linear transformations, Histogram equalization. Filtering operations- Image smoothing, Image sharpening. Frequency domain enhancement: 2D DFT, Smoothing and Sharpening in frequency domain. Homomorphic filtering. Restoration: Noise models, Restoration using inverse filtering and Wiener filtering. Restoration: Noise models, Restoration using Inverse filtering and Wiener filtering	**CLO 2**	**9**
UNIT III		
Image Compression: Types of redundancy, Fidelity criteria, Lossless compression – Runlength coding, Huffman coding, Bitplane coding, Arithmetic coding. Introduction to DCT, Wavelet transform. Lossy compression – DCT based compression, Wavelet based compression. Image and Video Compression Standards – JPEG, MPEG	**CLO 3**	**9**
UNIT IV		
Image Segmentation and Morphological Operations:- Image Segmentation: Point Detections, Line detection, Edge Detection-First order derivative - Prewitt and Sobel. Second order derivative – LoG, DoG, Canny. Edge linking, Hough Transform, Thresholding - Global, Adaptive. Otsu's Method. Region Growing, Region Splitting and Merging. Morphological Operations: Dilation, Erosion, Opening, Closing, Hit-or-Miss transform, Boundary Detection, Thinning, Thickening, Skeleton.	**CLO 4**	**9**
UNIT V		
Image Restoration and Description: - Image Restoration, degradation model, Properties, Noise models ,Mean Filters , Order Statistics , Adaptive filters , Band reject Filters, Band pass Filters ,Notch Filters , Optimum Notch Filtering, Inverse Filtering, Wiener filtering. Representation, Chain codes, Polygonal approximation, Signatures. Boundary Descriptors, Shape numbers, Fourier Descriptors, Statistical moments. Regional Descriptors, Topological, Texture. Principal Components for Description.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Textbooks:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, Third Edition, 2010.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson, 2002.

Reference Books:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB, Pearson Education, Inc., 2011.

Online Resources/E-learning Resources:

1. Digital Image Processing, IIT Kharagpur ,Prof. P.K. BiswasLink: https://nptel.ac.in/courses/117105079
2. NPTEL Video Course :NOC:Digital Image ProcessingLink: https://www.digimat.in/nptel/courses/video/117105135/L02.html

Name of the Program:		BTECH CSE AIDS			Semester: 4	Level: UG	
Course Name		Digital Image processing Laboratory			Course Code/ Course Type	UBTCE216B/OE-II	
Course Pattern		2024			Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
NA	1	NA	1	2	25	NA	25

Pre-Requisite:	Digital signal Processing
Course Objectives (CO):	The objectives of Image Processing are: 1. To become familiar with digital image fundamental operations 2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain. 3. To learn concepts of degradation function and restoration techniques. 4. To study the image segmentation and representation techniques. 5. To become familiar with image compression and recognition methods
Course Learning Outcomes (CLO):	Students would be able to: 1. Learn the basics and fundamentals of digital image processing operations, such as Digitization, sampling, quantization, and 2D-transforms. 2. Operate on images using the techniques of smoothing, sharpening and enhancement in spatial Domain. 3. Learn the basics of compression digital image and their different types. 4. Analyze the restoration concepts and filtering techniques. 5. Explore the basics of segmentation & features extraction techniques.

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Image Creation	Week 1/ Turn 1 Week 2 /Turn 1	Conversion of 24 bit color image to 8 bit, 4 bit image.	CLO1	2
2	Practical 2: Implement morphological operations	Week 2 /Turn 1	Perform Morphological operations – Erosion, Dilation, Opening, Closing	CLO1	2
3	Practical 3: Implement different operations on images	Week 2 /Turn 1	Apply image negation and power-law correction operations on image.	CLO1	2
4	Practical 4: Use statistical parameters to compare images	Week 2 /Turn 1	Study of statistical properties- Mean, Standard deviation, Variance & histogram plotting.	CLO1	2

5	Practical 5: Image Enhancement	Week 2 /Turn 1	Enhance image using histogram equalization and stretching.	CLO2	2
6	Practical 6: Use of Spatial Domain	Week 2 /Turn 1	To perform image filtering in spatial domain.	CLO2	2
7	Practical 7: Use of Frequency domain	Week 2 /Turn 1	To perform image filtering in frequency domain	CLO4	2
8	Practical 8: Image smoothing	Week 2 /Turn 1	Perform image smoothing and sharpening operations	CLO2	2
9	Practical 9: Image edge detection	Week 2 /Turn 1	Detect image edges using Sobel, Prewitt and Roberts‟s operator.	CLO4	2
10	Practical 10: Image Compression	Week 2 /Turn 1	Compress image using DCT / Wavelet transform.	CLO3	4
11	Practical 11: Thresholding model	Week 2 /Turn 1	Apply Global and adaptive thresholding to an image.	CLO4	4
12	Practical 12: Image Classification	Week 2 /Turn 1	To perform image classification / recognition	CLO5	4
Total hours					30

Learning resources:

Textbooks:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, Third Edition, 2010.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson, 2002.

Reference Books:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB, Pearson Education, Inc., 2011.

Online Resources/E-learning Resources:

1. Digital Image Processing, IIT Kharagpur, Prof. P.K. BiswasLink: https://nptel.ac.in/courses/117105079
2. NPTEL Video Course :NOC:Digital Image ProcessingLink: https://www.digimat.in/nptel/courses/video/117105135/L02.html
3. https://cse19-iiith.vlabs.ac.in/Introduction.html

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Name of the Program:	BTECH CSE AIDS				Semester: 4	Level: UG	
Course Name	Java Programming Laboratory				Course Code/ Course Type	UBTCE217/VSEC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25
Pre-Requisite: Basic knowledge of Programming in C and C++							
Course Objectives (CO):					The objectives of Java Programming are: 1. To learn the fundamentals of the Java programming language. 2. To learn object-oriented principles like abstraction, encapsulation, inheritance, and polymorphism and apply them in solving problems using java. 3. To apply the concepts of exception handling, multithreading and collection classes using java. 4. To develop software applications using JDBC connectivity. 5. To design the Graphical User Interface using applets and swing controls.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Grasp the fundamentals of the Java programming language. 2. Apply object-oriented principles like abstraction, encapsulation, inheritance, polymorphism in solving problems using java. 3. Create exception handling, multithreading code using java. 4. Develop software applications using JDBC connectivity. 5. Design the Graphical User Interface using event handling.		

Course Contents/Syllabus:

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Java control structures	Week 1/ Turn 1	Write a java program to define the data types, variable, operators, arrays and control structures.	CLO1	2
2	Practical 2: Constructor Creation	Week 2 /Turn 1	Develop a Program to define class and constructors. Demonstrate constructors with method overloading.	CLO1	2
3	Practical 3: Inheritance and interface	Week 3 /Turn 1 Week 4 /Turn 1	Develop a Program to define inheritance and show method overriding.	CLO2	4
4	Practical 4: Exception Handling	Week 5 /Turn 1	Develop a Program to demonstrate Exception Handling.	CLO3	2
5	Practical 5: Multithreading	Week 6 /Turn 1 Week 7 /Turn 1	Develop a Program to demonstrate Multithreading.	CLO3	4
6	Practical 6: Input and output operations	Week 8 /Turn 1	Develop a Program to demonstrate I/O operations.	CLO4	2
7	Practical 7: Database operations	Week 9 /Turn 1 Week 10 /Turn 1	Develop a Program to demonstrate Database handling.	CLO4	4
8	Practical 8: Network Programming	Week 11 /Turn 1	Develop a Program to demonstrate Network Programming.	CLO5	2
9	Practical 9:	Week	Develop a Program to demonstrate	CLO5	2

	Event Handling	12 /Turn 1	Applet structure and event handling.		
10	Practical 10: Layout Creation	Week 13 /Turn 1	Develop a Program to demonstrate Layout managers.	CLO5	2
11	Practical 11: Mini Project	Week 14 /Turn 1 Week 15 /Turn 1	Develop a Project using java.	CLO5	4
Total hours					30

Learning Resources:

Textbooks:

1. "Java Fundamentals a Comprehensive Introduction" Herbert Schildt and Dale Skrien,TMH
2. "Head First Java: Your Brain on Java - A Learner's Guide", 1st Edition, by Bert Bates, Kathy Sierra

Reference Books:

1. "Java: the complete reference" by Herbert Schildt and DaleSkrien,TMH
2. "Java For Dummies (For Dummies" (Computer/Tech)) 8th Edition by Barry Burd.

Online Resources/E-learning Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs58/preview Programming in Java By Prof. Debasis Samanta, IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Name of the Program:	BTECH CSE AIDS	Semester: 4	Level: UG
Name of the Program:	Foreign Language	Semester: 4	Level: UG/PG
Course Name	German A1.2	Course Code/Course Type	UFL 202 A/AEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

Pre-Requisite: Can understand and use familiar, everyday expressions and very simple sentences aimed at satisfying specific needs.

Course Objectives (CO):	The objectives of (German A1.2) are: 1. To get along with a basic vocab. 2. To understand German day to day culture. 3. Can communicate in routine situations. 4. To be able to have a direct exchange of information about familiar matters. 5. To describe own surroundings.
Course Learning Outcomes (CLO):	Students would be able to: 1. Communicate in the areas of immediate importance. 2. Able to frame simple sentences in formal conversation. 3. Translate simple sentences from English to the German language and vice-versa. 4. Construct a dialogue, in the German language, for basic human interactions in a social context. 5. Take part in an interaction relating to basic conversation

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Kontakte planning of letter writing, ramification of Letter, writing and understanding, discussion about language learning, find information from texts, understand conversations on various topics, texts related to office life Grammar – Usage of Articles and Prepositions	CLO 1	6
UNIT II		
MeineWohnung Understand home advertisements, describe house, how to reply invitations, how to express 'likes and dislikes', speak about different forms of living, how to write a text on house Grammar – Adjectives	CLO 2	6
UNIT III		
AllesArbeit? Talk about daily routine, talk about past, understand job advertisements, understand blogs on jobs, express opinions about jobs, prepare telephonic dialogues, speak about jobs Grammar – Past tense, Sentence connectors	CLO3	6
UNIT IV		
Kleidung und Mode Speak about cloths and shopping, lead a discussion during cloths shopping, discussion in departmental store, understand and research information about Berlin Grammar – Separable and non-separable verbs	CLO4	6
UNITV		
Gesund und munter&Ab in den Urlaub Learn body parts, Health related dialogue, City orientation, Travel reports, discussion regarding different travel destinations and weather Grammar – Imperative, Time adverbs	CLO5	6
Total Hours		30

Name of the	BTECH CSE	Semester : 4	Level: UG

Learning Resources:

Textbooks:

1. Netzwerk A1, Ernst klettVerlag&Goyal Publishers & Distributors Pvt. Ltd.
2. Studio d A1, CornelesenVerlag&Goyal Publishers & Distributors Pvt. Ltd.
3. NetzwerkNeu A1, Ernst klettVerlag&Goyal Publishers & Distributors Pvt. Ltd

Reference Books:

1. Hallo Deutsch A1,ErnstKlettVerlag, Goyal Publishers & Distributors Pvt. Ltd
2. ThemenAktuell 1, Hueberverlag
3. Maximal Ernst klettVerlag&Goyal Publishers & Distributors Pvt. Ltd.

Online Resources/E-Learning Resources:

1. Youtube :https://youtube.com/@LearnGermanwithAnja?si=BkJYDPi7TS0fT4lr
2. https://youtube.com/@deutschlernenmitheidi?si=TkICIabzioaU0roZ
3. Instagram :instagram.com/learngermanwithanja

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Program:	AIDS						
Course Name	Japanese language skill - L2			Course Code/Course Type		UFL202B/AEC	
Course Pattern	2024			Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50		-

Pre-Requisite: Desire to get acquainted with the Japanese language. Basic knowledge of Hiragana and Katakana.

Course Objectives (CO):	The objectives of Basic Japanese language skill are: 1. To meet the needs of ever-growing industry, with respect to language support. 2. To get introduced to Japanese society and culture through language. 3. To promote multilingualism in exposing students to different cultures 4. Fostering respect for linguistic diversity. 5. Learning additional language to develop a better memory, talent for problem solving, ability to concentrate.
Course Learning Outcomes (CLO):	Students would be able to: 1. Read & write words that have been borrowed from other language. 2. Comprehend and speak basic conversation with basic particles 3. Speak and write about Routine 4. Basic sentence patterns incorporated into short dialogues indicating how they are used in actual conversation. 5. Comprehend grammatical structure, and improve communication abilities.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Katakana Script Katakana Script / Writing Kanji	**CLO 1**	**6**
UNIT II		
System of demonstrative words : Minna no Nihongo lesson no. 1,2 & 3	**CLO 2**	**6**
UNIT III		
Minna no Nihongo lesson no. 4 (Write and Speak basic sentences in correct tenses)	**CLO 3**	**6**
UNIT IV		
Reading : Basic conversation using particles Listening : conversation related to particles Speaking : Sentences about give, lend, teach, receive	**CLO 4**	**6**
UNIT V		
Tenses : Writing : Affirmative present ,past & future Negative present ,past,& future sentences Writing : About Routine	**CLO 5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Minna no Nihongo , " Japanese for everyone" ,Elementary Main Textbook , Goyal Publishers & Distributors Pvt. Ltd.

Reference books:

1. Shyoho Volume 1
2. Genki Japan
3. Haru Vol. 1 & 2

Online Resources/E-Learning Resources:

YouTube links

1. https://youtu.be/1JephUxTHxg?si=ouCwTXZc_fYgY9Kh
2. https://youtu.be/9EfbkBkF2ag?si=rLNzc55_REacMoGu

Name of the Program:	BTECH CSE AIDS	Semester : 4	Level: UG
Course Name	UHV-II: Understanding	Course Code/ Course Type	ACUHV201/AC

3. https://youtu.be/DpEolYasgyg?si=dya9ue-YMSHO3VOG

	Harmony		
Course Pattern	**2024**	**Version**	**1.0**

Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/ Oral**
2	-	-	-	2	50	-	-

Pre-Requisite:	
Course Objectives (CO):	The objectives of Universal Human Value-Understanding Harmony are: 1. To train the student for Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. 2. To comprehend (or develop clarity) the harmony in the human being, family, society and nature/existence 3. To strengthen self-reflection. 4. To infuse a sense of commitment and courage to act 5. To understand Holistic Understanding of Harmony on Professional Ethics
Course Learning Outcomes (CLO):	Students would be able to: 1. Analyze the most important requirement for any human being 2. Apply correct appraisal of Physical needs, meaning of Prosperity in detail 3. Analyze salient values in relationship, Friends and Foes, Empathy, False Prestige. 4. Develop holistic perception of harmony at all levels of existence 5. Apply the Holistic Understanding of Harmony on Professional Ethics

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I 2. Self-Exploration–what is it? - Its content and process; Personality Traits- Self Excellence, Natural Acceptance" and Experiential Validation- as the process for self-exploration, Adaptability, Belief and Understanding- Self discipline 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario **6.** Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	**CLO 1**	**8**
UNIT II		
Understanding Harmony in the Human Being - Harmony in Myself: 1. Understanding human being as a co-existence of the sentient „I" and the material „Body" 2. Understanding the needs of Self („I") and „Body" - happiness and physical facility 3. Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)- Habits and Hobbies, SWOT Analysis (Activity) 4. Understanding the characteristics and activities of „I" and harmony in „I" – Dalai Lamas" Tibetan Personality Test – Dr. Menninger"s Psychometric Test. 5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail	**CLO 2**	**5**
UNIT III		
Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship: 1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship 2. Understanding the meaning of Trust; Difference between intention and competence	**CLO 3**	**5**

3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Friends and Foes, Empathy, False Prestige.		
UNIT IV		
Understanding Harmony in the Nature and Existence - Whole existence as Coexistence: 1. Understanding the harmony in the Nature and its Equanimity, Respect for all, Nature as Teacher 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature 3. Understanding Existence as Co-existence of mutually interacting units in all- pervasive space 4. Holistic perception of harmony at all levels of existence.	**CLO 4**	**5**
UNIT V		
Implications of the above Holistic Understanding of Harmony on Professional Ethics: 1. Natural acceptance of human values 2. Definitiveness of Ethical Human Conduct 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 4. Vision for the Holistic alternatives, UHVs for entrepreneurship	**CLO 5**	**7**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Reference Books:

1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
3. Small is Beautiful - E. F Schumacher
4. Slow is Beautiful - Cecile Andrews

Online Resources/E-Learning Resources:

1. https://www.studocu.com/in/document/jss-science-and-technology-university/human-values/uhv-handout-2-harmony-in-the-human-being/
2. https://vvce.ac.in/wp-content/uploads/2021/04/Realising-Aspirations-of-NEP2020-UHV.pdf
3. https://vemu.org/uploads/lecture_notes/22_12_2022_1850871704.pdf

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Name of the Program:	BTECH CSE AIDS	Semester : 4	Level: UG
Course Name	Constitution of India	Course Code/ Course Type	ACCOI201/AC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

Pre-Requisite:

Course Objectives (CO):	The objectives of Constitution of India are: 1. To familiarize the students with the key elements of the Indian constitution. 2. To enable students to grasp the constitutional provisions and values. 3. To acquaint the students with the powers and functions of various constitutional offices and institutions. 4. To make students understand the basic premises of Indian politics. 5. To make students understand the role of constitution and citizen-oriented measures in a democracy
Course Learning Outcomes (CLO):	Students would be able to: 1. Analyze the basic structure of Indian Constitution. 2. Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. 3. know about our Union Government, political structure & codes, procedures. 4. Elaborate our State Executive & Elections system of India. 5. Access the Amendments and Emergency Provisions, other important provisions given by the constitution

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.	**CLO 1**	**8**
UNIT II		
FR's, FD's and DPSP's: Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building	**CLO 2**	**5**
UNIT III		
Governance and Constitution: Federalism in India - Features, Local Government -Panchayats –Powers and functions; 73rd and 74th amendments, Election Commission – Composition, Powers and Functions; Electoral Reforms, Citizen oriented measures – RTI and PIL – Provisions and significance.	**CLO 3**	**5**
UNIT IV		
Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.	**CLO 4**	**5**
UNIT V		
State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important	**CLO 5**	**7**

Constitutional Amendments till today. Emergency Provisions.		
Total Hours		**30**

Learning Resources:

Text Books:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Engineering Ethics", M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Prentice – Hall, 2004

Reference Books:

1. "SamvidhanaOdu" - for Students & Youths by Justice HN NagamohanDhas, Sahayana, kerekon.
2. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
3. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.
4. "The Constitution of India" by Merunandan K B: published by Merugu Publication,
5. Second Edition, Bengaluru.

Online Resources/E-Learning Resources:

1. https://opportunitycell.com/online-course-on-the-indian-constitution-by-ministry-of-law-justice/#google_vignette dated 19/4/2024
2. https://onlinecourses.nptel.ac.in/noc20_lw03/preview dated 19/4/2024

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Name of the Program:	BTECH CSE AIDS				Semester : 4	Level: UG	
Course Name	Project Based on Digital and Technological Solutions				Course Code/Course Type	UBTCE218/CEP	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	1	-	1	2	25	-	25

Pre-Requisite:

1. Basic knowledge of English

Course Objectives (CO):	The objectives of Project Based on Digital and Technological Solutions are: 1. Gain an understanding of emerging digital technologies and their potential applications in addressing societal challenges. 2. Apply design thinking methodologies to identify user needs, define project requirements, and develop innovative solutions. 3. Develop technical skills in software development, data analysis, and digital prototyping. 4. Collaborate effectively in interdisciplinary teams to design, implement, and evaluate digital solutions. 5. Demonstrate proficiency in project management techniques, including planning, budgeting, and resource allocation.
Course Learning Outcomes (CLO):	Students would be able to: 1. Gain an understanding of emerging digital technologies and their potential applications in addressing societal challenges. 2. Apply design thinking methodologies to identify user needs, define project requirements, and develop innovative solutions. 3. Develop technical skills in software development, data analysis, and digital

	prototyping. 4. Collaborate effectively in interdisciplinary teams to design, implement, and evaluate digital solutions. 5. Demonstrate proficiency in project management techniques, including planning, budgeting, and resource allocation.

Descriptors/Topics	CLO	Hours
1. Introduction to Digital Innovation • Overview of course objectives, expectations, and project guidelines • Introduction to design thinking and user-centered design principles • Case studies of innovative digital solutions and their impact	CLO1 to CLO5	10
2. Needs Assessment and Solution Design • Methods for conducting user research and defining project requirements • Ideation and concept generation techniques for digital solutions • Prototyping and user testing methodologies		
3. Technology Selection and Development • Overview of emerging digital technologies, including AI, IoT, and blockchain • Introduction to programming languages and development frameworks • Hands-on workshops on software development and digital prototyping tools		10
4. Project Planning and Management • Project scoping, goal setting, and stakeholder analysis • Techniques for project planning, scheduling, and risk management • Budgeting and resource allocation for digital innovation projects		10
5. Implementation and Testing • Agile development methodologies and iterative prototyping • Quality assurance and testing strategies for digital solutions • Iterative feedback and refinement based on user testing		
6. Evaluation and Impact Assessment • Methods for evaluating the usability, effectiveness, and scalability of digital solutions • Data analysis techniques for measuring project outcomes and impact		10

• Documentation and reporting of project findings and recommendation		10
		10
Total Hours		**60**

Assessment:

1. Project Proposal: Written proposal outlining the project scope, objectives, and methodology (20%)
2. Project Implementation: Development and implementation of the digital solution, including documentation and code repository (30%)
3. Final Report: Written report summarizing the project process, outcomes, and impact assessment (30%)
4. Presentation: Oral presentation of project findings and demonstration of the digital solution (20%)

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COURSE SYLLABUS
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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	Theory of Computation	Course Code/Course Type	UBTCE301/PCC
Course Pattern	2024	Version	1.0
Teaching Scheme		Assessment Scheme	

COURSE CURRICULUM

Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	NA	1	3	3	40	60	NA

Pre-Requisite: Discrete Mathematics , Digital Electronics & Logic Design

Course Objectives (CO):	The objectives of Theory of Computation: 1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages 2. To illustrate finite state machines to solve problems in computing. 3. To familiarize Regular grammars, context frees grammar. 4. To propose computation solutions using Turing machines.
	Students would be able to: 1. Understanding basic concepts of formal languages of finite automata techniques. 2. Develop formal mathematical methods to prove properties of languages, grammars and automata. 3. Able to construct context free grammar for various languages. 4. Applying normal form techniques push down automata and Turing Machines for any language. 5. Illustrate the decidability or undecidability of various problems.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
FORMAL LANGUAGE THEORY AND FINITE AUTOMATA: Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.	**CLO 1**	**9**
UNIT II		
REGULAR EXPRESSIONS (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. **REGULAR GRAMMARS (RG):** Definition, regular grammar and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.	**CLO 2**	**10**

UNIT III		
CONTEXT FREE GRAMMER (CFG): Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted).	**CLO 3**	**7**
UNIT IV		
PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. **TURING MACHINES (TM):** Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of TMs.	**CLO 4**	**10**
UNIT V		
RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Text Books:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and SComputation, 3rdedition, Pearson Education, India.

Reference Books:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.
2. J.Martin, —Introduction to Languages and the Theory of Computation, Third Edition, TMH, 2007.
3. Micheal Sipser, —Introduction of the Theory and Computation, Thomson Brokecole, 3 rd Edition, 2013.

Online Resources/E-learning Resources:

1. https://www.udemy.com/course/the-complete-theory-of-computation/?couponCode=ST8MT40924
2. https://onlinecourses.nptel.ac.in/noc19_cs79/preview

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Name of the Program:	BTECH CSE AIDS				Semester : 5	Level: UG	
Course Name	Computer Network				Course Code/Course Type	UBTCE302/PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	NA	NA	3	3	40	60	NA

Pre-Requisite: Fundamental of Computers

Course Objectives (CO):	The objectives of Computer Network are: 1. To gain the knowledge of communication systems. 2. To Learn and understand the History of Computer Network and its evolution with the help of service models 3. To learn the various issues of Network layer, its management and Routing algorithms at Network layer 4. To learn the services offered by Transport Layer 5. To learn the session layer and Applications Layer protocols; and its services.
Course Learning Outcomes (CLO):	Students would be able to: 1. Identify various data communication techniques along with types of network 2. Interpret OSI and TCP/IP Protocol suit 3. Design routing algorithms to find shortest path in network 4. Compare TCP and UDP services 5. Demonstrate application layer protocols

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Data Communication:	**CLO 1**	**9**

Fundamentals of Data Communication, Type of Connections, Network Topologies, Types of Networks-LAN, WAN And MAN; Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance; Introduction to Digital to Digital, Analog to Digital, Digital to Analog, Analog to Analog Conversions; Transmission Modes.		
UNIT II		
Introduction to Computer Networks: Introduction to OSI and TCP/IP Protocol Suite, Classification of Addressing Mechanisms, Guided Media: Twisted Pair Cable, Coaxial Cable and Fiber-Optic Cable, Unguided Media: Wireless, Radio Waves, Microwaves and Infrared; Introduction to Data Link Layer	**CLO 2**	**9**
UNIT III		
Network Layer and Routing Principles: Network Layer Services, Packet Switching: Datagram and Virtual Circuit Approach, Network Layer Performance: Delay, Throughput, Packet Loss, Congestion Control; IPv4: Datagram Format; Routing Algorithms: Distance Vector, Link-state, Path Vector Routing.	**CLO 3**	**9**
UNIT IV		
Transport Layer and its Services: Overview of Transport Layer, Transport Layer services, User Datagram Protocol (UDP): User Datagram, UDP Services, UDP Applications; Transmission Control Protocol (TCP): TCP Services, Features, TCP Segment, TCP Connection, TCP Congestion Control.	**CLO 4**	**9**
UNIT V		
Application Layer Protocols: Introduction to Application Layer, Client-Server Paradigm, Socket Interface, DHCP, FTP, TFTP, WWW & HTTP, Electronic Mail: SMTP, POP3, IMAP and MIME.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Textbooks:

1. Behrouz A Forouzan , "Data Communications and Networking", 5th Ed, McGraw – Hill Education India Edition 2013, ISBN-13: 9781259064753.
2. Behrouz A. Forouzan,"TCP-IP protocol suite ", Tata McGraw Hill Edition, 4th Edition 2010, ISBN-13: 9780070706521.

Reference Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
2. S. Tanenbaum , "Computer, Networks", PHI Publication, 4th edition, ISBN: 8178087855.
3. William Stallings, "Data and Computer Communications", Person Education, 8th Edition, ISBN:- 9788131715369.

Online Resources/E-learning Resources:

1. Computer Networks and Internet Protocol By Prof. Soumya Kanti Ghosh, Prof. Sandip Chakraborty | IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc22_cs19/preview

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COURSE CURRICULUM

Name of the Program:	BTECH CSE AIDS				Semester : 5	Level: UG	
Course Name	Computer Network Laboratory				Course Code/Course Type	UBTCE303/PCC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
NA	1	NA	1	2	25	NA	25
Pre-Requisite: Basic knowledge of python Programming							
Course Objectives (CO):	The objectives of Computer Network Laboratory are: 1. To establish communication among the computing nodes in various networking architectures. 2. Configure the computing nodes with understanding of protocols and technologies. 3. Use different communicating modes and standards for communication. 4. Use modern tools for network traffic analysis. 5. To learn network programming						
Course Learning Outcomes (CLO):	Students would be able to: 6. Understand working and architecture of college/ organization network. 7. Design network application by using various concepts of layered architecture. 8. Write program to analyze working of various protocols and packets. 9. Demonstrate LAN and WAN protocol behavior using Modern Tools. 10. Justify the working of error control and error detection mechanism using a program.						

Course Contents/Syllabus:

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Implement Regression models	Week 1/ Turn 1	Study the college / organization network, networking devices and its working in detail. Study the college/organization Server functioning and security parameters. (If possible, plan visit to the server room)	CLO 1	2
2	Practical 2:	Week 2/	Study of Networking commands. 1. ping	CLO	2

	Implement binary classification model	Turn 1	2. ipconfig/ifconfig 3. Tracert 4. Netstat 5. NSLookup	1	
3	Practical 3: Implement Neural Network based classifier	Week 3 /Turn 1	Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and preparing server to send file to client. Demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool.	CLO 2	2
4	Practical 4: Implement GD	Week 4/ Turn 1	Write a program for error detection and correction for 7/8 bits ASCII codes using CRC.	CLO 5	2
5	Practical 5: Implement KNN	Week 5 /Turn 1	Write a program to demonstrate subnetting and find the subnet masks.	CLO 2	2
6	Practical 6: Implement clustering model	Week 6/ Turn 1	Write a program to prepare TCP and UDP packets using header files and send the packets to the destination machine in peer-to-peer mode	CLO 3	2
7	Practical 7: Implement prediction model	Week 7 /Turn 1	Write a program using TCP sockets for wired network to implement peer to Peer Chat (Use JAVA/PYTHON)	CLO 3	2
8	Practical 8: Prediction model using neural network	Week 8/ Turn 1	Write a program using UDP sockets for wired network to implement: a Peer to Peer Chat (Use JAVA/PYTHON)	CLO 3	2
9	Practical 8: Prediction model using neural network	Week 9 /Turn 1	Write a program to simulate Go back N and Selective Repeat Modes of Sliding Window Protocol in peer-to peer mode.	CLO 3	2
10	Practical 8: Prediction model using neural network	Week 10 / Turn 1	Write a program to capture and analyze following packet formats for wired network. 1. Ethernet 2. IP 3.TCP 4. UDP	CLO 3	2
11	Practical 8: Prediction model using neural network	Week 11 /Turn 1 Week 12 /Turn 1	Configure RIP/OSPF/BGP using packet Tracer.	CLO 4	4
12	Practical 8: Prediction model using neural network	Week 13/ Turn 1	Write a program for DNS lookup. Given an IP address input, it should return URL and vice-versa.	CLO 4	2
13	Practical 8: Prediction model using neural network	Week 14 /Turn 1	Installing and configure DHCP server.	CLO 4	2
14	Practical 8: Prediction model using	Week 15 / Turn 1	Write a program to simulate the behaviour of link state routing protocol to find suitable path for transmission.	CLO 3	2

	neural network				

Learning resources

Textbooks:

1. Behrouz A Forouzan , "Data Communications and Networking", 5th Ed, McGraw – Hill Education India Edition 2013, ISBN-13: 9781259064753.
2. Behrouz A. Forouzan,"TCP-IP protocol suite ", Tata McGraw Hill Edition, 4th Edition 2010, ISBN-13: 9780070706521.

Reference Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
2. S. Tanenbaum , "Computer, Networks", PHI Publication, 4th edition, ISBN: 8178087855.
3. William Stallings, "Data and Computer Communications", Person Education, 8th Edition, ISBN:- 9788131715369.

Online Resources/E-learning Resources:

1. Computer Networks and Internet Protocol By Prof. Soumya Kanti Ghosh, Prof. Sandip Chakraborty | IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc22_cs19/preview

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COURSE CURRICULUM

Course Contents/Syllabus:

Name of the Program:		**BTECH CSE AIDS**		**Semester: 5**		**Level: UG**	
Course Name		**Data Science and Analytics**		**Course Code/Course Type**		**UBTDS301 / PCC**	
Course Pattern		**2024**		**Version**		1.0	
Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/ Oral**
3	0	0	3	3	40	60	
Pre-Requisite: Computer Network							
Course Objectives (CO):		The objectives of (Name of course) are: 1. To recall the concepts of probability and statistics. 2. To recognize the use of the hypothesis's probability and statistics. 3. To apply the concept of regression and related topics. 4. To analyze and design procedures for cryptography. 5. To evaluate network security models. 6. To design and create network security applications.					
Course Learning Outcomes (CLO):		Students would be able to: 1. Students will be able to understand the basics of correlation and probability. 2. Explain the various aspects of regression analysis. 3. Apply knowledge of various preprocessing techniques. 4. Analyze several data clustering techniques. 5. Evaluate how to predict the data using analytical techniques.					

(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	**CLO**	**Hours**
UNIT I		
Correlation: Axioms of Probability (Joint Probability, Marginal Probability, Independent Events and Conditional Probability), Random Variables, Various Distributions, Sampling, Confidence Intervals and Hypothesis Testing, Correlation and Covariance.	**CLO 1**	**9**
UNIT II		
Regression Analysis: ANOVA, Detailed Simple and Multi-Linear Linear Regression, Time Series Analysis Algorithms.	**CLO 2**	**9**
UNIT III		

Data preprocessing: Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization	**CLO 3**	**9**
UNIT IV		
Clustering: K-means, K-medoids, Hierarchical clustering, Graph Clustering including Spectral Clustering, Cluster Evaluation.	**CLO 4**	**9**
UNIT V		
Descriptive analytics: Data Modeling, Trend Analysis, Simple Linear Regression Analysis Forecasting models: Heuristic methods, predictive modeling, and pattern discovery.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Textbooks:

1. Wes McKinney, "Python for Data Analysis",O'REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.

2. Rachel Schutt &O'neil, "Doing Data Science", O'REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013.

3. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013.

Reference Books:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.

2. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.

3. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition, 2015.

Online Resources/E-Learning Resources

1. https://onlinecourses.nptel.ac.in/noc21_cs69/preview By Prof. Ragunathan Rengasamy, Prof. Shankar Narasimhan | IIT Madras

2. https://onlinecourses.nptel.ac.in/noc22_cs32/preview By Prof. Ragunathan Rengasamy | IIT Madras

3. https://ocw.mit.edu/courses/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/video_galleries/lecture-videos/

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Name of the Program:	BTECH CSE AIDS	Semester: 5	Level: UG
Course Name	Data Science and Analytics Lab	Course Code/Course Type	UBTDS302/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25

Pre-Requisite:	Computer Network
Course Objectives (CO):	The objectives of (Name of course) are: 1. To recall the concepts of probability and statistics. 2. To recognize the use of the hypothesis's probability and statistics. 3. To apply the concept of regression and related topics. 4. To analyze and design procedures for cryptography. 5. To evaluate network security models. 6. To design and create network security applications.
Course Learning Outcomes (CLO):	Students would be able to: 1. Students will be able to understand the basics of correlation and probability. 2. Explain the various aspects of regression analysis. 3. Apply knowledge of various preprocessing techniques. 4. Analyze several data clustering techniques. 5. Evaluate how to predict the data using analytical techniques.

Course Contents/Syllabus:
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1: Numpy	Week 1	1.1 Creating a NumPy Array 1.2 The Shape and Reshaping of NumPy Array	CLO1	2
2		Week 2	1.3 Expanding and Squeezing a NumPy Array 1.4 Indexing and Slicing of NumPy Array	CLO1	2
3	Practical 2: Pandas	Week 3	2.1 Perform following operations using pandas. 2.2 Perform following operations using pandas	CLO 2	2
4		Week 4	2.3 Read the following file formats using pandas. 2.4 Read the following file formats.	CLO 2	2
5	Practical 3: Web Scraping	Week 5	Demonstrate web scraping using python	CLO 3	2
6	Practical 4: Preprocessing Techniques	Week 6	4.1 Feature Scaling and Feature Standardization	CLO 4	2
7		Week 7	4.2 Label Encoding and One Hot Encoding	CLO 5	2

Learning resources

Textbooks:

1. Wes McKinney, "Python for Data Analysis", O'REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.
2. Rachel Schutt &O'neil, "Doing Data Science", O'REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013.
3. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013.

Reference Books:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.
2. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.
3. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition, 2015.

Online Resources/E-Learning Resources

1. https://onlinecourses.nptel.ac.in/noc21_cs69/preview By Prof. Ragunathan Rengasamy, Prof. Shankar Narasimhan | IIT Madras
2. https://onlinecourses.nptel.ac.in/noc22_cs32/preview By Prof. Ragunathan Rengasamy | IIT Madras
3. https://ocw.mit.edu/courses/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/video_galleries/lecture-videos/

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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	Artificial Intelligence	Course Code/ Course Type	UBTML301A/PEC-I
Course Pattern	2024	Version	1.0

Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-

Pre-Requisite: Proficiency in a programming language, such as Python or Java.

Course Objectives (CO):	The objectives of (Artificial Intelligence) are: 1. To impart artificial intelligence principles, techniques and its history. 2. To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering problems 3. To develop intelligent systems by assembling solutions to concrete computational problems
Course Learning Outcomes (CLO):	Students would be able to: 1. Evaluate Artificial Intelligence (AI) methods and describe their foundations. 2. Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation and learning. 3. Demonstrate knowledge of reasoning, uncertainty, and knowledge representation for solving real-world problems 4. Analyses and illustrate how search algorithms play a vital role in problem-solving 5. Demonstrate knowledge of Expert systems in problem-solving

Descriptors/Topics	CLO	Hours
UNIT I		
Foundation Of AI AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.	**CLO 1**	**09**
UNIT II		
Searching For Solutions Problem space and search, Toy Problems, Uninformed search methods – Breadth First Search, Uniform Cost Search, Depth First Search, Depth Limited Search, Iterative Deepening Search, Bi-directional Search, Heuristic search methods - Best first, Greedy, A*, AO*, Hill Climbing, Local Search and optimization - Simulated Annealing, Local Beam Search, Adversarial search –Mini max, Alpha-Beta Pruning	**CLO 2**	**09**
UNIT III		
Logic And Reasoning Introduction to Logic and Reasoning -Propositional Logic-First Order Logic-Inference in First Order Logic- Unification, Forward Chaining, Backward Chaining, Resolution	**CLO 3**	**09**
UNIT IV		
Planning Classical planning, Planning as State-space search, Forward search, backward search, Planning graphs, Hierarchical Planning, Planning and acting in Nondeterministic domains – Sensor-less Planning, Multi agent planning	**CLO 4**	**09**
UNIT V		
Expert Systems Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition,	**CLO 5**	**09**
Total Hours:		**45**

Learning Resources:

Textbooks:

1. Stuart Russell and Peter Norvig (1995), "Artificial Intelligence: A Modern Approach", Third edition, Pearson, 2003.\
2. Elaine Rich and Kevin Knight "Artificial Intelligence", Tata McGraw Hill, 1991

Reference Books:

1. Patrick Henry Winston, "Artificial Intelligence", Addison-Wesley, 1992
2. K. R. Chowdhary, Fundamentals of Artificial Intelligence, Springer, 2020
3. Alpaydin, E. 2010. Introduction to Machine Learning. 2nd Edition, MIT Press.

Online Resources/E-Learning Resources:

1.https://www.edx.org/learn/artificial-intelligence

2.https://online courses.nptel.ac.in/noc22_cs56/preview

3.https://www.w3schools.com/ai/ai_whatis.asp

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Name of the Program:	BTECH CSE AIDS	Semester: 5	Level: UG
Course Name	Artificial Intelligence Lab	Course Code/ Course Type	UBTML302A/PEC-I
Course Pattern	2024	Version	1.0

Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	1	-	1	2	25	-	25

Pre-Requisite:

1. Programming Languages

Course Objectives (CO):	The objectives of (Artificial Intelligence) are: 1. To impart artificial intelligence principles, techniques and its history. 2. To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering problems 3. To develop intelligent systems by assembling solutions to concrete computational problems
Course Learning Outcomes (CLO):	Students would be able to: On completion of this course, student should be able to: 1. Evaluate Artificial Intelligence (AI) methods and describe their foundations. 2. Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation and learning. 3. Demonstrate knowledge of reasoning, uncertainty, and knowledge representation for solving real-world problems 4. Analyse and illustrate how search algorithms play a vital role in problem-solving 5. Demonstrate knowledge of Expert systems in problem-solving

Assignment/ Practical/Activity Number	Assignment / Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1:	Week 1	Create a SWI Prolog program to represent the family tree	CLO1	2
2	Practical 2:	Week 2	FACTORIAL, FIBONACCI SERIES AND PRIME NUMBER CHECKING Q1. Find whether a number N is prime or not Q2. Find factorial of a number N. Q3. Find Nth term of Fibonacci series	CLO1	2
3	Practical 3:	Week 3	Lists are important in Prolog. You will often need to pattern match against lists. Create a prolog file named Lab3_List_exercise.pl and create the following knowledge base.	CLO2	2
4	Practical 4:	Week 4/ Week 5	Eight queens problem is a constraint satisfaction problem (CSP). The task is to place eight queens in the 64 available squares in such a way that no queen attacks each other. So the problem can be formulated with variables x1, x2, x3, x4, x5, x6, x7, x8 and y1, y2, y3, y4, y5, y6, y7, y8.	CLO 2	4
5	Practical 5:	Week 6	The Tower of Hanoi puzzle in prolog	CLO3	2
6	Practical 6:	Week 7	WAP to Solve Travel salesman problem in prolog	CLO3	2
7	Practical 7:	Week 8	WAP to solve Water Jug in prolog	CLO4	2
8	Practical 8:	Week 9	WAP to solve Monkey Bannana Problem in prolog	CLO4	2
9	Practical 9:	Week 10	Write a program in PROLOG to implement factorial (N, F) where F represents the factorial of a number N.	CLO5	2
10	Practical 10:	Week 11/ Week 12	A prolog program will represent this expert knowledge in terms of rules in its knowledge base for Expert systems are computer applications which embody some non-algorithmic expertise for solving certain types of problems.	CLO5	4
11	Mini Project /Task	Week 13/14/15	Mini Project	CLO1 /2/3/4/ 5	6

Practical Plan

Learning Resources:

Textbooks:

3. Stuart Russell and Peter Norvig (1995), "Artificial Intelligence: A Modern Approach", Third edition, Pearson, 2003.\
4. Elaine Rich and Kevin Knight "Artificial Intelligence", Tata McGraw Hill, 1991

Reference Books:

4. Patrick Henry Winston, "Artificial Intelligence", Addison-Wesley, 1992
5. K. R. Chowdhary, Fundamentals of Artificial Intelligence, Springer, 2020
6. Alpaydin, E. 2010. Introduction to Machine Learning. 2nd Edition, MIT Press.

Online Resources/E-Learning Resources:

1.https://www.edx.org/learn/artificial-intelligence

2.https://onlinecourses.nptel.ac.in/noc22_cs56/preview

3.https://www.w3schools.com/ai/ai_whatis.asp

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Name of the Program:	BTECH CSE AIDS	Semester: 5	Level: UG
Course Name	Advanced Web Programming	Course Code/ Course Type	UBTCE304/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-

Pre-Requisite: Proficiency in a programming language, such as Python or Java

Course Objectives (CO):	The objectives of Advanced Web Programming are: 1. To familiarize students with Web Programming basic concepts. 2. To learn and understand Web scripting languages. 3. To explore the Front end& Back-end web programming skills. 4. To understand and learn Mobile web development. 5. To understand and learn Web application deployment.
Course Learning Outcomes (CLO):	1. Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap. 2. Demonstrate the use of web scripting languages. 3. Develop web application with Front End & Back End Technologies. 4. Develop mobile website using JQuery Mobile. 5. Deploy web application on cloud using AWS.

Descriptors/Topics	CLO	Hours
UNIT I INTRODUCTION TO WEB TECHNOLOGIES		
HTML: Getting started with HTML, Why HTML, Tags and Elements, Attributes, Properties, Headings list, Links, Tables, Images, HTML Form, Media (Audio, Video), Semantic HTML5 Elements. CSS: Why CSS, Types of CSS, How to use CSS, Properties, Classes, Child-Class (Nested CSS), Colors, Text, Background, Border, Margin, Padding, Positioning (flex, grid, inline, block), Animation, Transition. BOOTSTRAP: Why Bootstrap, CSS over Bootstrap, How to Use Bootstrap, Bootstrap Grid System, Bootstrap Responsive, Bootstrap Classes, Bootstrap Components (i.e., Button, Table, List, etc.), Bootstrap as a Cross Platform. W3C: What is W3C, How W3C handles/Supports Web Technologies.	**CLO 1**	**09**
UNIT II WEB SCRIPTING LANGUAGES		
JavaScript: Introduction to Scripting languages, Introduction to JavaScript (JS), JS Variables and Constants, JS Variable Scopes, JS Data Types, JS Functions, JS Array, JS Object, JS Events. Advanced JavaScript: JSON - JSON Create, Key-Value Pair, JSON Access, JSON Array, JS Arrow Functions, JS Callback Functions, JS Promises, JS Async-Await Functions, JS Error Handling. AJAX: Why AJAX, Call HTTP Methods Using AJAX, Data Sending, Data Receiving, AJAX Error Handling. JQUERY: Why JQuery, How to Use, DOM Manipulation with JQuery, Dynamic Content Change with JQuery, UI Design Using JQuery.	**CLO 2**	**09**
UNIT III FRONT END TECHNOLOGIES		
Front-End Frameworks: What is web framework? Why Web Framework? Web Framework Types. MVC: What is MVC, MVC Architecture, MVC in Practical, MVC in Web Frameworks. TypeScript: Introduction to Typescript (TS), Variables and Constants, UNITs in TS. AngularVersion 10+: Angular CLI, Angular Architecture, Angular Project Structure, Angular Lifecycle, Angular UNITs, Angular Components, Angular Data Binding, ReactJS: Introduction to ReactJS, React Components, Inter Components Communication, Components Styling, Routing, Redux- Architecture, Hooks- Basic hooks, useState() hook, useEffect() hook, useContext() hook.	**CLO 3** **CLO 4**	**09**
UNIT IV BACK-END TECHNOLOGIES		
Node.JS: Introduction to Node.JS, Environment Setup, Node.JS Events, Node.JS Functions, Node.JS Built-in UNITs, File System, NPM, Install External UNITs, Handling Data I/O in Node.JS, Create HTTP Server, Create Socket Server, Microservices- PM2. ExpressJS: Introduction to ExpressJS, Configure Routes, Template Engines, ExpressJS as Middleware, Serving Static Files, REST HTTP Method APIs, Applying Basic HTTP Authentication, Implement Session Authentication.	**CLO 5** **CLO 6**	**09**
UNIT V BACK-END WITH DATABASE		
MongoDB: NoSQL and MongoDB Basics, MongoDB-Node.JS Communication, CURD Operations using Node.JS, Mongoose ODM for Middleware, Advanced MongoDB. Big database Connectivity.	**CLO 9** **CLO 10**	**09**
Total Hours		**45**

Learning resources

Text Books:

gent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496.

Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891.

Reference Books:

teven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81- 265-1635-3

Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93- 5004-088-1

Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81-265- 1635-3

Ivan Bayross,"Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,BPB Publications,4th Edition,ISBN:978-8183330084.

URLs (Optional) - List of Online Courses

Online Resources:

1.https://www.udemy.com/course/advanced-web-developer-course-beginner-to advanced/?couponCode=ST8MT40924

2. https://www.shiksha.com/online-courses/web-development-courses-certification-training-by-nptel-st644

3. https://onlinecourses.swayam2.ac.in/nou20_cs05/preview

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COURSE CURRICULUM

Name of the Program:		**BTECH CSE AIDS**		**Semester: 5**		**Level: UG**	
Course Name		**Advanced Web Programming Lab**		Course Code/ Course Type		**UBTCE305 B/ PEC**	
Course Pattern		**2024**		**Version**		1.0	
Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/Oral**
-	1	-	1	16	25	--	25
Pre-Requisite: Proficiency in a programming language, such as Python or Java							
Course Objectives (CO):				The objectives of (Advanced Web Programming Lab) are: 1.To familiarize students with Web Programming basic concepts. 2.To learn and understand Web scripting languages. 3.To explore the Front end& Back-end web programming skills. 4. To understand and learn Mobile web development. 5. To understand and learn Web application deployment.		
Course Learning Outcomes (CLO):				Students would be able to: 1. Develop Static and Dynamic website using technologieslike HTML, CSS, Bootstrap. 2. Demonstrate the use of web scripting languages. 3. Develop web application with Front End & Back End Technologies. 4. Develop mobile website using JQuery Mobile. 5. Deploy web application on cloud using AWS.		

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Working with HTML CSS	Week 1/ Turn 1	a. Create a responsive web page which shows the ecommerce/college/exam admin dashboard with sidebar and statistics in cards using HTML, CSS and Bootstrap. b. Write a JavaScript Program to get the user registration data and push to array/local storage with AJAX POST method and data list in new page.	CLO1	3
2	Practical 2: Working with GitHub, NVIDEIA Docker	Week 2/ Turn 1	a. Create version control account on GitHub and using Git commands to create repository and push your code to GitHub. b. Create Docker Container Environment (NVIDEIA Docker or any other). c. Create an Angular application which will do following actions: Register User, Login User, Show User Data on Profile Component.	CLO1	3
3	Practical 3: Working with Node.JS, ExpressJS	Week 3 /Turn 1	Create: a. Node.JS Application which serves a static website. b. Create four API using Node.JS, ExpressJS and MongoDB for CURD Operations on assignment.	CLO2	3
4	Practical 4: Working with AWS VPC or AWS Elastic	Week 4/ Turn 1	a. Create a simple Mobile Website using jQuery Mobile. b. Deploy/Host Your web application on AWS VPC or AWS Elastic Beanstalk. Mini Project.	CLO5	3
5	Practical 5: Working With AJAX POST	Week 5 /Turn 1	a. Create a responsive web page which shows the ecommerce/college/exam admin dashboard with sidebar and statistics in cards using HTML, CSS and Bootstrap. b. Write a JavaScript Program to get the user registration data and push to array/local storage with AJAX POST method and data list in new page.	CLO2	3

Learning resources

Text Books:

1. Kogent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496.
2. Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891.

Reference Books:

1. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978-81- 265-1635-3
2. Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93- 5004-088-1
3. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978-81-265- 1635-3
4. Ivan Bayross,"Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,BPB Publications,4th Edition,ISBN:978-8183330084.
5. URLs (Optional) - List of Online Courses

Online Resources/E-Learning Resources

1. https://www.udemy.com/course/advanced-web-developer-course-beginner-to advanced/?couponCode=ST8MT40924
2. https://www.shiksha.com/online-courses/web-development-courses-certification-training-by-nptel-st644
3. https://onlinecourses.swayam2.ac.in/nou20_cs05/preview

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Data Science with Python: Fundamentals of Data Manipulation with Python, Basic Data Processing with Pandas, More Data Processing with Pandas, statistical test knowledge on Data Frames in pandas. Recognize other kinds of structured data such as networks, graphs, natural language.	**CLO 1**	**9**
UNIT II		
Applied Plotting, Charting & Data Representation in Python Principles of Information Visualization, Basic Charting, Charting Fundamentals, Applied Visualizations.	**CLO 2**	**9**
UNIT III		
Applied Machine Learning in Python Estimation and prediction in linear model-based supervised learning algorithms. strengths and weaknesses of supervised learning methods to choose the right algorithm for a task. Apply supervised machine learning algorithms in Python using scikit-learn and understand general principles, techniques such as regularization, feature scaling, and cross-validation to avoid overfitting or underfitting. evaluation metrics in machine learning, and how to interpret results when using them. Optimize machine learning algorithm by choosing appropriate evaluation metric for the task.	**CLO 3**	**9**
UNIT IV		
Applied Text Mining in Python: Common problems with raw text and perform textual cleaning tasks in Python, regular expressions (RegEx) to find textual patterns. different natural language tasks and process free text through the NLTK toolkit to tag language constructs onto text. Classification of Text, Compare text classification to other classification approaches, including Naive Bayes and Support Vector Machine algorithms.	**CLO 4**	**9**
UNIT V		
Applied Social Network Analysis in Python: Recognize and categorize real-world networks. Determine appropriate type of network to model real networked data. Construct and manipulate networks of different types using NetworkX, including bipartite graph and related algorithms such as graph projections, Degree distribution of a network and use NetworkX to visualize it.Recognize properties of real-world networks, such as power law degree distribution, high clustering and small average shortest paths.the mechanics of network generation models, such as Preferential Attachment and Small World Models and their properties, and use NetworkX for link prediction and node feature creation in real-world networks.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Textbooks:

1. Applied Data Science with Python and Jupyter Paperback – 31 October 2018, by Alex Galea
2. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython by Wes McKinney,Oreilly Publications.

Reference books:

1. Applied Data Science: Lessons Learned for the Data-Driven Business Hardcover 25 June 2019,by MartinBraschler,ThiloStadelmann, Kurt Stockinger,
2. Python Data Science Handbook by Jake VanderPlas, Oreilly Publications

Online Resources/E-learning Resources:

1 https://github.com/yonycherkos/Applied-Data-Science-with-Python-Specialization/tree/main
2 https://www.udemy.com/course/applied-data-science-with-python-specialization
3 https://www.coursera.org/specializations/data-science-python

PCET's Pimpri Chinchwad University
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Name of the Program:	BTECH CSE AIDS	Semester: 5	Level: UG
Course Name	Software Engineering Project Management	Course Code/ Course Type	UBTCE308 /PCC
Course Pattern	2024	Version	1.0

Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	2	2	20	30	-

Pre-Requisite: NA

Course Objectives (CO):	The objectives of Software Engineering Project Management course are: 1. Comprehend Software Engineering & project management Fundamentals: 2. Apply Project Life Cycle Phases 3. To conceptualize the Software Development Life Cycle (SDLC) models. 4. Master Project Execution and Team Leadership: 5. Implement Risk Management Strategies
Course Learning Outcomes (CLO):	Students would be able to: - 1. Demonstrate a Fundamental Understanding 2. Develop Comprehensive Project Plans 3. Effectively Lead Project Teams 4. Apply Risk Management Strategies 5. Identify the Inputs, Tools and techniques to get the required Project deliverable.

Descriptors/Topics	CLO	Hours
UNIT I INTRODUCTION TO SOFTWARE ENGINEERING AND PROJECT MANAGEMENT		
Definition and Importance Software Engineering & Project Management, The Software Product and Software Process Software Product and Process Characteristics, Three "R"-Reuse, Reengineering and Retooling, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics).	**CLO 1**	**06**
UNIT II REQUIREMENT AND DESIGN ENGINEERING		

Requirement Elicitation, Analysis, and Specification Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Analysis Modeling for Function-oriented and Object-oriented software development. System and Software Requirement Specifications, Requirement Validation, Traceability, Facilitated Application Specification Technique (FAST), Design Concepts and Principles Use case Modeling, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics. **SRS Case Studies**: Software Estimation: Size Estimation: Function Point (Numerical). Cost Estimation: COCOMO(Numerical), COCOMO-II (Numerical). Earned Value Management.	**CLO 2**	**06**
UNIT III SOFTWARE ANALYSIS AND TESTING		
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. **Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.	**CLO 3**	**06**
UNIT IV RISK MANAGEMENT AND QUALITY CONTROL		
Software Maintenance & Software Project Measurement Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Feasibility Analysis, Project and Process Planning, Resources Allocations, Software efforts, Schedule, and Cost estimations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA). Project Plan, Project Metrics. **Case Studies**: 1. Project Risk Management in Action 2. Quality Control and Process Improvement: Quality Control, Process improvement and activities Risk assessment simulation, Quality control exercises,Individual assignment on risk management, Group project on quality control.	**CLO 4**	**06**
UNIT V PROJECT MONITORING AND CLOSURE		
Monitoring and Controlling Project Performance:Performance Measurement,Key Performance Indicators (KPIs),Status Reporting,Risk Monitoring,Change Control. Change Control and Configuration Management:Change control,Configuration Management,Integration of Change Control and Configuration Management,Tools and Technologies. Project Closure and Evaluation:Project Evaluation,Performance Metrics,Stakeholder Feedback,Documentation Review,Benchmarking,Root Cause Analysis.Feedback to Team and Stakeholders,Closure of Evaluation Phase. **Case Studies on :** 1. Real-time project monitoring exercise 2. Group project on project closure 3. Final examination covering all topics Presentation on a case study of a project closure	**CLO5**	**06**
Total Hours:		**30**

Learning Resources:

Text Books:

1. "Project Management: A Managerial Approach" by Jack R. Meredith and Samuel J. Mantel Jr.
2. "Project Management: The Managerial Process" by Erik W. Larson and Clifford F. Gray.
3. "Effective Project Management: Traditional, Agile, Extreme" by Robert K. Wysocki.

Reference Books:

1. "Project Management: A Systems Approach to Planning, Scheduling, and Controlling"" by Harold Kerzner.
2. "Effective Project Management: Traditional, Agile, Extreme " by Robert K. Wysocki.
3. "The Art of Project Management "by Scott Berkun
4. Software Engineering, 5th and 7th edition, by Roger S Pressman, McGraw Hill publication.
5. Managing Information Technology Project, 6edition, by Kathy Schwalbe, Cengage Learning publication.
6. Information Technology Project Management by Jack T Marchewka Wiley India publication.
7. Software Engineering 3rd edition by KK Agrawal, Yogesh Singh, New Age International publication.

Online Resources/E-Learning Resources:

1. https://www.coursera.org/courses?query=software%20project%20management
2. https://archive.nptel.ac.in/courses/106/105/106105218/3.

PCET's Pimpri Chinchwad University
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Name of the Program:	BTECH CSE AIDS				Semester: 5	Level: UG	
Course Name	Technical Seminar				Course Code/ Course Type	UBTCE309 /PROJ	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	-	1	1	1	25	-	25
Pre-Requisite: NA							

Course Objectives (CO):	The objectives of Machine Learning are: 1. Explore current trends in specific area of interest 2. Perform literature survey related to the specific topics of interest 3. Appreciate the results of technical work 4. Write technical reports 5. Summarize and present the technical contents.
Course Learning Outcomes (CLO):	Students would be able to: 1. Explore current trends in specific area of interest 2. Perform literature survey related to the specific topics of interest 3. Evaluate the results of technical work 4. Analyze how to write technical reports 5. Summarize and present the technical contents.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
A Seminar should be given by an individual student based on topics chosen from the emerging areas and technologies of Computer science & Computer Applications. References from journals such as IEEE, ACM etc., shall be used. A report on this seminar with 15-20 pages shall also be	CLO 1-5	15

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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	German A2.1	Course Code/ Course Type	UFL301A/AEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

prepared and submitted to the guide.		

Pre-Requisite: Able to have a basic conversation in German.	
Course Objectives (CO):	The objectives of (GermanA2.1) are: 1. To get familiar with food culture in Germany. 2. To comprehend professional and educational concepts. 3. To apply advance grammar topics. 4. To Analyse advance text. 5. To Design and create texts in German
Course Learning Outcomes (CLO):	Students would be able to: 1. Comprehend food related texts. 2. Enhance writing skills in German language. 3. Enhance professional speaking skills of German language. 4. Construct a dialogue, in the German language, for basic human interactions in a social context. 5. Take part in an interaction relating to formal conversation

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Rund ums Essen Kitchen and cooking, Food habits, Emotions and assumptions Grammar – Possessive articles, reflexive verbs	**CLO 1**	**6**
UNIT II		
Nach der Schulzeit Daily activities and experiences during school time, school subjects, school types Grammar – Changing prepositions	**CLO 2**	**6**
UNIT III		
Medien in Alltag Media, activities in media, film Grammar – Degree of comparison	**CLO3**	**6**
UNIT IV		
Groβe und kleineGefühle Festivals and celebrations, invitation cards, thanksgiving cards,	**CLO4**	**6**

Grammar – Adjective ending		
UNIT V		
Was machen Sie beruflich? & Ganz schonmobil Daily activities in the working world, different professions, public transport and travelling towards working place Grammar – Clauses, Modalverbs in past tense	**CLO5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Netzwerk A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.
2. Studio d A1, Cornelesen Verlag & Goyal Publishers & Distributors Pvt. Ltd.
3. Netzwerk Neu A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd

Reference Books:

1. Hallo Deutsch A1,Ernst Klett Verlag, Goyal Publishers & Distributors Pvt. Ltd
2. ThemenAktuell 1, Hueber verlag
3. Maximal Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.

Online Resources/E-Learning Resources:

1.Youtube :https://youtube.com/@LearnGermanwithAnja?si=BkJYDPi7TS0fT4lr
2.https://youtube.com/@deutschlernenmitheidi?si=TkICIabzioaU0roZ
3. Instagram : instagram.com/learngermanwithanja

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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	Basic Japanese language skill	Course Code/Course Type	UFL301B/AEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	50	-	-

Pre-Requisite: Desire to get acquainted with the Japanese language. Basic knowledge of Hiragana and Katakana. Reading & writing Japanese script with basic kanji.

Course Objectives (CO):	The objectives of (Basic Japanese language skill) are: 1. Being fluent in a additional language will increase the opportunities in a competitive job market. 2. To develop students' basic abilities such as listening, speaking, reading and writing. 3. To enhance the listening skills and memory. 4. Unlock career potential with language skills. 5. To interpret a variety of cultural products in the target language from a critical perspective.
Course Learning Outcomes (CLO):	Students would be able to: 1. Read & write days / dates using Kanji. Write and speak basic sentences with adverb. 2. Identify relations, make sentences using adjectives 3. Illustrate the location of particle and living things 4. Conversation in the question answer format 5. Express ambition appetite aspiration craving

Descriptors/Topics	CLO	Hours

UNIT I		
Minna no Nihongo lesson no. 5 & 6 Express Days and dates using kanji. Speaking : days in month with kanji, Particals / Introduction to calenderWriting sentences using Verbs / Adverb Speaking : want to invite someone to do something	**CLO 1**	**6**
UNIT II		
Minna no Nihongo lesson no. 7 & 8 Writing : Verbs / method of an action /family members Speaking : Reference word & Information regarding family Introduction of Adjectives /tenses of adjectives	**CLO 2**	**6**
UNIT III		
Minna no Nihongo lesson no. 9 & 10 Adverbs & Preposition	**CLO 3**	**6**
UNIT IV		
Minna no Nihongo lesson no. 11 & 12 Counters, Adjectives / tenses of adjective	**CLO 4**	**6**
UNIT V		
Minna no Nihongo lesson no. 13 Desire/phrases	**CLO 5**	**6**
Total Hours		**30**

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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	Aptitude And Logical Reasoning	Course Code/ Course Type	ACALR301/AC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

Pre-Requisite:	
Course Objectives (CO):	The objectives of Aptitude and Logical Reasoning are: 1. To Familiarize Students with Different Types of Mathematical Problems. 2. To learn and Strengthen Logical Reasoning Skills. 3. To Develop Critical Thinking Skills. 4. To Improve Quantitative and Numerical Skills. 5. To Prepare Students for Standardized Tests and build Confidence in Problem-Solving.
Course Learning Outcomes (CLO):	Students would be able to: 1. Students will develop enhanced problem-solving abilities through Exposure to various types of aptitude and logical reasoning problems. 2. Sharpen their analytical thinking skills by learning to analyze and interpret different types of data, patterns, and logical structures. 3. Cultivate critical thinking abilities by challenging students to evaluate and assess information, arguments, and scenarios using logical reasoning principles. 4. Apply different forms of logical reasoning, such as deductive reasoning, inductive reasoning, and critical reasoning, to solve problems and make decisions. 5. Students will be able to develop soft skills and communication skills

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
QuantitativeAptitude: Number System, Problems on Ages, Percentage, Average, Time and Work, Profit and Loss, Permutation and Combination	**CLO 1**	**8**
UNIT II		
Logical Reasoning: Number Series, Letter Series, Coding and Decoding, Calendars, Clocks	**CLO 2**	**8**
UNIT III		
Verbal Reasoning: Subject-Verb Agreement, Preposition and Verbal Analogy, Closet test	**CLO2,3**	**7**
UNIT IV		
Personality Development: Resilience, Motivation and Listening skills, Self-confidence, Body language, Leadership, Goal setting, Emotional intelligence, Personal growth and development	**CLO 3**	**7**
UNIT V		
Soft Skills and Communication Skills: Introduction to Teamwork, Collaboration and Time Management, Communication Skills, Organization Skills, Introduction to Critical Thinking, Leadership, Negotiation and Presentation Skills, Time Management, Adaptability Skills, actively listening in conversations, Public speaking, Effectively communicating ideas to others, Introduction to Career Development, Goal Setting, Emotional Intelligence Fundamentals, Building Adaptability and Resilience	**CLO2,3**	**8**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Quantitative Aptitude for Competitive Examinations, R.S Agarwal, 2017
2. Quantitative Aptitude for All Competitive Examinations by Abhijit Guha, 6th edition,2016
3. Word Power Made Easy by Norman Lewis, 2023

Reference Books:

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations by Dinesh khattar, 2nd Edition

CIA Guidelines:

- Online Quiz (Based on MCQ)- 20 marks
- Activity (with short Report Submission) - 20 Marks
- Academic Sincerity - 10 marks
- Few of the suggested Activities are Assignments, Debates, Poster presentations, Model making, Group presentation, Field visits and Group Discussions.

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Name of the Program:	BTECH CSE AIDS	Semester : 5	Level: UG
Course Name	Environmental Studies	Course Code / Course Type	ACEVS301 /AEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	-	2	50	-	-

Pre-Requisite: Nil

Course Objectives (CO):	The objectives of Environmental Studies are: 1. Comprehend multidisciplinary nature of environmental Studies and natural resources 2. Comprehend solid E waste and global impacts of air pollution and its control strategies 3. To learn about technics for Industrial water management and treatment processes 4. To comprehend interlinking of rivers and disaster management 5. To impart knowledge about existing environmental laws and legislations
Course Learning Outcomes (CLO):	Students would be able to: 1. Explore the breadth and interdisciplinary nature of environmental issues, resources 2. Identify the sources, effects, and remedial measures for E waste and Air Pollution 3. Analyze for Industrial water management and treatment processes 4. Analyze about interlinking of rivers and disaster management 5. Evaluate existing environmental laws and legislations with case studies

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Multidisciplinary Nature of Environmental Studies: Definition, scope, environment, and its relation to the branch. Introduction to basic terminologies. Sustainable development Goals, natural resources and associated problems- water, solar, mineral and energy, actual sustainability report study, Water conservation, rain water harvesting. Resettlement and rehabilitation of people; its problems, concerns and case studies.	**CLO 1**	**6**
UNIT II		
Solid Waste, E waste and Air Pollution: Sources and types of solid wastes, introduction to solid waste management. Introduction to E- waste, generation and case studies. Air Pollution Definition, sources, classification of air pollution. Air pollutants: CO, CO_2, SO_2, NO_X, hydrocarbons and aerosols. Specific phenomena related with air pollution- Greenhouse effect, Acid rain, Ozone layer depletion and Smog, Control of Air Pollution.	**CLO 2**	**6**
UNIT III		
Industrial waste water treatment : Important terminologies related to waste water treatment process. Preliminary, primary, secondary, and tertiary waste water treatment process. Waste water treatment process of (a) Paper and pulp (b) Oil refinery (c) Petrochemical (d) Sugar industries. Case studies.	**CLO 3**	**6**
UNIT IV		
Environmental priorities in India and sustainable development: Ganga Action plan, Interlinking of rivers, Natural disasters and their management. Disaster management: floods, earthquake, cyclone and landslides.	**CLO 4**	**6**
UNIT V		
Environmental Legislations and case studies: National: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, International: Montreal protocol, Kyoto protocol, Rio summit and Paris agreement.	**CLO 5**	**6**
Total Hours		**30**

Learning Resources

Textbooks:

1. Kaushik, A and Kaushik C.P. Perspective in Environmental studies. New Age International Publications
2. Iqbal H. Khan, Naved Ahsan. Textbook of Solid Wastes Management. CBS Publisher & Distributors P Ltd.

Reference Books:

1. S. K. Garg. Sewage Disposal and Air pollution Engineering. Khanna Publishers
2. M. N. Roa, H. V. N. Rao. Air Pollution. Mc.Graw Hill.

Online Resources/E-Learning Resources

1. https://nitsri.ac.in/Department/CHEMISTRY/EVS_MATERIAL_2.pdf
2. https://onlinecourses.swayam2.ac.in/cec19_bt03/preview
3. https://onlinecourses.swayam2.ac.in/cec19_bt03/preview

CIA Guidelines: -

- Online Quiz (Based on MCQ)- 20 marks
- Activity (with short Report Submission) - 20 Marks
- Academic Sincerity - 10 marks
- Suggested activities are Assignments, Debates, Poster presentations, Model making, Group presentation, Field visits and Group Discussions

Few of suggested topics related to Environmental studies are:

Debate Topics

- Montreal Protocol/Kyoto Protocol
- Development Pro/Cons

Activities

- E waste Management / Project (Apply Computer engineering knowledge to find control pollution or any other environmental problem).
- Sustainable development goals poster presentation/ Plantation drive

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COURSE SYLLABUS

TY BTECH

SEMESTER-VI

Name of the Program:	BTECH CSE AIDS	Semester : 6	Level: UG
Course Name	Data Visualization Techniques	Course Code/Course Type	UBTDS 303 / PCC
Course Pattern	2024	Version	1.0

Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	0	0	3	3	40	60	

Pre-Requisite: Computer Network

Course Objectives (CO):	The objectives of (Name of course) are: 1. To recall the concepts of data visualization to develop charts, maps, tables, and other visual representations of data. 2. To recognize visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset. 3. To apply the concept of interactive dashboards to combine several visualizations into a cohesive and functional whole. 4. To analyze and design features animations techniques. 5. To evaluate various principles of visualization. 6. To design and create various group operations.
Course Learning Outcomes (CLO):	Students would be able to: 1. Students will be able to understand the basics of plotting techniques. 2. Explain the procedure various data visualization methods. 3. Apply knowledge of various animation types. 4. Analyze data the various principles of visualization. 5. Evaluate how to perform group operations.

COURSE CURRICULUM

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	CLO	Hours
UNIT I		
Basic Plotting: Line plot - Bar plot - Pie Chart - Scatter Plot - Histogram - Stacked Bar Charts - Sub Plots - Matplotlib, Searborn, Plotly - Seaborn Styles	**CLO 1**	**9**
UNIT II		
Applied Visualizations: Box plot - Density Plot - Area Chart - Heat map - Tree map - Graph Networks	**CLO 2**	**9**
UNIT III		
Interactive Visualizations and Animations: Dynamic charts - Dynamic maps - Animation types - 2D, 3D, Motion Animation - Animation Principles - Altair Package - Statistical Visualizations	**CLO 3**	**9**
UNIT IV		

Principles of Information Visualization: Visual Perception and Cognition - Gestalt's Principles - Tufte's Principles - Applications of Principles of Information Visualization - Dashboard Design.	**CLO 4**	**9**
UNIT V		
Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation.	**CLO 5**	**9**
Total Hours		**45**

Learning resources

Textbooks:

1. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media.
2. O'Neil, C., & Schutt, R. (2013). Doing Data Science: Straight Talk from the Frontline O'Reilly Media.
3. Tamara Munzner, Visualization Analysis and Design, A K Peters Visualization Series, CRC Press, 2014.

Reference Books:

1. Scott Murray, Interactive Data Visualization for the Web, O'Reilly, 2013.
2. Alberto Cairo, The Functional Art: An Introduction to Information Graphics and Visualization, New Riders, 2012.
3. Nathan Yau, Visualize This: The FlowingData Guide to Design, Visualization and Statistics, John Wiley & Sons, 2011.

Online Resources/E-Learning Resources

1. https://freevideolectures.com/course/4041/nptel-introduction-to-learning-analytics/11
2. https://nptel.ac.in/courses/111106415
3.https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-visualization-with-r/?v=c86ee0d9d7ed

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COURSE CURRICULUM

Name of the Program:		BTECH CSE AIDS		Semester : 6		Level: UG	
Course Name		Data Visualization Techniques Lab		Course Code/Course Type		UBTDS304 / PCC	
Course Pattern		2024		Version		1.0	
Teaching Scheme						Assessment Scheme	
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	1	-	1	2	25	-	25
Pre-Requisite: Computer Network							
Course Objectives (CO):		The objectives of (Name of course) are: 1. To recall the concepts of NumPy operations 2. To recognize and explore pandas libraries. 3. To apply the concept data visualization using tableau. 4. To analyze and design features animations techniques. 5. To evaluate various principles of visualization. 6. To design and create various group operations.					
Course Learning Outcomes (CLO):		Students would be able to: 1. Students will be able to understand the basics of numpy and pandas techniques. 2. Explain the procedure of various data visualization methods. 3. Apply knowledge of web scrapping. 4. Analyze data the various dashboard attributes. 5. Evaluate how to perform data visualization using tableau.					

Course Contents/Syllabus:
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)

Practical Plan

Assignment/Practical/Activity Number	Assignment/ Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Numpy and Pandas	Week 1	1. Creating a NumPy Array 2. The Shape and Reshaping of NumPy Array 3. Expanding and Squeezing a NumPy Array 4. Indexing and Slicing of NumPy Array	CLO1	4

2		Week 2	2.1 Perform following operations using pandas. 2.2 Perform following operations using pandas. 2.3 Read the following file formats using pandas. 2.4 Read the following file formats.	CLO 1	4
3	Practical 2: Discussion of workflow Exploratory Visualization	Week 3	3.1 Data Joins 3.2 Creating visualizations with Tableau.	CLO 2	4
4		Week 4	3.3 Sorting, Top N, bottom N 3.4 Filtering 3.5 Maps	CLO 2	4
5	Practical 3: Web Scraping	Week 5	Demonstrate web scraping using python	CLO 3	
6	Practical 4: Dashboard development& Tableau	Week 6	4.1 Dashboard design principles 4.2 Dashboard interactivity 4.3 Connected "drill-down" dashboards	CLO 4	2
7		Week 7	4.4 Datasets exploration using tableau. 4.5Fiscal Year Calculations and Parameter explorations	CLO 5	2
Total Hours					**14**

Learning resources

Textbooks:

1. McKinney, W. (2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media.
2. O'Neil, C., & Schutt, R. (2013). Doing Data Science: Straight Talk from the Frontline O'Reilly Media.
3. Tamara Munzner, Visualization Analysis and Design, A K Peters Visualization Series, CRC Press, 2014.

Reference Books:

1. Scott Murray, Interactive Data Visualization for the Web, O'Reilly, 2013.
2. Alberto Cairo, The Functional Art: An Introduction to Information Graphics and Visualization, New Riders, 2012.
3. Nathan Yau, Visualize This: The FlowingData Guide to Design, Visualization and Statistics, John Wiley & Sons, 2011.

Online Resources/E-Learning Resources

1. https://freevideolectures.com/course/4041/nptel-introduction-to-learning-analytics/11
2. https://nptel.ac.in/courses/111106415
3.https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-visualization-with-r/?v=c86ee0d9d7ed

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Name of the Program:	BTECH CSE AIDS	Semester : 6	Level: UG
Course Name	DESIGN AND ANALYSIS OF ALGORITHMS	Course Code/Course Type	UBTCE313/ PCC
Course Pattern	2024	Version	1.0/1.1/1.2…

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	1		3	4	40	60	25

Pre-Requisite:	Knowledge of C Programming and DSA
Course Objectives (CO):	The objectives of (Name of course) are: 1. Describe and express performance analysis of various algorithms, Fundamentals of Data Structures and their applications. 2. Explain and demonstrate Divide and Conquer technique to provide solutions for well-known problems like searching, Sorting etc. 3. Discuss Greedy method and solve problems which are based on Greedy method such as Knapsack problem, Single-source Shortest Path, etc. 4. Use Dynamic Programming to solve problems like All Pairs Shortest paths, Travelling Sales Person (TSP), etc. and also compare with Greedy method. 5. Choose Backtracking Algorithms for solving N-Queens, Sum of subsets Problems and compare /Contrast with Branch and Bound Technique.
Course Learning Outcomes (CLO): (Guidelines to follow For First year course, at least 2-4 levels of Bloom's; 2nd Year- 3-5; 3rd Year; 4-6 4th Year- 5-6) For PG – start from 3-6 Level of Blooms)	Students would be able to: 1. To compare worst-case running time of algorithms and describe the fundamental of algorithmic problems. 2. To describe and apply problem solving techniques such as divide-and- conquer, greedy method, dynamic programming, etc. 3. To compare and contrast among various problem solving techniques. 4. To explain and demonstrate NP- completeness.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	CLO	Hours
UNIT I		
Foundations of Algorithm Analysis Algorithm, algorithm design strategies, time and space complexity, asymptotic notation, complexity analysis; Introduction to divide and conquer technique: merge sort, quick sort, binary search and its performance analysis, Strassen's matrix multiplication	**CLO 1**	**9**
UNIT II		
Divide and Conquer Algorithms Concept and applications of divide and conquer approach in algorithm design, Concept and detail description of Binary Search algorithms and its analysis, Finding Minimum and maximum element in a list of items(Min-Max algorithm) and their analysis., Concepts of Order statistics, Median order. Bruteforce approach for selection, Selection in Worst Case Linear Time algorithm and its complexity analysis.	**CLO 2**	**9**
UNIT III		
Greedy Algorithms Concept of Optimization Problems and Optimal solution. Introduction of Greedy Strategy for algorithm design. Elements of Greedy ,Concept of Knapsak problem, Algorithm for Fractional Knapsack Problem examples and analysis of its complexity, Kruskal's and Prim's algorithms for Minimum Spanning Tree, their examples and complexity analysis. Correctness .Dijkastra Shortest Path Algorithms, example and its time complexity Purpose of Huffman Coding, Prefix Codes, Huffman Tree, Huffman Coding Algorithm, example and its Analysis.	**CLO 3**	**9**
UNIT IV		
Dynamic Programming Concepts of Dynamic Programming approach for algorithm design, Greedy Algorithm vs Dynamic Programming, Recursion vs Dynamic Programming. Elements of Dynamic Programming Approach Concept of Matrix Chain Multiplication, its Algorithm ,examples and complexity analysis,0-1 Knapsack problem and its complexity analysis, Floyd Warshall Algorithms for all pair shortest path problem, example and its complexity analysis. Travelling Salesman Problem and its analysis.	**CLO 4**	**9**
UNITV		
Backtracking and NP Completeness Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms; String matching algorithms; Introduction to NP-completeness.	**CLO 5**	**9**
Total Hours		**45**

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Name of the Program:	BTECH CSE AIDS	Semester : 6	Level: UG
Course Name	SYSTEM SOFTWARE	Course Code/Course Type	UBTCE312/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	2	2	20	30	-

Pre-Requisite: Knowledge of Data Structures, Operating Systems

Course Objectives (CO):	**The objectives of System Software are:** 1. To classify different methodologies, concepts and approaches to System Software Programming. 2. To Identify elements of language processors with various data structures used in development of one-pass and multi-pass assemblers. 3. To Examine macro processor, its usage and compare various loading and linking schemes 4. To Build various system programs using language processor development tools. 5. To Design code optimization based solution for the given system problems by applying various techniques of compiler, interpreter and debugger.
Course Learning Outcomes (CLO):	**Students would be able to:** 1. compare various system software related to the given system 2. Apply and analyze the concepts required to develop the system software. 3. Handle proper use of system software tools. 4. Apply strategiessystem programs to solve real world problems. 5. Apply concepts code optimizationbased solution for the given system problems by applying various techniques of compiler, interpreter and debugger.

Learning resources

Text Books:

1. Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.

2. Analysis & Design of Algorithm. Horowitz & Sahani, Computer Science Press, Latest Edition.

Reference Books:

1. The Design and Analysis of Algorithm, Ullmann, Addison-Wesley, Latest Edition.
2. Algorithm Design, Michael T Goodrich, RobartoTamassia, Wiley India.

URLs (Optional) - List of Online Courses

1. http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.
2. https://nptel.ac.in/courses/106106131

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Overview of System Software and Language Processors: Introduction, Software, Software Hierarchy, Systems Programming, Machine Structure, Interfaces, Address Space, Computer Languages, Tools, Life Cycle of a Source Program, Programming Languages and Language Processors, Language Processing Activities, Program Execution.	**CLO 1**	**6**
UNIT II		
Assemblers Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86, Algorithm of Single Pass Assembler, Multi-Pass Assemblers, Advanced Assembly Process, Variants of Assemblers Design of two passassembler.	**CLO 2**	**6**
UNIT III		
Macro and Macro Processors Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a Macro Preprocessor, Design of a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass MacroProcessors, One-Pass Macro Processors.	**CLO 3**	**6**
UNIT IV		
Linkers and Loaders Introduction, Relocation of Linking Concept, Design of a Linker, elfRelocating Programs, Linking in MSDOS, Linking of Overlay Structured Programs, Dynamic Linking, Loaders, Different Loading Schemes, Sequential and Direct Loaders, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, Practical Relocating Loaders, Linking Loaders, Relocating Linking Loaders, Linkers v/s Loaders	**CLO 4**	**6**

UNITV		
Compilers Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization	**CLO 5**	**6**
TotalHours		**30**

Learning resources

Text Books:

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.
2. System Software – An Introduction to Systems Programming by Leland L. Beck, 3rd Edition, Pearson Education Asia, 2000

Reference Books:

3. System Programming by D M Dhamdhere, McGraw Hill Publication
4. System Programming by Srimanta Pal, OXFORD Publication
5. System Programming and Compiler Construction by R.K. Maurya & A. Godbole.

Online Resources/E-Learning Resources:

1. www.en.wikipedia.org/wiki/System_programming
2. https://www.isi.edu/~pedro/Teaching/CSCI565-Fall15/Materials/LexAndYaccTutorial.pdf
3. https://developer.ibm.com/technologies/systems/tutorials/au-lexyacc/

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Name of the Program:	BTECH CSE AIDS	Semester : 6	Level: UG
Course Name	DESIGN AND ANALYSIS OF ALGORITHMS LAB	Course Code/Course Type	UBTCE314 PCC
Course Pattern	2024	Version	1.0/1.1/1.2…

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
	1		1	2	25		25

Pre-Requisite: Knowledge of C Programming **and** DSA

Course Objectives (CO):	The objectives of (Name of course) are: 1. Describe and express performance analysis of various algorithms, Fundamentals of Data Structures and their applications. **2.** Explain and demonstrate Divide and Conquer technique to provide solutions for well-known problems like searching, Sorting etc. **3.** Discuss Greedy method and solve problems which are based on Greedy method such as Knapsack problem, Single-source Shortest Path, etc. **4.** Use Dynamic Programming to solve problems like All Pairs Shortest paths, Travelling SalesPerson (TSP), etc. and also compare with Greedy method. **5.** Choose Backtracking Algorithms for solving N-Queens, Sum of subsets Problems and compare /Contrast with Branch and Bound Technique.
Course Learning Outcomes (CLO):	Students would be able to: **1.** To compare worst-case running time of algorithms and describe the fundamental of algorithmic problems. **2.** To describe and apply problem solving techniques such as divide-and- conquer, greedy method, dynamic programming, etc. **3.** To compare and contrast among various problem solving techniques. **4.** To explain and demonstrate NP- completeness.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1: Basic iterative algorithms GCD algorithm, Fibonacci Sequences, Sequential and Binary Search.	Week 1		CLO1	2
2	Practical 2: Basic iterative sorting algorithms: Bubble Sort, selection Sort, Insertion Sort.	Week 2		CLO1	2
3	Practical3: Binary Search with Divide and conquer approach.	Week 3		CLO2	2
4	Practical 4: Merge Sort, Heap sort, Quick Sort, Randomized Quick Sort.	Week 4		CLO 2	2
5	Revision	Week 5			2
6	Practical5: Selection Problem with divide and Conquer approach	Week 6		CLO3	2
7	Practical6: Fractional Knapsack Problem, Job sequencing with deadline, Kruskal's algorithm, Prims algorithm, Dijkstra's Algorithm	Week 7		CLO3	2
8	Practical 7: Implement the dynamic programming algorithms.	Week 8		CLO4	2
9	Practical 8: Algorithms using Backtracking approach	Week 9		CLO4	2
10	Practical 9: Implement approximation Algorithm.	Week 10		CLO5	2

11	Practical 10: Implement Backtracking and NP Completeness	Week 11		CLO5	2
12	Revision	Week 12			2
13	Mini Project /Task	Week 13/14/15		CLO1/2/3/4/5	6
Total Hours					30

Learning resources

Text Books:

1. Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
2. Analysis & Design of Algorithm. Horowitz & Sahani, Computer Science Press, Latest Edition.

Reference Books:

1. The Design and Analysis of Algorithm, Ullmann, Addison-Wesley, Latest Edition.
2. Algorithm Design, Michael T Goodrich, RobartoTamassia, Wiley India.

URLs (Optional) - List of Online Courses

1. http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.
2. https://nptel.ac.in/courses/106106131

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Name of the Program:		BTECH CSE AIDS			Semester : 6	Level: UG	
Course Name		Machine Learning			Course Code/ Course Type	UBTML303A/PEC	
Course Pattern		2024			Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-

Pre-Requisite:

1. Applied Statistical Techniques
2. Introduction to Artificial Intelligence

Course Objectives (CO):	The objectives of Machine Learning are: 1. To explore the knowledge of Machine learning and its types. 2. To analyze various data pre-processing methods. 3. To learn Supervise learning methods. 4. To analyze the need of unsupervised learning methods. 5. To learn fundamental neural network algorithms.
Course Learning Outcomes (CLO):	Students would be able to: 1. Identify the needs and challenges of machine learning for real time applications. 2. Apply various data pre-processing techniques to simplify and speed up machine learning algorithms. 3. Apply appropriately supervised machine learning algorithms for real time applications. 4. Compare and contrast different clustering algorithms. 5. Design a neural network for solving engineering problems.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction To Machine Learning: Introduction to Machine Learning, Comparison of Machine learning with traditional programming, ML vs AI vs Data Science. Types of learning: Supervised, Unsupervised, and semi-supervised, reinforcement learning techniques, Models of Machine learning: Geometric model, Probabilistic Models, Logical Models, Grouping and grading models, Parametric and non-parametric models. Important Elements of Machine Learning- Data formats, Learnability, Statistical learning approaches.	**CLO 1**	**9**
UNIT II		
Feature Engineering: Concept of Feature, preprocessing of data: Normalization and Scaling, Standardization, Managing missing values, Introduction to Dimensionality Reduction, Principal Component Analysis (PCA), Feature Extraction: Kernel PCA, Local Binary Pattern. Introduction to various Feature Selection Techniques, Sequential Forward Selection, Sequential Backward Selection. Statistical feature engineering: count-based, Length, Mean, Median, Mode etc. based feature vector creation. Multidimensional Scaling, Matrix Factorization Techniques.	**CLO 2**	**9**
UNIT III		
Supervised Learning : Bias, Variance, Generalization, Underfitting, Overfitting, Linear regression, Regression: Lasso regression, Ridge regression, Gradient descent algorithm. Evaluation Metrics: MAE, RMSE, R2 Classification: K-nearest neighbour, Support vector machine. Ensemble Learning: Bagging, Boosting, Random Forest, Adaboost. Binary-vs-Multiclass Classification, Balanced and Imbalanced Multiclass Classification Problems, Variants of Multiclass Classification: One-vs-One and One-vs-All Evaluation Metrics and Score: Accuracy, Precision, Recall, Fscore, Cross-validation, Micro Average Precision and Recall, Micro-Average F-score, Macro-Average Precision and Recall, Macro-Average F-score	**CLO 3**	**9**
UNIT IV		

Unsupervised Learning: K-Means, K-medoids, Hierarchical, and Density-based Clustering, Spectral Clustering. Outlier analysis: introduction of isolation factor, local outlier factor. Evaluation metrics and score: elbow method, extrinsic and intrinsic methods.	**CLO 4**	**9**
UNIT V		
Introduction To Neural Networks: Artificial Neural Networks: Single Layer Neural Network, Multilayer Perceptron, Back Propagation Learning, Functional Link Artificial Neural Network, and Radial Basis Function Network, Activation functions, Introduction to Recurrent Neural Networks and Convolutional Neural Networks.	**CLO 5**	**9**
Total Hours		**45**

Learning resources:

Textbooks:

1. Introduction to Machine Learning" by Ethem Alpaydin, PHI , 2nd Edition-2013.
2. Pattern recognition and machine learning" by Bishop, Christopher M., and Nasser M. Nasrabadi, Vol. 4.No. 4. New York: springer, 2006.

Reference Books:

1. "Machine learning", by Tom Mitchell, McGraw-Hill series in Computer Science, 1997 2. Shalev-Shwartz, Shai, and Shai Ben-David,
2. "Understanding machine learning: From theory to algorithms", by Shai Shalev-Shwartz and Shai Ben-David, Cambridge university press, 2017
3. "The Elements of Statistical Learning" Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009. [TH-2009]
4. "Mathematics for Machine Learning" by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge University Press (23 April 2020)
5. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", by Aurélien Géron O'Reilly Media, Inc. 2nd Edition

Online Resources:

1. https://developers.google.com/machine-learning/foundational-courses
2. Introduction to Machine Learning (IIT Madras): https://onlinecourses.nptel.ac.in/noc22_cs29/prevew

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Name of the Program:		BTECH CSE AIDS			Semester: VI	Level: UG	
Course Name		Machine Learning Laboratory			Course Code/ Course Type	UBTML304A/PEC	
Course Pattern		2024			Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
NA	1	NA	1	2	25	NA	25

Pre-Requisite:

1. Basic knowledge of python Programming

Course Objectives (CO):	The objectives of Machine Learning are: 1. To explore the knowledge of Supervised Machine learning Algorithms. 2. To analyze different Classifier Models. 3. To learn unsupervised learning Models. 4. To analyze different clustering models.. 5. To explore different neural network architectures.
Course Learning Outcomes (CLO):	Students would be able to: 1. To implement Supervised Machine learning Algorithms. 2. To design different Classifier Models. 3. To apply unsupervised learning Models for real life problems. 4. To apply and evaluate different clustering models. 5. To create different neural network architecture models.

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Implement Regression models	Week 1/ Turn 1 Week 2 /Turn 1	Predict the price of the Uber ride from a given pickup point to the agreed drop-off location. Perform following tasks: 1. Pre-process the dataset. 2. Identify outliers. 3. Check the correlation. 4. Implement linear regression and random forest regression models. 5. Evaluate the models and compare their respective scores like R2, RMSE, etc. Dataset link: https://www.kaggle.com/datasets/yasserh/uber-fares-dataset	CLO1	4
2	Practical 2: Implement binary classification model	Week 3 /Turn 1 Week 4 /Turn 1	Classify the email using the binary classification method. Email Spam detection has two states: a) Normal State – Not Spam, b) Abnormal State – Spam. Use K-Nearest Neighbors and Support Vector Machine for classification. Analyze their performance. Dataset link: The emails.csv dataset on the Kaggle https://www.kaggle.com/datasets/balaka18/email-spam-classification-dataset-csv	CLO1	4
3	Practical 3: Implement Neural Network based classifier	Week 5 /Turn 1 Week 6 /Turn 1	Given a bank customer, build a neural network-based classifier that can determine whether they will leave or not in the next 6 months. Dataset Description: The case study is from an open-source dataset from Kaggle. The dataset contains 10,000 sample points with 14 distinct features such as Customer Id, Credit Score, Geography, Gender, Age, Tenure, Balance, etc. Link to the Kaggle project: https://www.kaggle.com/barelydedicated/bank-customer-churn-modeling Perform following steps: 1. Read the dataset. 2. Distinguish the feature and target set and divide the data set into training and test sets. 3. Normalize the train and test data. 4. Initialize and build the model. Identify the points of improvement and implement the same. 5. Print the accuracy score and confusion matrix (5 points).	CLO5	4
4	Practical 4: Implement	Week 7	Implement Gradient Descent Algorithm to	CLO2	2

	GD	/Turn 1	find the local minima of a function. For example, find the local minima of the function $y=(x+3)^2$ starting from the point $x=2$		
5	Practical5: Implement KNN	Week 8 /Turn 1 Week 9 /Turn 1	Implement K-Nearest Neighbors algorithm on diabetes.csv dataset. Compute confusion matrix, accuracy, error rate, precision and recall on the given dataset. Dataset link : https://www.kaggle.com/datasets/abdallamahgoub/diabetes	CLO4	4
6	Practical 6: Implement clustering model	Week 10 /Turn 1 Week 11 /Turn 1	Implement K-Means clustering/ hierarchical clustering on sales_data_sample.csv dataset. Determine the number of clusters using the elbow method. Dataset link : https://www.kaggle.com/datasets/kyanyoga/sample-sales-data	CLO4	4
7	Practical 7: Implement prediction model	Week 12 /Turn 1 Week 13 /Turn 1	Use the following dataset to analyze ups and downs in the market and predict future stock price returns based on Indian Market data from 2000 to 2020. Dataset Link: https://www.kaggle.com/datasets/sagara9595/stock-data	CLO5	4
8	Practical 8: Prediction model using neural network	Week 14 /Turn 1 Week 15 /Turn 1	Build a machine learning model that predicts the type of people who survived the Titanic shipwreck using passenger data (i.e. name, age, gender, socio-economic class, etc.). Dataset Link: https://www.kaggle.com/competitions/titanic/data	CLO5	4

Learning resources:
Textbooks:

1. "Introduction to Machine Learning" by Ethem Alpaydin, PHI , 2nd Edition-2013.
2. "Pattern recognition and machine learning" by Bishop, Christopher M., and Nasser M. Nasrabadi, Vol. 4.No. 4. New York: springer, 2006.

Reference Books:

1. "Machine learning", by Tom Mitchell, McGraw-Hill series in Computer Science, 1997 2. Shalev-Shwartz, Shai, and Shai Ben-David,
2. "Understanding machine learning: From theory to algorithms", by Shai Shalev-Shwartz and Shai Ben-David, Cambridge university press, 2017
3. "The Elements of Statistical Learning" Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009. [TH-2009]
4. "Mathematics for Machine Learning" by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge University Press (23 April 2020)
5. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", by Aurélien Géron O'Reilly Media, Inc. 2nd Edition

Online Resources:

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Name of the Program:	BTECH CSE AIDS	Semester : 6	Level: UG
Course Name	Pattern recognition and Optimization Lab	Course Code/ Course Type	UBTML306 B
Course Pattern	2024	Version	1.0/1.1/1.2…

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	1	-	1	15	25		25

Pre-Requisite:
1. Programming Languages.
2. Mat lab/ Scilab

Course Objectives (CO):	**The objectives of (**Pattern recognition and Optimization**)** are: pattern

1. https://developers.google.com/machine-learning/foundational-courses
2. Introduction to Machine Learning (IIT Madras): https://onlinecourses.nptel.ac.in/noc22_cs29/prevew

	recognition and 1. To familiarize students with MATLAB/Scilab/Python Programming basic concepts. 2. To learn and understand Pattern Recognition and Optimization techniques. 3. To explore Open-Source Software. 4. To understand and learn Computational facility. 5. To understand and learn Pattern Recognition and Optimization techniques
Course Learning Outcomes (CLO):	1. CO1: Develop Pattern recognition techniques algorithm. 2. CO2: Demonstrate the use Pattern recognition and optimization techniques. 3. CO3: Develop optimization techniques. 4. CO4: Develop Pattern recognition techniques algorithm using Python/MATLAB. 5. CO5: Deploy Pattern recognition techniques using Mat lab/ Scilab.

Descriptors/Topics	**CLO**	**Hours**
Assignment-I		
1. Implementation of Linear Regression using Gradient Descent	**CLO 1**	**02 Hours**
Assignment-II		
1. Implementation of Unrestricted Search methods 2.Implementation of Golden Section Method Optimization	**CLO 2**	**04 Hours**
Assignment-III		
1. Implementation of Fibonacci Method 2. 2. Implementation of Bacteria Foraging	**CLO 3** **CLO 4**	**04 Hours**
Assignment-IV		
Implementation of 1. Particle Swarm Optimization 2. Univariate methods Ant colony optimization		**04 Hours**
Assignment-V		
Improving Fraud Detection in Financial Transactions through Pattern Recognition and Optimization		**02 Hours**

(All the units carry equal weightage in Summative Assessment and equal engagement)

Learning resources:

Text Books:

1. Duda R.O., and Hart.P.E.,Pattern Classification and Scene Analysis, second edition, Wiley, 2001.

2. Robert J.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, JohnWiley& Sons Inc., New York, 2007.
3. Trevor H, Robert T,Jerome Friedman, The Elements of Statistical Learning, Springer Series,2017.
4 J. K. Sharma, "Operations Research", Macmillan, 5th Edition, 2012.
5. R. Pannerselvan, "Operations Research", 2nd Edition, PHI Publications, 2006.
6. A. M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2013

Reference Books:

1. Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.
2. Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, NewYork, 1993.
3. Christopher M Bishop, Pattern Recognition and Machine Learning. Springer. 2011.
4. Engineering Optimization Theory and Practice, S.S.Rao, New Age International (P) Ltd, Publishers
5. .Kalyanmoy Deb Multi-objective optimization using evolutionary algorithms John Wiley Publications 3. Jasbir S. Arora Introduction to Optimum Design McGraw Hill Publication

Online Resources/E-Learning Resources

1. https://www.researchgate.net/publication/359435428_A_Pattern_Recognition_Method_of_Personalized_Adaptive_Learning_in_Online_Education
2. https://elearning.di.unipi.it/course/view.php?id=110
3. https://www.sciencedirect.com/science/article/pii/S0140366423001457

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Name of the Program:	BTECH CSE AIDS				Semester: 6	Level: UG	
Course Name	Big Data Analytics				Course Code/Course Type	UBTDS305B/PEC	
Course Pattern	2024				Version	1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-

Pre-Requisite:

Proficiency in Python .

Basic understanding ETL processes.

Course Objectives (CO):	The objectives of Big Data Analytics are: 1. The goal is to introduce Big Data concepts and the Data Analytics lifecycle, enabling students to tackle business challenges using Big Data solutions. 2. To understanding how to leverage Big Data for strategic decision-making and problem-solving in various business contexts. 3. To understand the importance of mining data streams and social network graphs. 4. To introduce big data analytics technology and tools including MapReduce and Hadoop.

Descriptors/Topics		CLO	Hours
Course Learning Outcomes (CLO):	At the end of the course: 1. Transform a business challenge into an analytics problem. 2. Ability to explain the foundations, definitions, and challenges of Big Data and various Analytical tools. 3. Ability to program using HADOOP and Map reduce, NOSQL. 4. Create models and identify insights that 5. Ability to understand the importance of Big Data in social media and Mining.		
UNIT I			
Getting an Overview of Big Data: What is Big Data? History of Data Management – Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics, Careers in Big Data, Future of Big Data **Technologies for Handling Big Data:** Distributed and Parallel Computing for Big Data, Introducing Hadoop, Cloud Computing and Big Data, In-Memory Computing Technology for Big Data.		**CLO 1**	9
UNIT II			
Understanding Hadoop Ecosystem: Hadoop Ecosystem, Hadoop Distributed File System, MapReduce, Hadoop YARN, Hbase, Hive, Pig		**CLO 2**	8

Course Content/Syllabus

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework, Techniques to Optimize MapReduce Jobs, Uses of MapReduce, Role of HBase in Big Data Processing						
UNIT III						
Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics, Points to Consider during Analysis, Developing an Analytic Team, Understanding Text Analytics Analytical **Approaches and Tools to Analyze Data:** Analytical Approaches, History of Analytical Tools. Introduction to Popular Analytical Tools, Comparing Various Analytical Tools. **Algorithms for Handling Big Data:** Random Forest Algorithm, Unstructured Data Analytics, Randomized Matrix Algorithms in Parallel and Distributed Environments, Learning on Massive Data, Dirichlet process clustering, Latent Dirichlet Allocation, Singular Value decomposition, Complementary Naive Bayes classifier					**CLO 3**	**10**
UNIT IV						
Lambda Architecture Different layers of Lambda Architecture, Data storage on the batch layer. Serving Layer Requirements for a serving layer database, Indexing strategies. Speed Layer, Storing and Computing Real time views, Queuing and Streaming – Illustration using Cassandra data model.					**CLO 4**	**9**
UNIT V						
Social Media Analytics and Text Mining: Introducing social media, Introducing Key Elements of social media, Introducing Text Mining,- Understanding Text Mining Process, Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets Mobile Analytics: Introducing Mobile Analytics, Introducing Mobile Analytics Tools, Performing Mobile Analytics, Challenges of Mobile Analytics					**CLO 5**	**9**
Total Hours						**45**

Name of the Program:	**BTECH CSE AIDS**			**Semester: 6**		**Level: UG**		
Course Name	**Big Data Analytics Lab**			**Course Code/Course Type**		**UBTDS306B/ PEC**		
Course Pattern	**2024**			**Version**	1.0			
Teaching Scheme					**Assessment Scheme**			
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**		**ESA (End Semester Assessment)**	**Practical/Oral**
1	2		2		25			25
Pre-Requisite: Proficiency in Python. Basic understanding ETL processes.								

Course Objectives (CO):	The objectives of Big Data Analytics are: 1. The goal is to introduce Big Data concepts and the Data Analytics lifecycle, enabling students to tackle business challenges using Big Data solutions. 2. To understanding how to leverage Big Data for strategic decision-making and problem-solving in various business contexts. 3. To understand the importance of mining data streams and social network graphs. 4. To introduce big data analytics technology and tools including MapReduce and Hadoop.
Course Learning Outcomes (CLO):	At the end of the course: 1. Transform a business challenge into an analytics problem. 2. Ability to explain the foundations, definitions, and challenges of Big Data and various Analytical tools. 3. Ability to program using HADOOP and Map reduce, NOSQL. 4. Create models and identify insights that can lead to actionable results. 5. Ability to understand the importance of Big Data in social media and Mining

Assignment /Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours

Learning Resources: -

Text Books:

1. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw-Hill, 2015.
2. Big data, blackbook, Dreamtech press, 2015
3. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.
4. Simon Walkowiak, Big Data Analytics with R, Packt Publishing, ISBN: 9781786466457

Reference Books:

1. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013.
2.
3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O" Reilly Media, 2012.
4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

Online resources:

1. **NOC:Big Data Computing, IIT Patna** https://nptel.ac.in/courses/106104189
2. **Big Data and its Sources ,** https://youtu.be/2zRhfEFHzHk?si=X_LOwbgi177LWVcq
3. **Data analytics with big data** https://youtu.be/zwasdVPPFFw?si=K9024FPYvq_9g5jm

1	Practical 1:	Week 1	Practical 1: Introduction to Hadoop and Distributed Computing. Objective: Gain hands-on experience with Hadoop, understand distributed computing principles, and work with large datasets.	CLO1	2
2	Practical 2:	Week 2	Practical 2: Implementing a MapReduce Job Objective: Gain practical experience with the MapReduce framework and understand its fundamentals.	CLO1	2
3	Practical 3:	Week 3	Practical 3: Comparing Analytical Tools. Objective: Gain practical experience in using and comparing various analytical tools.	CLO2	2
4	Practical 4:	Week 4	Practical 4: Implementing Random Forest Algorithm Objective: Gain practical experience in implementing and using the Random Forest algorithm for predictive modeling.	CLO 3	2
5	Practical 5:	Week 5	Practical 5: Applying Latent Dirichlet Allocation (LDA) Objective: Explore topic modeling using Latent Dirichlet Allocation (LDA) on a corpus of text documents.	CLO3	2
6	Practical 6:	Week 6	Practical 6: Implement Randomized Matrix Algorithms in Parallel and Distributed Environments	CLO3	2
7	Practical 7:	Week 7	Practical 7: Implementing Batch and Serving Layers Objective: Gain practical experience in implementing the Batch and Serving layers of Lambda Architecture.	CLO4	2
8	Practical 8:	Week 8	Practical 8: Real-time Data Processing with Speed Layer and Cassandra	CLO 4	2
9	Practical 9:	Week 9	Practical 9: Data Mining and Sentiment analysis on News dataset in particular event.	CLO5	2
10	Practical 10:	Week 10	Practical 10: Visualize the sentiment distribution using charts (e.g., pie chart, bar chart) to show the proportion of positive, negative, and neutral sentiments.	CLO5	2
Total Hours					**20**

Learning Resources: -

Text Books:

5. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw-Hill, 2015.
6. Big data, blackbook, Dreamtech press, 2015
7. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.
8. Simon Walkowiak, Big Data Analytics with R, Packt Publishing, ISBN: 9781786466457

Reference Books:

5. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013.
6. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O" Reilly Media, 2012.
7. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

Online resources:

NOC:Big Data Computing, IIT Patna https://nptel.ac.in/courses/106104189
Big Data and its Sources , https://youtu.be/2zRhfEFHzHk?si=X_LOwbgi177LWVcq
Data analytics with big data https://youtu.be/zwasdVPPFFw?si=K9024FPYvq_9g5jm

PCET's Pimpri Chinchwad University
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Name of the Program:	B.Tech CSE AIDS	Semester: 6	Level: UG
Course Name	Software Testing and Quality Assurance	Course Code/Course Type	UBTCE310/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	-	3	3	40	60	-

Pre-Requisite: Software Engineering

Course Objectives (CO):	The objectives of Software Testing and Quality Assurance are: 1. Grasp the essentials of software testing, quality assurance, and the differences between faults, errors, and failures. 2. Learn various testing strategies and techniques, including black box, white box, and grey box testing. 3. Develop proficiency in applying different levels of testing, such as unit, integration, system, and acceptance testing. 4. Master test planning, management, execution, reporting, and the importance of automated testing tools. 5. Understand software quality assurance principles, practices, standards, metrics, and formal approaches.
Course Learning Outcomes (CLO):	Students would be able to: 1. Identify the history, principles, goals of software testing, and distinguish between testing and debugging. 2. Apply various testing techniques to design and execute test cases, understanding their strengths and weaknesses. 3. Implement different testing levels and specific methods like boundary value analysis and equivalence partitioning. 4. Develop comprehensive test plans, execute manual and automated tests, manage and report test activities effectively. 5. Apply quality assurance principles, statistical methods, and standards like ISO 9000 to ensure and enhance software quality.

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Software Testing: Introduction, Evolution of Software testing, Basics of Software Testing – faults, errors and failures, Developers vs Test Engineers, testing objectives Principles of testing, Testing and debugging, testing metrics and measurements, Verification and Validation, Testing Life Cycle, SDLC vs STLC.	**CLO 1**	**8**
UNIT II		
Software Testing Strategies & Techniques: Types of Testing Techniques- Introduction to Black Box, White Box, Grey Box, Exploratory testing. Classification of Testing- Functional testing, non-Functional testing, Maintenance testing. White Box Testing- Direct Inspections, Walkthroughs, Technical Reviews, Functional Testing, Basis path testing, Control Structure Testing, Code Coverage Testing, Code Complexity Testing. Black Box Testing-Requirement Based Testing, Boundary Value Analysis, Equivalence Partitioning. Differences between BBT & WBT	**CLO 2**	**9**
UNIT III		
Levels of Testing: A Strategic Approach to Software Testing Test strategies for conventional Software- Unit Testing- Driver, Stub. Integration Testing - Incremental Testing: -Top-Down, Bottom-Up Integration, Bi-Directional, Non-incremental Integration. Testing on Web Application: Performance Testing, Load/Stress Testing, Security Testing, Client-Server Testing, Scalability, Stability testing. Acceptance Testing: Alpha Testing and Beta Testing, Usability and accessibility testing, Configuration, compatibility testing, Special Tests: Regression Testing, GUI Testing.	**CLO 3**	**8**
UNIT IV		
Test Planning: Preparing a Test Plan, test Approach, criteria for Testing, Test Deliverables, Testing Tasks, Test Management, Test Process- Base lining a Test Plan, Test Case Specification. Test Reporting- Executing Test Cases, Preparing Test Summary Report. Manual Testing and Need for Automated Testing Tools , Advantages and Disadvantages of Using Tools, Selecting a Testing Tool, When to Use Automated Test Tools, Testing Using Automated Tools(Selenium), Metrics and Measurement: Types of Metrics, Product Metrics and Process Metrics, Object oriented metrics in testing. **Agile Testing:** Agile Testing, Difference between Traditional and Agile testing, Agile principles and values, Agile Testing Quadrants, Automated Tests.	**CLO 4**	**10**
UNIT V		
Quality Assurance:	**CLO 5**	**10**

Software Quality, Software Quality Dilemma, Achieving Software Quality, Software Quality Assurance. Elements of SQA, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance, Six Sigma for Software engineering, ISO 9000 Quality Standards, SQA Plan. Total Quality Management, Product Quality Metrics, In process Quality Metrics, Software maintenance, Ishikawa's 7 basic tools, Checklists, Pareto diagrams, Histogram, Run Charts, Scatter diagrams, Control chart, Cause Effect diagram. Defect Removal Effectiveness and Process Maturity Level.		
Total Hours		**45**

Learning Resources

Text Book(s):

1. Naresh Chauhan "Software Testing Principles and Practices", Oxford University Press, 2010.
2. Software Engineering – A Practitioners Approach, Roger S. Pressman, 7thEdition, Tata McGraw Hill, 20

Reference Books:

1. Effective Methods of Software Testing, William E Perry, 3rd Edition, Wiley Publishing Inc
2. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Microsoft Press, 1999
3. Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin and Janet Gregory, 1st Edition, Addison-Wesley Professional, 2008
4. Software Testing Principles and Practices By Srinivasan Desikan, Gopalaswamy Ramesh, Pearson

Online Resources/E-Learning Resources

1. https://www.w3schools.in/software-testing/tutorials/
2. https://www.geeksforgeeks.org/software-testing-tutorial/
3. https://onlinecourses.nptel.ac.in/noc22_cs61/preview

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Name of the Program:	BTECH CSE AIDS	Semester:6	Level: UG
Course Name	Software Testing and Quality Assurance Laboratory	Course Code/Course Type	UBTCE311/PCC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
	1		1	2	25		25

Pre-Requisite: Knowledge of C Programming

Course Objectives (CO):	The objectives of Software Testing and Quality Assurance laboratory are: 1. Design and execute various test cases manually and using automation tools. 2. Effectively identify, document, track, and manage defects using industry tools. 3. Create and maintain automated test scripts, understanding automation's pros and cons. 4. Plan, organize, and execute testing activities ensuring coverage and traceability. 5. Evaluate testing tools and select appropriate ones for different scenarios.
Course Learning Outcomes (CLO):	Students would be able to: 1. Understand the objectives, scope, and significance of software testing and QA. 2. Gain a comprehensive understanding of different testing techniques and their applications. 3. Become familiar with the defect life cycle and the steps involved in defect management. 4. Learn the principles of test automation, including script development, execution, and maintenance. 5. Understand quality assurance processes, including planning, design, execution, and reporting.

Assignment /Practical / Activity Number	Assignment/ Practical /Activity Title	Week Number / Turn	Details	CLO	Hours
1	Practical 1:	Week 1	Understand the objectives, scope, and significance of software testing and quality assurance. Familiarize with the lab environment, tools, and resources.	CLO1	2
2	Practical 2:	Week 2	Write and execute black box functional test cases manually for the given application, focusing on validating its functionality against the specified requirements.	CLO2	2
3	Practical 3:	Week 3	Develop and execute unit tests for a specified module or function using a testing framework such as JUnit or pytest. Emphasize verifying the correctness of individual code units.	CLO2	2
4	Practical 4:	Week 4	Design and conduct integration testing for a system comprising multiple modules or components. Identify and address interface defects and inconsistencies to ensure seamless interaction between integrated units.	CLO 2	2
5	Practical 5:	Week 5	Prepare a comprehensive defect tracking report or bug report using MS-Excel or a defect tracking tool like Jira or BugZilla. Track and manage identified defects systematically.	CLO3	2
6	Practical 6:	Week 6	Study and explore the functionalities and features of Selenium, an open-source automated testing tool for web applications. Understand its capabilities and limitations.	CLO3	2
7	Practical 7:	Week 7	Perform black box testing on an application using an automated testing tool. Focus on testing points such as data-driven testing, parameterization, and exception handling.	CLO4	2
8	Practical 8:	Week 8	Conduct system testing on a complete application based on its functional and non-functional requirements. Report and track defects using a bug tracking tool, ensuring the overall system's quality and performance.	CLO4	2
9	Practical 9:	Week 9	Investigate the features and usage of QA Complete, a comprehensive test management tool. Learn how to manage test cases, test plans, and test executions effectively.	CLO5	2
10	Practical 10:	Week 10 / Week 11	Automate the test cases using the QA Complete tool. Focus on scripting, executing, and maintaining automated tests to enhance testing efficiency	CLO5	4
11	Practical 11:	Week 12 / Week 13	Learn the process of raising and reporting bugs using bug tracking tools such as Bugzilla or Jira. Use QA Complete for integration and streamline the defect management process.	CLO5	4

12	Practical 12:	Week 14 / Week 15	Explore and analyze open-source testing tools like Web Performance Analyzer or Open-Source Test Automation (OSTA). Evaluate their capabilities and applications in various testing scenarios.	CLO5	4
Total Hours					**30**

Name of the Program:	**Foreign Language**	**Semester: 6**	**Level: UG/PG**
Course Name	**German A2.2**	**Course Code/ Course Type**	**UFL302 A/VSEC**
Course Pattern	**2024**	**Version**	1.0

Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/ Oral**
2	-	-	-	2	50	-	-

Pre-Requisite: Can use simple means to describe the things related to immediate needs

Course Objectives (CO):	The objectives of (German A2.2) are: 1. To understand the main points when the standard language is used. 2. Describe dreams, goals and hopes. 3. To implement the acquired grammar topics. 4. To deal with most situations typically encountered in the language region. 5. To Design and create texts in the areas of Personal interest.
Course Learning Outcomes (CLO):	Students would be able to:- 1. Learn advance vocabulary terms. 2. Enhance expression skills in German language. 3. Enhance professional speaking skills of German language. 4. Construct short statements justifying own views and plans. 5. Participate in an interaction associated with the topics such as work, school, leisure time, travelling ex.

Learning Resources:

Text Book(s):

1. Naresh Chauhan "Software Testing Principles and Practices", Oxford University Press, 2010.
2. Software Engineering – A Practitioners Approach, Roger S. Pressman, 7thEdition, Tata McGraw Hill, 20

Reference Books:

1. Effective Methods of Software Testing, William E Perry, 3rd Edition, Wiley Publishing Inc
2. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Microsoft Press, 1999
3. Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin and Janet Gregory, 1st Edition, Addison-Wesley Professional, 2008
4. Software Testing Principles and Practices By Srinivasan Desikan, Gopalaswamy Ramesh, Pearson

Online Resources/E-Learning Resources

1. https://www.w3schools.in/software-testing/tutorials/
2. https://www.geeksforgeeks.org/software-testing-tutorial/
3. https://onlinecourses.nptel.ac.in/noc22_cs61/preview

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Gelernt ist gelernt Different learning problems, exams and presentations Grammar – KII, Genetive	**CLO 1**	**6**
UNIT II		
Sportlich sportlich Different sport activities, connection between sport and different emotions, Grammar – deshalb and trotzdem	**CLO 2**	**6**
UNIT III		
Zusammen leben Conflicts in an apartment, living in different types and living with pets Grammar –Connectors (als and wenn)	**CLO3**	**6**
UNIT IV		
Gute unterhaltung Describe a picture, discussion on different music styles Grammar – Interrogative articles	**CLO4**	**6**
UNIT V		
Wie die Zeit vergeht! & Typisch, oder? Express different wishes, write a story, speak about proverbs, speak about cliche Grammar – Relative sentences	**CLO5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1. Netzwerk A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.
2. Studio d A1, Cornelesen Verlag & Goyal Publishers & Distributors Pvt. Ltd.
3. Netzwerk Neu A1, Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd

Reference Books:

1. Hallo Deutsch A1,Ernst Klett Verlag, Goyal Publishers & Distributors Pvt. Ltd
2. ThemenAktuell 1, Hueber verla
3. Maximal Ernst klett Verlag & Goyal Publishers & Distributors Pvt. Ltd.

Online Resources/E-Learning Resources:

1. YouTube :https://youtube.com/@LearnGermanwithAnja?si=BkJYDPi7TS0fT4lr
2. https://youtube.com/@deutschlernenmitheidi?si=TkICIabzioaU0roZ
3. Instagram : instagram.com/learngermanwithanja

Name of the Program:	BTECH CSE	Semester : 6	Level: UG/PG
Course Name	Basic Japanese language skill	Course Code/Course Type	UFL302B/VSEC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	-	2	50	-	-

Pre-Requisite: Desire to get acquainted with the Japanese language. Basic knowledge of Hiragana and Katakana. Reading & writing Japanese script with basic kanji. Basic conversation.

Course Objectives (CO):	The objectives of (Basic Japanese language skill) are: 1. To meet the needs of ever-growing industry with respect to language support. 2. Access Global Job Opportunities with Language Skills. 3. Expand cognitive abilities & adaptability through language learning. 4. Promote cultural awareness & inclusivity through language acquisition. 5. To engage in cross-cultural dialogue and experiences through participation in curricular, co-curricular, and/or study abroad programs.
Course Learning Outcomes (CLO):	After learning the course, the students will be able to: 1. Acquire communicative proficiency / confidence 2. Express your thoughts / desires in writing 3. Read / Understand the Language script. 4. Develop listening skills 5. Inter cultural awareness

Descriptors/Topics	CLO	Hours
UNIT I		
Minna no Nihongo lesson no. 14 Te / Ta /Nai forms of verbs	**CLO 1**	**6**
UNIT II		
Minna no Nihongo lesson no. 15 Te forms of verbs /usage of te form	**CLO 2**	**6**
UNIT III		
Minna no Nihongo lesson no. 16 Adjective conjugation	**CLO 3**	**6**
UNIT IV		
Minna no Nihongo lesson no. 17 Verbs Nai forms	**CLO 4**	**6**
UNIT V		
Revision & Conversation practice	**CLO 5**	**6**
Total Hours		**30**

Learning Resources:

Textbooks:

1.Minna no Nihongo , " Japanese for everyone" ,Elementary Main Textbook , Goyal Publishers & Distributors Pvt. Ltd.

Reference books:

1. Shyoho Volume 1
2. Genki Japan
3. Haru Vol. 1 & 2

Online Resources/E-Learning Resources:

1. https://www.youtube.com/watch?v=T3hC03n_qWU
2. https://www.youtube.com/watch?v=T3hC03n_qWU
3. https://www.youtube.com/watch?v=vWUFZ4Z2F4c

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Name of the Program:	B.Tech/B.B.A/B.C.A/B.Sc/B.Pham	Semester: 6	Level: UG
Course Name	UHV-I: Professional Ethics	Course Code/ Course Type	ACCEVS301/AC
Course Pattern	2024	Version	1.0

Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	0	0	0	2	-	-	-

Pre-Requisite: UHV-I

Course Objectives (CO):	The objectives of UHV-I Professional Ethics are: 1. To make the students understand the importance of ethical behavior 2. To expose the students to the ethical practices to be followed in profession 3. To sensitize the students to become responsible persons who will uphold ethics in profession when they pursue their career 4. To make students understand Psychological and Philosophical approaches 5. To make students understand social responsibility and corporate Sustainability
Course Learning Outcomes (CLO):	Students would be able to: 1. Equip themselves with an understanding of moral, professional and personal values. 2. Learn the need of ethics in shaping their profession The learners will hone their decision-making skills. 3. Refine their business ethics based on psychological and philosophical perspective. 4. Assess the need for a balance between ecology, and economy. 5. Equip themselves with a better understanding of themselves and the society they live in and the responsibilities they shoulder in creating a sustainable world.

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Individual and Professional Ethics: Introduction to Professional Ethics, Morals, Values and Ethics – Personal and Professional-Sense of Professional Ethics – Code of Ethics by NSPE-Making decisions with ethical dimensions–definition–roadmap to ethical decision making–common standards– internal obstacles – bias – empathy	CLO 1	8
UNIT II		
Business Ethics: Philosophical approaches to Business Ethics – ethical reasoning – ethical issues in business - Social Responsibility of Business- conflict of interest–cultural relativism-Ethical Leadership-Resisting un-ethical authority and domination-Global Business Ethics	CLO 2	5
UNIT III		
Psychological Approaches: Ethical Theories-Psychological and Philosophical Approaches-Myths about Morality-conflict of interest in psychological perspective - Courage-Integrity – ethical dilemma – Emotional Intelligence (Mahabharata- Iskcon Publications)	CLO 3	5
UNIT IV		
Workplace Ethics: Ethics in changing domains of Research–academic integrity–intellectual honesty-Role of Engineers and Managers-Ethical issues in Diverse workplace – competition – free will- Confidentiality – employee rights – Intellectual property rights – discrimination	CLO 4	5
UNIT V		
Safety, Responsibilities and Rights: Ecology, and Economy-Risk benefit analysis and reducing risk SDGs–Corporate social responsibility and Corporate Sustainability - CSR in India - Sustainability Case Studies	CLO 5	7

Total Hours		**30**

Learning Resources:

Textbooks:

1. Subramanian. R. *Professional Ethics*, Oxford Publication,2013.
2. Nagarasan. R. S. *Professional Ethics and Human Values*. New Age International Publications, 2006.

Reference Book:

1. Mike W Martin and Roland Schinzinger, "*Ethics in Engineering"*,4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi,2014

Online Resources/E-Learning Resources:

1. https://www.nspe.org/resources/ethics/code-ethics
2. https://www.toolshero.com/tag/ethical-decision-making/
3. https://pagecentertraining.psu.edu/public-relations-ethics/introduction-to-public-relations-ethics/lesson-1/ethical-theories/
4. https://peer.asee.org/case-studies-in-engineering-ethics.pdf