

**Faculty of Science & Technology**  
**Programme Structure & Syllabus**  
For  
Second Year  
**Bachelor of Technology**  
**Computer Engineering**  
Programme Code: BTECCE  
**Pattern 2022**  
< With Effect from Academic Year 2023-24 >

	<b>Authority</b>	<b>Date</b>
<b>Proposed by</b>	Board of Studies in Computer Engineering	
<b>Approved by</b>	Academic Council, Vishwakarma University, Pune	

Issued by

**Chairman – BoS**

**Dean of Faculty**

**Director, IQAC**

Title: Programme Structure and Syllabus

Form No: IQAC-101

Vision of the University	
Emerge as a Premier University Recognized Internationally for Excellence in Education, Research and Innovation	
Mission of the University	
VU-M1	To impart contemporary transformative education through research and innovation
VU-M2	To develop competent leaders-professionals for life and livelihood
VU-M3	To co-create human and socio-economic capital par excellence
VU-M4	To inculcate life skills and holistic culture appreciating morals and ethics
Values of the University	
Excellence	Transparency
Innovation	Sustainability
Diversity	Responsibility
Adaptability	Compassion

<b>Vision of the Department of Computer Engineering</b>	
To create an intellectual and academically rich environment for careers in Computing Education and Research to fulfill global needs.	
<b>Mission of the Department of Computer Engineering</b>	
M1	To impart modern computing education through novel methods and research.
M2	To prepare the students for life-long learning in pursuit of excellence.
M3	To create technically competent human in socio-economic domain.
M4	To promote aspiring ethically conscious engineers demonstrating sustainable entrepreneurship and professional maturity in social context.
<b>Values of the Department of Computer Engineering</b>	
Pursuing Excellence	Ethics & Social Responsibility
Nurturing Talent	Collaborative Approach
Career Architect	Sustainable Growth Transparency & Accountability
Innovative Outlook	Freedom of Expression

## Mapping of Mission Statement of Department to University Mission Statement

Mission Statement	VU-M1	VU-M2	VU-M3	VU-M4
M1	3	3	2	2
M2	1	2	2	3
M3	2	3	2	2
M4	1	1	2	3

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

## Programme Educational Objectives (PEOs)

PEO No.	Statement
PEO1	To prepare the students to evolve into a professional and committed data science technology workforce by providing them with a global educational platform with innovative practices.
PEO2	To provide a sufficient mathematical, statistical and computing theory knowledge base, leading to practical and long-lasting data science solutions.
PEO3	To ingrain problem solving skills in data science and sound Engineering principles in students with the help of modern data science tools and techniques.
PEO4	To impart in the students professional and ethical practices based on standard guidelines as applied to the field of artificial intelligence to acquire the right attitude and aptitude for the benefit of society.
PEO5	To guide students for higher education and lead them to avenues of entrepreneurship in areas of artificial intelligence and data science.

## Mapping of Mission Statement of Department to PEOs

Mission Statement	PEO1	PEO2	PEO3	PEO4	PEO5
M1	3	3	3	1	2
M2	2	2	3	3	2
M3	3	3	2	2	1
M4	2	1	2	3	2

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

## Programme Outcomes (POs)

PO No.	Statement
PO1	Apply the knowledge of engineering, data science fundamentals and artificial intelligence to solve complex engineering problems.
PO2	Identify, formulate, and analyze complex engineering problems to create solutions using the first principles of mathematics, statistics, and data science.
PO3	Design solutions for system components that meet the specified needs for the benefit of society.
PO4	Apply research methods including design of experiments, statistical analysis and business interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Apply appropriate data mining techniques and statistical tools to model complex engineering activities.
PO6	Apply reasoning using contextual knowledge to assess the needs of society and understand the responsibilities relevant to the engineer specializing in data science.
PO7	Understand the impact of artificial intelligence as applied to the environment, and demonstrate the knowledge for sustainable development.
PO8	Adopt ethical practices as applied to the professional world to execute responsibilities and adhere to norms of the engineering profession.
PO9	Execute professional functions effectively as an individual, as well as a leader or member in diverse multidisciplinary teams.
PO10	Communicate effectively with the engineering community and with society in solving complex artificial intelligence problems in terms of being able to comprehend and write effective reports, make effective presentations, as well as execute and receive clear instructions.
PO11	Demonstrate an ability to lead projects and build cost models in an interdisciplinary professional setting.
PO12	Develop learning mechanisms and inculcate the ability to prepare for lifelong learning in the context of technological change.

## Mapping of PEOs to POs

PEO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	2	3	2	3	1	2	3	1	1	-	-	2
PEO2	3	3	2	3	1	1	2	1	-	1	1	1
PEO3	2	2	2	2	3	1	3	1	-	1	-	2
PEO4	1	1	1	1	1	1	1	3	3	2	2	-
PEO5	2	2	2	2	1	1	1	1	1	-	2	1

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

## Programme Specific Outcomes (PSOs)

PSO No.	Statement
PSO1	Imbibe foundational knowledge of computing theory, statistics, algorithms, and programming paradigms to create innovative, scientific solutions for challenges in the field of data science and artificial intelligence.
PSO2	Prepare for recent trends in the data science industry by adapting to various computing platforms architectures and changing software paradigms.
PSO3	Evolve new design ideas for real world problems in data science using appropriate mechanisms, design patterns, modeling methods and modern machine learning and statistical tools.
PSO4	Inculcate research attitude and aptitude in students using techniques and standards as applied to data science technology migration and evolution.

## Mapping of PEOs to PSOs

PEO Number	PSO1	PSO2	PSO3	PSO4
PEO1	2	3	1	2
PEO2	3	2	1	3
PEO3	3	2	3	2
PEO4	2	2	1	1
PEO5	2	2	1	2

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial

## Programme Structure

<b>Faculty</b>	Science and Technology	<b>Pattern</b>	2022
<b>Department</b>	Computer Engineering	<b>Date (w.e.f.)</b>	01/07/2022
<b>Programme</b>	BTech Computer Engineering		

Semester –III									
Course Type	Course Code	Course Name	TeachingScheme(Hours/Week)			Credit	Examination Scheme and Marks		
			L	T	P	C	CIE	ESE	Total
BSC	BTECCE22301	Discrete Mathematics	3	0	0	3	50	50	100
PCC	BTECCE22302	Data Structures	3	0	0	3	50	50	100
PCC	BTECCE22303	Applied Statistical Analysis	3	0	0	3	50	50	100
LC	BTECCE22304	Data Structures - Lab	0	0	4	2	50	50	100
LC	BTECCE22305	Applied Statistical Analysis Lab	0	0	2	1	25	25	50
LC	BTECCE22306	Technology Skill Dev.-2 (Python)	1	0	2	2	50	50	100
PCC	BTECCE22307	Information Security Fundamentals	2	0	0	2	50	50	100
HSMC	**	Open Elective 1	2	0	0	2	50	0	50
TOTAL			14	0	8	18	375	325	700
			22						
Instructions, if any: 1 Theory/Tutorial Hour = 1 Credit, 2 Practical hours = 1 Credit									

** Open Elective 1	
BTECCE22308	Finance & Accounting
BTECCE22309	Organization Behaviour

Semester –IV									
Course Type	Course Code	Course Name	TeachingScheme(Hours/Week)			Credit	Examination Scheme and Marks		
			L	T	P	C	CIE	ESE	Total
PCC	BTECCE22401	Theory of Computation	3	0	0	3	50	50	100
PCC	BTECCE22402	Computer Graphics and Gaming	3	0	0	3	50	50	100
PCC	BTECCE22403	Database Management Systems	3	0	0	3	50	50	100
LC	BTECCE22404	Computer Graphics and Gaming Lab	0	0	2	1	25	25	50
LC	BTECCE22405	Database Management Systems Lab	0	0	2	1	25	25	50
LC	BTECCE22406	Technology Skill Dev.-3 (Java)	1	0	2	2	50	50	100
LC	BTECCE22407	Advance Web Technology Lab	1	0	2	2	50	50	100
PCC	BTECCE22408	Application Security	3	0	0	3	50	50	100
PCC	BTECCE22409	Application Security Lab	0	0	2	1	25	25	50
HSMC	**	Open Elective 2	2	0	0	0	50	0	50
TOTAL			16	0	10	19	425	375	800
			26						
Instructions, if any: 1 Theory/Tutorial Hour = 1 Credit, 2 Practical hours = 1 Credit									

** Open Elective 2	
BTECCE22410	Yoga
BTECCE22411	Indian Constitution

Name of Head of Department

Sign:

Date:

Name of Dean

Sign:

Date:



# **SEM III**

**BTECCE22301::Discrete Mathematics**

Course Type	Theory	Semester	III
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	0 Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	100
Total	3 Hr./Week	Total	3		

**Course Description**

This course will help students to learn logic and proof techniques to expand mathematical maturity. It teaches students how to apply propositional and predicate logic, as well as modular arithmetic, graph theory and trees. It highlights and analyzes real world problems using discrete mathematics.

**Course Outcomes**

	On completion of the course, student will be able to –
1	Demonstrate an understanding of basic concepts and properties of set theory and integers.
2	Express formal mathematical properties using propositional and predicate logic, use of Boolean expressions for logic gates & Circuits.
3	Analyzing problems in computer science using an appropriate set, function, and relation models,
4	Gain the conceptual background needed to be able to identify structures of algebraic nature, and discover, prove and use properties about them.
5	Model the real-world problem using Graph Theory and Trees.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																AP
CO2		2															AP
CO3				1													AN
CO4							1										AP
CO5											3						AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

## Course Content

<b>Unit No 1</b>	<b>Set Theory and Integers</b>	<b>09 Hours</b>
<b>Sets:</b> Naïve Set Theory (Cantorian Set Theory), Cartesian product. Representation of Sets –Roster Method, Builder representation, Venn Diagrams. Set Operations – Intersection, Union, Difference, Complement, Symmetric difference. Cardinality of set, Principle of inclusion and exclusion, Multisets-operations & properties. <b>Integers:</b> Primes, Relatively Primes (Co-primes), Euler Totient Function, Least common multiple, Greatest Common Divisor, Divisibility, Euclid's theorem, Division Algorithm, Modular arithmetic, congruences.		
<b>Unit No 2</b>	<b>Logics &amp; Boolean Algebra</b>	<b>09 Hours</b>
<b>Propositional Logic:</b> Logical Operators and precedence, Truth Tables, Propositional Equivalences, Laws of equivalence, Propositional Satisfiability, Basic Rules of inference, Resolution. <b>Predicate Logic:</b> Predicates and Quantifiers, Pre-conditions and Post-conditions, Application of Predicate logic, Translating English Sentences <b>Proof:</b> Theorem, Axiom, Lemma, Corollary, Conjecture, Valid Arguments, Theorems. Methods of Proving Theorems – Direct proof, Proof by counter positioning, proof by contradiction, proof by mathematical induction. <b>Boolean Algebra:</b> Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits.		
<b>Unit No 3</b>	<b>Relations and Functions</b>	<b>09 Hours</b>
Properties of Binary Relations, Database representation as an n-ary relation, Relational Algebra operators, Closure of relations, Warshall's Algorithm, Equivalence relations and partitions, Partial ordering relations. Definition of function, Composition of functions, Invertible functions, Pigeonhole Principle, Recurrence Relation-Linear Recurrence Relations with constant Coefficients.		
<b>Unit No 4</b>	<b>Algebraic Structures</b>	<b>08 Hours</b>
Algebraic Systems-Semi Groups, Monoids, Groups, Abelian Group, Subgroups, Lagrange's theorem, Permutation Groups, Group Generator (Cyclic Group), Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Integral Domain, Field, Cyclic Codes.		
<b>Unit No 5</b>	<b>Graphs and Trees</b>	<b>10 Hours</b>
<b>Graph Theory</b> Basic terminology, multi-graphs, Subgraphs, Complete, regular and bipartite graphs, matrix representation of the graph, Isomorphic graphs, paths and circuits, Hamiltonian and Eulerian paths and circuits, Graph coloring, Applications of graphs- Travelling salesman problem, Chinese postman problem etc. <b>Trees</b> Basic terminology and characterization of trees, Prefix codes and optimal prefix codes, Huffman coding, Spanning tree and minimum spanning tree, Application of trees- Kruskal's algorithm, Prim's algorithm.		

## Textbooks

1	Kenneth H. Rosen, "Discrete Mathematics and its Applications", 6th edition, McGraw-Hill, 2007. ISBN 978-0-07-288008-3
2	C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", Six Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9

**Reference Books**

1	R. Johnsonbaugh, “Discrete Mathematics”, 5th Edition, Pearson Education, 2001, ISBN 81 – 7808 – 279 - 9 (Recommended for Unit I and Unit II)
2	N. Deo, “Graph Theory with application to Engineering and Computer Science”, Prentice Hall of India,1990, 0 – 87692 – 145 – 4
3	B. Kolman, R. Busby and S. Ross, “Discrete Mathematical Structures”, 4th Edition, Pearson Education,2002, ISBN 81-7808-556-9
4	SemyourLipschutz& Marc Lipson, “ Discrete Mathematics”, McGraw-Hill, 3rd Special Indian Edition,ISBN-13 : 978-0-07-060174-1
5	N. Biggs, “Discrete Mathematics”, 3rd Edition, Oxford University Press, ISBN 0 –19 –850717 – 8
6	E. Goodaire and M. Parmenter, “Discrete Mathematics with Graph Theory”, 2nd edition, Pearson Education,2003 ISBN 81 – 7808 – 827 – 4
7	Lipschutz, Discrete Mathematics, McGraw-Hill Publication, 3rd Edition, 2009.
8	Y. N. Singh, Discrete Mathematical Structures, Wiley Publication, 1st Edition, 2010.

**BTECCE22302: Data Structures**

Course Type	Theory	Semester	III
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	0 Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	100
Total	5 Hr./Week	Total	4		

**Course Description**

This course helps the student to study the representation and applications of Stack and Queue data structures, tree data structure and its traversals. It also focuses on graph data structure and usage of hashing techniques.

**Course Objectives**

1	To study the representation and applications of Stack and Queue data structures.
2	To understand use of efficient programming using Linked list
3	To understand the Tree data structure and its traversals.
4	To study Advanced trees for various applications.
5	To learn graph data structure and use hashing techniques

**Course Outcomes**

CO No.	Statement
1	To understand the representation and applications of stack and Queue data structure.
2	To perform various operations on linked lists.
3	To demonstrate the use of binary tree traversals and perform operations on them.
4	To Use advanced trees and its applications for various purposes.
5	To Apply the Graph data structure to solve the applications of it and use hashing techniques.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																UN
CO2		3															AP
CO3							2										AP
CO4												3					AP
CO5													3				AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

Unit No-1	Stacks and Queues	Hours -9
Stacks: Fundamentals of stack, Representation and Implementation of stack using arrays, Applications of stack: Decimal to Binary Conversion, reversing a string, Parsing: Well-form parenthesis, Different expression conversions and evaluation. Queues: Fundamentals of queue, Representation and Implementation of queue using arrays, Circular queue: representation and implementation, Applications of queue: Josephus Problem, Job Scheduling, Queue Simulation, Categorizing Data, Doubly Ended Queue, Priority queue. Multiple Stacks and Multiple Queues.		
Unit No-2	Linked Lists	Hours -9
Dynamic Memory allocation, Concept of linked organization, singly linked list, doubly linked list, circular linked list, Insertion, Deletion, and traversal on above data structures. Representation and manipulations of polynomials using linked lists. Implementation of linked Lists for Stacks and Queues, Generalized Linked List, operations on GLL like copy, Equality.		
Unit No-3	Trees	Hours -9
Trees: Basic Terminologies, Binary trees, Types of binary trees, Binary tree representation using array and linked list, Creation of a binary tree, Binary Search Trees, creation of binary Search tree, tree traversals (recursive and non-recursive), finding height and counting leaf nodes of a binary search tree (with and without recursion), Deletion of a node from a binary search tree. Finding mirror image of the binary search tree with and without recursion, Printing a tree level wise.		
Unit No-4	Advanced Trees	Hours -9
Threaded binary trees, Creation and traversal of in-order, pre-order and post-order threaded binary tree, Insertion and deletion of nodes in threaded binary tree, AVL Trees, Creation of Heap Tree and Heap sorting, Huffman tree.		
Unit No-5	Graphs	Hours -9
Review of basic terminology, Types of graphs: directed, undirected, weighted graph, Representation of graphs using adjacency matrix, adjacency list, Traversals: Depth First and Breadth First, connected components and spanning trees, Kruskal's and Prim's algorithms for minimum spanning tree, Algorithm for shortest path- Dijkstra's algorithm.		

**Textbooks**

1	"Fundamentals of Data Structures in C", E. Horwitz, S. Sahani, Anderson-Freed, Second Edition, Universities Press.
2	Data structures using C and C++", Y. Langsam, M.J. Augenstein, A.M.Tanenbaum, Pearson Education, Second Edition
3	"Data structures using C and C++", YedidyahLangsam, Moshe Jugenstein, Aaron M. Tanenbaum, Second Edition, Pearson Publications

**Reference Books**

1	"An Introduction to data Structures with applications", J. Tremblay, P. Sorenson, TMH Publication, 2nd Edition.2.
2	"C and Data Structures", E. Balaguruswamy, TMH Publication, 2003.
3	"Data Structures and Algorithm Analysis in C++", M. Weiss, Pearson Education, Second Edition, 2002.

4	“Data Structures using C”, ReemaThareja, Second Edition, Oxford Publications
5	“Data Structures with C”, Schaum’s online series, SaymourLipschutz, McGraw Hill Publications.
6	“Data Structures and Algorithms”, A.V. Aho, J.E. Hopcroft, J.D. Ullman, Pearson Publication
7	“Data Structures and analysis in C”, Mark Allen Weiss, second Edition, Pearson Publication

## **BTECCE22304:: Data Structure Laboratory**

### **List of Experiments**

	<b>Unit 1: Stacks and Queues</b>
1	Program for different stack applications
2	Program for Expression conversion and evaluation using stack
3	Program for different queue applications
	<b>Unit 2: Linked List</b>
4	Program for different types of linked list implementation
5	Program for Generalized Linked Lists.
	<b>Unit 3: Trees</b>
6	Assignment on Binary and Binary Search tree and its traversals
7	Assignment on BST operations
	<b>Unit 4: Advanced Trees</b>
8	Assignment on Threaded binary tree and heap tree
9	Assignment on AVL tree
	<b>Unit 5: Graphs</b>
10	Assignment on Graph traversals (BFS and DFS)
11	Assignment on min. spanning tree and Dijkstra’s algorithm
12	Mini Project

**BTECCE22303: Applied Statistical Analysis**

Course Type	Theory	Semester	III
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	0 Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	100
Total	5 Hr./Week	Total	4		

**Course Description**

Applied Statistical analysis is a fundamental course designed to provide students with a comprehensive understanding of statistical techniques and their applications in analyzing and interpreting data. The course emphasizes the practical aspects of statistical analysis and equips students with the necessary skills to make informed decisions based on data.

**Course Outcomes:**

CO	Statement
1	Gain an understanding of statistical methods relevant to upper division interdisciplinary courses.
2	Sharpen students' statistical intuition and abstract reasoning as well as their reasoning from numerical data through community-based and other research.
3	Learn and apply the procedure of hypothesis testing.
4	Understand the relationships within data using regression and correlation.
5	Learn advance techniques for statistical analysis.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																UN
CO2		3															AP
CO3				3													AP
CO4					3												AP
CO5														3			AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level



**Course Contents**

<b>UNIT-1</b>	<b>Introduction to Statistics - Organizing and Graphing Data</b>	<b>Hours 9</b>
What is statistics? - Types of statistics - Population versus sample - Basic terms - types of variables - cross section verses time series data - different types of data - sources of data - designing studies and collecting good quality data Raw data- organizing and graphing qualitative data - organizing and graphing quantitative data - Histograms - Cumulative Frequency Distributions - Stem-and-Leaf Display		
<b>UNIT-2</b>	<b>Numerical Descriptive Measures</b>	<b>Hours 9</b>
Measures of central tendency for ungrouped data - Measures of dispersion for ungrouped data - Mean, variance, and standard deviation for grouped data - Use of standard deviation - Measures of position - Box-and-Whisker Plot		
<b>UNIT-3</b>	<b>Discrete Random Variables and Their Probability Distributions</b>	<b>Hours 9</b>
Random variables - probability distribution of a discrete random variable - mean of a discrete random variable - standard deviation of a discrete random variable - The binomial probability distribution - The Poisson probability distribution		
<b>UNIT-4</b>	<b>Continuous Random Variables &amp; Normal Distribution-Sampling Distributions</b>	<b>Hours 9</b>
Continuous probability distribution - The normal distribution - The standard normal distribution - Standardizing a normal distribution - Applications of the normal distribution - determining the $z$ and $x$ values when an area under the normal distribution curve is known - The normal approximation to the binomial distribution. Population and sampling distributions- mean and standard deviation of $\bar{x}$ - applications of the sampling distribution of $\bar{x}$ .		
<b>UNIT-5</b>	<b>Estimations and Hypothesis Testing</b>	<b>Hours 9</b>
Point and interval estimates - estimation of a population mean: ( $\sigma$ known)-estimation of a population mean: ( $\sigma$ not known) Hypothesis tests: Introduction -Hypothesis tests about population mean ( $\sigma$ known) - Hypothesis tests about population mean ( $\sigma$ not known) Chi-Square Tests - The Chi-square distribution - Goodness-of-fit test - Contingency tables - Test of independence or homogeneity - Inferences about the population variance Analysis of Variance - The $F$ Distribution - One-Way Analysis.		

**Text Books**

1	Mann Prem S., Lacke Christopher Jay. (2010). Introductory Statistics(Jenn Albanese, Ellen Keohane),7, John Wiley & Sons, Inc
2	Christopher Chatfield. (1994). Statistics for Technology: A Course In Applied Statistics, 3, Taylor & Francis Group.

**Reference Books**

1	Bruce Peter, BruceAndrew. (2017). Practical Statistics for Data Scientists(Shannon Cutt),1, O'Reilly Media, Inc.
2	EasterlingRobert G. (2015). Fundamentals of Statistical Experimental Design and Analysis(Prachi Sinha Sahay, Jo Taylor, Kathryn Sharples), John Wiley & Sons, Ltd.

**BTECCE22305:: Applied Statistical Analysis Lab****List of Experiments**

1	<b>Introduction to R Language and basic R commands-</b> basic calculations - help - installing packages - datatypes - data structures - vectors - subsetting - logical operators - matrices - calculations with vectors and matrices - lists - data frames
2	<b>Programming in R</b> - control flow - if/else - for loop - functions - Reading in data from different sources
3	<b>Summarizing Data</b> - Use R commands to find following summery measures of the given 3 data-sets - mean , median , mode, standard deviation, range, variance, coefficient of variation, minimum, maximum, quartiles , interquartile range (IQR). Compare the data-sets based these descriptive measures.-- Data cleaning -missing values
4	<b>Graphing data</b> - Plot following graphs - frequency distribution, bar-plots, pie chart, histogram, polygon and box-and-whisker plot, scatter-plots, stem-and-leaf plot, (Examples of continuous and discrete data )
5	<b>Probability Distributions</b> - Computing probabilities of an event by applying various probability distribution function viz. binomial distribution , Poisson distribution , normal distribution , Chi-squared distribution , student t distribution , F distribution, Confidence interval computation
6	<b>Hypothesis testing -1</b> - One sample t-Test - Two sample t-Test , independent samples t-test - non-parametric tests - One-way ANOVA - Two-way ANOVA
7	<b>Hypothesis testing -2</b> - Comparing group means using the independent samples t test , F-test , Chi-square test ,
8	<b>Confidence Interval Estimation</b> - Proportion test , z-test , t-test , confidence

**BTECCE22306:: Technology Skill Development – 2 (Python)**

Course Type-	LC	Semester	III
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Teaching Scheme		Credits		Examination Scheme	
Lecture	1Hr./Week	Lecture	1	CIE Marks	50
Tutorial	0 Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	0Hr./Week	Practical/Studio	1	Total Marks	100
Total	2 Hr./Week	Total	2		

**Course Description**

This course provides an introduction to programming and the Python language with core programming concepts like data structures, conditionals, loops, variables, and functions. This course includes an overview of the various tools available for writing and running Python, and gets coding quickly. It also provides hands-on coding exercises using commonly used data structures, writing custom functions, and reading and writing to files. It also introduces to advanced python programming concepts.

**Course Objectives**

1	To learn fundamental concepts of Python Programming
2	To learn Object oriented features of Python
3	To analyse data using NumPy, Pandas and data visualization libraries in Python Programming

**Course Outcomes**

1	To understand basic concepts in python
2	To develop application employing different object-oriented concepts
3	To implement linear algebra functions for arrays using NumPy
4	To demonstrate high-performance data manipulation and analysis using PandasLibrary
5	To plot data visualization using Matplotlib, seaborn libraries.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BT L
	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3	PSO4	
CO1			3														UN
CO2					3												AP
CO3						2											AP
CO4							2										AP
CO5														3			AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

## Course Content

<b>Unit No-1</b>	<b>Fundamental Concepts inPython</b>	<b>Hours 3</b>
Installing Python, Variables, Data types in python , Keywords, Literals, Operators in python, Input and Output, Control statement, Loops, Arrays, List, Tuples, Dictionary, Functions, Modules, File I/O, Exception		
<b>Unit No-2</b>	<b>Python OOPs Concepts</b>	<b>Hours 3</b>
Introduction to OOP, Classes, Objects, Interfaces, Constructor, Inheritance.		
<b>Unit No-3</b>	<b>Data Processing Library inPython</b>	<b>Hours 3</b>
NumPy, why do we need NumPy, Arrays, Shaping and transposition, Mathematical Operations, Indexing and slicing, Broadcasting, NumPy Array Attributes, Descriptive Statistics methods, matrices		
<b>Unit No-4</b>	<b>Data Analysis using PythonLibrary</b>	<b>Hours 5</b>
Overview of Python Libraries for Data Scientists, reading data using pandas, Data frame, Data Frame data types, Data Frames attributes, Exploring data frames, Data Frames methods, groupby method, filtering, Slicing, sorting, missing value, Aggregation Functions in Pandas.		
<b>Unit No-5</b>	<b>Data Visualization in Python</b>	<b>Hours 3</b>
Plotting libraries in python, Matplotlib: Scatter Plot, Histogram, Bar Plot. Seaborn: Scatter Plot, Histogram, Bar Plot, Box and whiskers plot, Pairwise Plots		

## List of Experiments

1.	Write a program to demonstrate basic data type in python
2.	Write a Program for checking whether the given number is a even number or not.
3.	Write a Program in Python to print Fibonacci series, by starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89.
4.	Write a program to count the numbers of characters in the given string and store them in a dictionary data structure
5.	Write a program in Python to combine two lists into a dictionary.
6.	To sort list of elements using merge sort, Selection Sort and Insertion Sort.
7.	Write a program in Python to demonstrate the concept of Inheritance.
8.	Write a program in Python to compute the number of characters, words and lines n a file.
9.	Create a function in Python unique() to find all the unique elements of a list.
10.	Write a NumPy program to test whether none of the elements of a given array are zero
11.	Write a NumPy program to find the number of rows and columns in a given matrix.
12.	Write a NumPy program to create a 3x3 identity matrix.
13.	Write a Pandas program to add, subtract, multiple and divide two Pandas Series.
14.	Write a Pandas program to convert a dictionary to a Pandas series.

**BTECCE22307::Information Security Fundamentals**

Course Type	PCC	Semester	3
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2 Hr./Week	Lecture	2	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	-- Hr./Week	Practical/Studio	-	Total Marks	100
Total	2 Hr./Week	Total	2		

**Course Description**

This course helps the student to learn about various Domains under Information Security, algorithms/mechanisms for implementing security solutions. Focuses on how to maintain the Confidentiality, Integrity and Availability of a data. Provides an understanding of principal concepts, major issues, in information security, various tools and techniques associated to Information Security.

**Course Outcomes**

CO No.	Statement
1	Explain the foundational theory behind information security
2	Conceptually clarify about tools available in modern cryptography and reflections of operations security in personal lives.
3	Gain the knowledge about network security tools.
4	Explain the basic principles and techniques for operating system security application security.
5	Use monitoring and reporting tools available in information security.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1			3														UN
CO2						2											AP
CO3							2										AN
CO4												2					AP
CO5														3			AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No 1</b>	<b>CIA Triad</b>	<b>Hours 6</b>
Confidentiality, Integrity & Availability, what is Information Security? Identification and Authentication, Authorization and Access Control, Auditing and Accountability.		
<b>Unit No 2</b>	<b>Cryptography and Operations Security</b>	<b>Hours 6</b>
Modern Cryptography Tools (DES, RSA), Protecting Data at rest, In motion, and in Use, Origins of Operations Security, The Operations Security Process, Laws of Operations Security, Operations Security in our Personal Lives.		
<b>Unit No 3</b>	<b>Physical Security and Network Security</b>	<b>Hours 6</b>
Introduction, Physical Security Controls, Protecting People, Data and Equipment. Protecting Networks, Protecting Network Traffic. Network Security Tools.		
<b>Unit No 4</b>	<b>Operating System and Application Security</b>	<b>Hours 6</b>
Operating System Hardening, Protecting Against Malware, Software Firewalls and Host Intrusion Detection, Operating System Security Tools, Software Development Vulnerabilities, Web Security, Database Security, Application Security Tools.		
<b>Unit No 5</b>	<b>System Security</b>	<b>Hours 6</b>
Change and Security Implications, System Models, Targets and Methods, Log Management, Data Aggregation and Reduction, Notifications and Reporting, Monitoring and Control Challenges, Auditing Standards, SAS 70 Audits, Sarbanes-Oxley, Addressing Multiple Regulations for Information Security Technical Frameworks for IT Audits, Intelligence and Compliance, Management and Governance.		

**Textbooks**

<b>1</b>	<i>Jason Andress, "Basics of Information Security-Understanding the Fundamentals of Infosec in Theory and Practice", Syngress (imprint of Elsevier), 2011</i>
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**Reference Books / Journal Articles / Weblink**

<b>1</b>	<i>Nina Godbole, "Information Systems Security", Wiley India Pvt. Ltd, ISBN -978-81-265-1692-6</i>
<b>2</b>	<i>Mark Merkow, " Information Security-Principles and Practices", Pearson Ed. 978-81-317-1288-7</i>
<b>3</b>	<i>William Stallings, "CRYPTOGRAPHY AND NETWORK SECURITY PRINCIPLES AND PRACTICE", FIFTH EDITION, PEARSON, 2011, ISBN 10:0-13-609704-9 BehrouzForouzan, "Cryptography and Network Security", McGraw Hill</i>
<b>4</b>	<a href="https://www.youtube.com/playlist?list=PLZ_pui6BPFOW3hWS7SkkYki7AI-XI-Dq6">https://www.youtube.com/playlist?list=PLZ_pui6BPFOW3hWS7SkkYki7AI-XI-Dq6</a>

**BTECCE22308::-Finance and Accounting**

Course Type	HSMC	Semester	3
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2Hr./Week	Lecture	2	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	-
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	50
Total	2Hr./Week	Total	2		

**Course Description**

This course helps the student to learn financial planning & control, practical aspects of Account. Focuses on financial management skills to practical situations.

**Course Outcomes**

CO No.	Statement
1	Implement financial knowledge in real life related to personal context and business context.
2	Use the knowledge of financial planning with respect to the personal financial planning.
3	Understand various intelligent sources for investment by analyzing capital, insurance and risks involved in processing.
4	Explain balance sheet.
5	Acquaint the current financial trends.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1								3									UN
CO2									2								AP
CO3										2							AN
CO4												2					AP
CO5														2			AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No 1</b>	<b>Introduction</b>	<b>Hours 6</b>
To understand Basic Accounting Concepts , Golden Rules , Journal Entries , Ledger Finance and costing concepts, Expenditure and Revenue.		
<b>Unit No 2</b>	<b>Financial Planning</b>	<b>Hours 6</b>
To Understand the Financial Planning Process. Life cycle of financial plans, role they play in achieving your financial goals , how to deal with special planning concern, Economic environments influence on personal financial planning, Evaluate the impact of age, education and geographic location on personal income. Compounding Interest.		
<b>Unit No 3</b>	<b>Investment Management</b>	<b>Hours 6</b>
Investment Avenues (Types of Investments) Bank Account, Transactions, Mutual Fund, Share Capital, Insurance their returns and Risk, Balance Sheet and its Analysis by using Ratios		
<b>Unit No 4</b>	<b>Financial Statements and Budgeting</b>	<b>Hours 6</b>
Using Financial Statements and Budgets. Preparation of personal Balance Sheet, Development of good record keeping system. Cash Budget and use it to monitor and control spending. Time value of money concept. NPA, Profitability Index, Pay Back Period, Cost sheet.		
<b>Unit No 5</b>	<b>Current Financial Trends</b>	<b>Hours 6</b>
Current Trends in finance (Blockchain, GST, Commodity Market, Basel Accord, Basel Accord.		

**Textbooks**

<b>1</b>	Book keeping and Accountancy : Maharashtra state board STD XI
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**Reference Books / Journal Articles / Weblink**

<b>1</b>	Introduction to accounting: S.N Maheshwari
<b>2</b>	Business Finance : Dr. Mahesh Kulkarni and Dr. SuhasMahajan
<b>3</b>	Management Accounting : Dr. Mahesh Kulkarni and Dr. SuhasMahajan
<b>4</b>	<a href="https://byjus.com/commerce/class-11-accountancy-chapter-1-introduction-to-accounting/">https://byjus.com/commerce/class-11-accountancy-chapter-1-introduction-to-accounting/</a>
<b>5</b>	<a href="https://www.topperlearning.com/t-s-grewal-solutions/cbse-class-11-commerce-accountancy/financial-accounting">https://www.topperlearning.com/t-s-grewal-solutions/cbse-class-11-commerce-accountancy/financial-accounting</a>



**BTECCE22309::Organizational Behavior**

Course Type-Humanities	Theory	Semester	III
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2 Hr./Week	Lecture	2	CIE Marks	50
Tutorial	0 Hr./Week	Tutorial	0	ESE Marks	-
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	50
Total	2 Hr./Week	Total	2		

**Course Description**

This course helps the student to identify the role of manager, learn motivational theories to work in competitive work environment. Focuses on concept of team to become active team members and able leaders, ethics, morals and law in the organization.

**Course Outcomes**

1	Describe the concepts of organizational behavior and management practices.
2	Summarize the problems occurring due to organizational change and analyze how the theories and empirical evidence can help to solve contemporary organizational issues.
3	Apply theories of motivation to practical problems in organizations in a critical manner.
4	Justify the role of leadership qualities.
5	Apply MBO technique to achieve the organizational objectives.
6	Develop the skills that are necessary for making ethical decisions in Professional life.

**Mapping of COs to POs and PSOs**

CO No	PO1	POs											PSOs				BTL
		PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1								3									UN
CO2									3								AP
CO3										3							AN
CO4												2					AP
CO5														2			AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No-1</b>	<b>Introduction to Organizational Behavior</b>	<b>Hours 6</b>
Introduction: A review of the Manager's Job Management Functions, Management Roles, Management Skills, Effective versus Successful Managerial Activities. Definition, Importance, Scope, Fundamental Concepts of OB, Challenges and Opportunities of OB Different models of OB - autocratic, custodial, supportive, collegial models, Disciplines That Contribute to the OB Field - Psychology, Social Psychology, Sociology, Anthropology. Responding to Economic Pressures, Responding to Globalization, Managing Workforce Diversity, Improving Customer Service.		
<b>Unit No-2</b>	<b>Organizational Change and Stress Management</b>	<b>Hours 6</b>
Types of changes: Dilemma of change, Pressure of change, Resistance to change Force field analysis, Change process, Overcoming the resistance to change, Approaches to Managing Organizational Change: Lewin's Three-Step Model, Creating a Culture for Change, Work Stress and Its Management: What is Stress? Potential Sources of Stress, Individual Differences, Cultural Differences, Consequences of Stress, Managing Stress, Coping with "Temporariness", Helping Employees Balance Work-Life Conflicts, Creating a Positive Work Environment.		
<b>Unit No-3</b>	<b>Motivation</b>	<b>Hours 6</b>
Definition, Importance, Motives – Characteristics, Classification of motives - Primary & Secondary motives. Theories of Motivation - Maslow's Theory of need hierarchy - Herzberg's theory, Goal-Setting, Motivating by Job Design, How can Jobs be Redesigned? Alternative Work Arrangements, Employee Involvement Programs, Using Rewards to Motivate Employees.		
<b>Unit No-4</b>	<b>Group Dynamics and Team building</b>	<b>Hours 6</b>
Concept of Group & Team, Differences Between Groups and Team, Theories of Group Formation - Formal and Informal Groups. Importance of Team building, Stages of Group Development - The Five-Stage Model, Group Decision Making, Groups versus the Individual, Problem-Solving Teams, Self-Managed Work Teams, Creating Effective Teams, Leadership, Quality Circle.		
<b>Unit No-5</b>	<b>Organizational Culture</b>	<b>Hours 6</b>
Concept of Organizational Culture, Culture's Functions, Creating an Ethical Organizational Culture, Creating a Positive Organizational Culture, What Is Spirituality? Spirituality and Organizational Culture, Why Spirituality Now? Characteristics of a Spiritual Organization, Achieving a Spiritual Organization, Criticisms of Spirituality, How a Culture Begins, Creating and Sustaining Culture, Keeping a Culture alive, Concept of MBO technique and details, case studies.		

**Textbooks**

<b>1</b>	Fundamentals of Organizational Behavior by Nancy Langton, Stephen Robbins
<b>2</b>	Organizational Behavior: Stephen Robbins, Timothy Judge: Pearson Publications : 13th Edition
<b>3</b>	Organizational Behavior: Concepts, Controversies and Applications: Stephen Robbins

**Reference Books / Journal Articles / Weblink**

<b>1</b>	Essentials of Organizational Behavior: Laurie J. Mullins: Pearson Education : 2nd Edition
<b>2</b>	Organizational Behavior: Individuals, Groups and Organization, 3rd Edition: Ian Brooks : Pearson Publication
<b>3</b>	Organizations: Structures, Processes, and Outcomes: Richard H. Hall

# **SEM IV**

**BTECCE22401:: Theory of Computation**

Course Type	PCC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	-- Hr./Week	Practical/Studio	-	Total Marks	100
Total	3 Hr./Week	Total	3		

**Course Description**

This course introduces students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability. Provides knowledge on mathematical proofs for computation and algorithms

**Course Outcomes**

CO No.	Statement
1	Infer the applicability of various automata theoretic models for recognizing formal languages.
2	Discriminate the expressive powers of various automata theoretic and formal language theoretic computational models.
3	Illustrate significance of non-determinism pertaining to expressive powers of various automata theoretic models.
4	Comprehend general purpose powers and computability issues related to state machines and Grammars.
5	Explain the relevance of Church-Turing thesis, and the computational equivalence of Turing machine model with the general purpose computers.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																AP
CO2		3															AP
CO3						1											AP
CO4												3					AN
CO5														3			AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

Unit No 1	Finite Automata	Hours 9	CO	BTL
	Introduction to Automata, Computability and Complexity theory, Automaton as a model of computation, Central Concepts of Automata Theory: Alphabets, Strings, Languages. Decision Problems Vs Languages. Finite Automata, Structural Representations, Deterministic Finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, transition table, Language of DFA, construction of DFAs for Languages and proving correctness, Product construction, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Conversion of NFA with epsilon transitions to DFA, Automata with output. Applications and Limitation of Finite Automata		1	AP
Unit No 2	Regular and Non Regular Languages	Hours 9	2	AP
	Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleene's Theorem: Equivalence Regular expressions and DFAs, Closure properties of Regular Languages (union, intersection, complementation, concatenation, Kleene closure), Decision properties of Regular Languages, Applications of Regular expressions Myhill-Nerode theorem and its applications: proving non-regularity, lower bound on number of states of DFA, State Minimization algorithm, Equivalence testing of DFAs. Non Regular Languages, Pumping Lemma for regular Languages.			
Unit No 3	Context Free Grammars (CFG)	Hours 9	3	AP
	Context Free Grammars: Definition, Examples, Derivation and syntax trees, Languages of CFG, Constructing CFG, correctness proof using induction. Closure properties of CFLs (Union, Concatenation, Kleene closure, reversal). Derivation trees, Ambiguity in CFGs, Removing ambiguity, Inherent ambiguity. Simplification of CFGs, Normal forms for CFGs: CNF and GNF. Decision Properties of CFLs (Emptiness, Finiteness and Membership). Applications of CFG.			
Unit No 4	Push Down Automata (PDA), Non-Context Free Languages, Context Sensitive Languages	Hours 9	4	AN
	Push Down Automata: Description and definition, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic, Non-deterministic PDAs, CFG to PDA construction (with proof). Equivalence of PDA and CFG (without proof). Intersection of CFLs and Regular language. Pumping lemma for CFLs, closure properties of CFLs, non-Context Free Languages, Context Sensitive Languages, Definition and Examples of Context Sensitive Grammars, Linear Bounded Automata. Chomsky hierarchy.			
Unit No 5	Introduction to Turing Machines	Hours 9	5	AN
	Turing Machines: Basic model, definition and representation, Instantaneous Description, Language acceptance by TM. Design of Turing Machine, Church's Machine, Robustness of Turing Machine model and equivalence with various variants: Two-way/One-way infinite tape TM, multi-tape TM, non-deterministic TM, Universal Turing Machines. TM as enumerator. Recursive and Recursively Enumerable languages and their closure properties.			

**Textbooks**

1	Hopcroft J, Motwani R, Ullman, Addison-Wesley, "Introduction to Automata Theory, Languages and Computation", Second Edition, ISBN 81-7808-347-7.
2	Michael Sipser, Course Technology, "Introduction to Theory of Computation", Third Edition, ISBN-10: 053494728X

**Reference Books / Journal Articles / Weblink**

1	J. Martin, "Introduction to Languages and the Theory of computation", Third edition, Tata McGraw-Hill, ISBN 0-07-049939-x, 2003.
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**BTECCE22402::Computer Graphics and Gaming**

Course Type	PCC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	100
Total	3 Hr./Week	Total	3		

**Course Description**

This course helps the student to understand the role of Computer Graphics in Animation and Gaming. The C Programming and fundamentals of Data Structures is the prerequisite for this course. The course highlights the drawing of basic geometric shapes with 2D and 3D transformations and clipping of objects. It also introduces the basics of animation and gaming platforms.

**Course Outcomes**

CO No.	Statement
1	Understand computer graphics fundamentals and use algorithms to draw line, circle, and polygons.
2	Perform various transformations and numerical on 2D object and apply different clipping algorithms on polygons.
3	Apply transformations on 3D objects and systematically solve numerical problems based on transformations and projections.
4	Detect hidden surfaces and interpret the difference between curves and fractals.
5	Construct animation based demonstrating system using segments and various gaming platforms.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																AP
CO2		3															AP
CO3				2													AP
CO4						3											AN
CO5														3			AN

**Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level**

### Course Content

Unit No 1	Fundamentals of Scan Conversion	Hours 10	CO	BTL
	<p>Overview of Computer Graphics, Computer Graphics Application and Software, Display adapters, Display modes, Pixel, Frame Buffer, Display devices, Aspect Ratio, Display file structure, Display file interpreter.</p> <p><b>Mathematical foundations:</b> Lines and line representations, Intersection of lines, Normalized Device Coordinates (NDC).</p> <p><b>Scan conversions:</b> DDA and Bresenham's line drawing algorithms, Bresenham and Midpoint circle drawing algorithms, Aliasing and Anti-aliasing,</p> <p><b>Polygons:</b> Introduction, Types of polygons, Inside-outside test of polygon. Polygon filling algorithms: Seed fill, Boundary fill, Edge fill, Fence fill, Scan line fill algorithm.</p>		1	UN
Unit No 2	2D Transformations and Clipping	Hours 9	2	AP
	<p><b>2D Transformations:</b> Introduction, Scaling, Rotation, Translation, Derivation of matrix representation of 2D transformation, Homogeneous coordinates for transformations, Reflection Transformations, rotation about an arbitrary point, Inverse transforms, and shear transforms. Numerical Problems on 2D transformation.</p> <p><b>Windowing and Clipping:</b> Introduction, Window, Viewport, Window to viewport transformation, Line clipping: Cohen Sutherland algorithm, Mid-point line clipping algorithm, Polygon clipping: Sutherland Hodgeman algorithm, Weiler-Atherton algorithm, Text clipping, Interior and Exterior clipping.</p>			
Unit No 3	3D Transformations and Projections	Hours 9	3	AN
	<p><b>3D Transformations:</b> Introduction, 3D point representation, Left handed system, Right handed system. Scaling, Rotation, Translation, Matrix representation, Derivation of Rotation matrices along the main axis, Rotation about an arbitrary axis, Reflection transformation with respect to main axes and planes, Numerical Problems on 3D transformations.</p> <p><b>Projection:</b> 3D Projection concept, parallel and perspective projections, 3D clipping. Introduction to file formats: Bmp, Jpeg, Gif, Tiff, PNG.</p>			
Unit No 4	Hidden Surfaces, Curves and Fractals	Hours 8	4	AP
	<p>Introduction, Techniques for efficient Visible Surface Algorithms, Categories of algorithms, Back face removal, The Z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting), Area sub-division method, Binary Space Partition method, comparison of the methods. <b>Curve generation:</b> Curve continuity, Interpolation, Lagrange interpolating algorithms, Spline. curve representation, B-Spline Curves, Bezier Curves, Fractals, Hilbert curve, Triadic Koch Curve, Fractal lines and surfaces.</p>			
Unit No 5	Introduction to Animation and Gaming	Hours 9	5	AN
	<p><b>Segment:</b> Introduction, Segment table, Segment Creation, Closing, Delete and renaming, Image transformation, Display structures used for segment.</p> <p><b>Animation:</b> Introduction to animation, Conventional and Computer based animation, Real time Animation, Methods of Controlling animation, Animation Guidelines.</p> <p><b>Graphics tools:</b> Study of 2D / 3D Graphics tools: 3D Studio Max, Maya.</p> <p><b>Gaming:</b> Gaming Platforms, General Purpose GPU, NVIDIA Workstations: Tesla, Quadra.</p>			

**Textbooks**

<b>1</b>	<i>“Computer Graphics”, D. Hearn, M. Baker, 2nd Edition, Pearson Education, 2002, ISBN 81-7808-794-4</i>
<b>2</b>	<i>“Procedural Elements for Computer Graphics”, D. Rogers, 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0-07-047371-4</i>

**Reference Books / Journal Articles / Weblink**

<b>1</b>	<i>“Computer Graphics”, S. Harrington, 2nd Edition, McGraw-Hill Publications, ISBN 0 - 07 -100472 - 6.</i>
<b>2</b>	<i>“Computer Graphics Principles and Practice”, J. Foley, V. Dam, S. Feiner, J. Hughes, 2nd Edition, Pearson Education, 2003, ISBN 81-7808-038-9.</i>

**BTECCE22404:: Computer Graphics and Gaming Lab**

Teaching Scheme		Credits		Examination Scheme	
Lecture	-- Hr./Week	Lecture	0	CIE Marks	25
Tutorial	-- Hr./Week	Tutorial	0	ESE Marks	25
Practical/Studio	2 Hr./Week	Practical/Studio	1	Total Marks	50
Total	2 Hr./Week	Total	1		

**List of Experiments**

<b>1</b>	Implementation of Line drawing algorithms
<b>2</b>	Implementation of Circle drawing algorithms
<b>3</b>	Implementation of Polygon Filling algorithms
<b>4</b>	Implementation of various 2D Transformations
<b>5</b>	Implementation of a Line Clipping algorithms
<b>6</b>	Implementation of a Polygon Clipping algorithms
<b>7</b>	Implementation of basic 3D Transformations
<b>8</b>	Study of various graphical file formats
<b>9</b>	Implementation of Curves and Fractals
<b>10</b>	Assignment of Animation
<b>11</b>	Mini Project



**BTECCE22403:: Database Management Systems Theory**

Course Type	PCC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3 Hr./Week	Lecture	3	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	0	ESE Marks	50
Practical/Studio	0 Hr./Week	Practical/Studio	0	Total Marks	100
Total	3 Hr./Week	Total	3		

**Course Description**

The course will enable student understand the different issues involved in the design and implementation of a database system. Student will learn the physical and logical database designs, database modeling, relational, hierarchical, and network models. Student will learn to use data manipulation language to query, update, and manage a database. Student will understand essential DBMS concepts such as: database security, integrity, concurrency, storage strategies etc. The students will get the hands on practice of using SQL and PL/SQL concepts.

**Course Outcomes**

CO No.	Statement
1	Design and construct data models, logical database models of an organization
2	Develop a database system using relational database query languages and PL/SQL
3	Apply and relate the concepts of transaction, concurrency control, recovery and security in database
4	Recognize the purpose of query processing, optimization and demonstrate the SQL query evaluation
5	Build a database management system that satisfies relational theory and provides users with business queries.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1	3																AP
CO2		3															AP
CO3			3														AP
CO4					3												AN
CO5													3				AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

Unit No 1	Introduction and Design Theory	Hours 9	CO	BTL
<b>Introduction:</b> Need of Database Management System, Evolution, Data Abstraction, Data Independence, System Architecture of DBMS; Data Models: Entity Relationship (ER) Model, Extended ER Model, Relational Data Model <b>Normalization:</b> Need, Functional Dependency, Inference Rules, FD Closure, Minimal Cover, Decomposition Properties, Normal Forms (upto BCNF), Multi-valued Dependency (4NF),			1	UN
Unit No 2	SQL and PL/SQL	Hours 10	2	AP
<b>SQL Concepts :</b> Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types., transaction control commands. <b>PL/SQL Concepts :</b> Cursors, Stored Procedures, Stored Function, Database Triggers				
Unit No 3	Transaction Management	Hours 10	3	AN
Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Time-stamping Methods, Optimistic Techniques, Recovery methods: Shadow-Paging and Log-Based Recovery, Checkpoints.				
Unit No 4	Query processing and optimization	Hours 7	4	AP
<b>Query processing and optimization:</b> Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization				
Unit No 5	Emerging Databases and Case Studies	Hours 9	5	AN
Limitations of Conventional Databases , Multimedia Database, Temporal Databases, Spatial Databases, Cloud Databases, Google Big Table, No SQL, SQLite				

**Textbooks**

1	<i>Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 6 th Edition, McGraw Hill Publishers, ISBN 0-07-120413-X</i>
2	<i>Rob, Coronel, "Database Systems", Seventh Edition,</i>

**Reference Books / Journal Articles / Weblink**

1	<i>S.K.Singh, "Database Systems : Concepts, Design and Application", 2nd Edition, Pearson, 2013, ISBN 978-81-317-6092-5</i>
2	<i>Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 81-7808-861-4</i>
3	<i>"Fundamentals of Database Systems", Elmasri, Navathe, Pearson Education, ISBN 81-297-0228-2, 5th Edition.</i>

**BTECCE22405:: Database Management Systems Lab****List of Experiments**

<b>1</b>	Create tables with appropriate constraints for the relational schema. a) Create Views on the table. b) Create Indices on the table c) Create Sequence on the table d) Alter the schema by adding/removing columns and constraints. Write DML queries.
<b>2</b>	Execute 'SELECT' queries on the suitable database by using the following methods. a) Using order by clause b) Using group by clause c) Using aggregate functions d) Using having clause e) Using set operators. f) Use SQL single row functions for date, time, string etc.
<b>3</b>	Create suitable database and perform following operations. a) Write equijoin, non-equijoin, self-join and outer join queries. b) Write queries containing single row / multiple row / correlated subqueries using operator like c) Write queries containing single row / multiple row / correlated subqueries using operator = d) Write queries containing single row / multiple row / correlated subqueries using operator in e) Write queries containing single row / multiple row / correlated subqueries using operator any f) Write queries containing single row / multiple row / correlated subqueries using operator all g) Write queries containing single row / multiple row / correlated subqueries using operator exists. Write DML queries containing subqueries. Study a set of query processing strategies.
<b>4</b>	Choose a suitable database system and perform following operations a) Write meaningful stored procedures in PL/SQL. b) Make use of cursors and different arguments. c) Write useful stored functions to perform complex computation. d) Write row level and statement level triggers in PL/SQL.
<b>5</b>	Choose a suitable database system you propose to work. a) Perform requirements analysis in detail for design of the database. b) Design an entity-relationship (ER) data model for the selected database system.
<b>6</b>	Develop a Mini project in a group by using all the concepts you have learnt.

**BTECCE22406: Technology Skill Development -2 (JAVA)**

Course Type	LC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	1Hr./Week	Lecture	1	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	2 Hr./Week	Practical/Studio	1	Total Marks	100
Total	3Hr./Week	Total	2		

**Course Description**

This course helps to learn Object Oriented programming paradigm with help of JAVA, java advanced concepts and API. Identifies and analyzes real world practices of web and database implementation.

**Course Outcomes**

CO No.	Statement
1	Extend their knowledge in utilizing the appropriate advanced features of Java for using emerging frameworks.
2	Understand database programming using JDBC and exception handling.
3	Design dynamic web application.
4	Compare the servlet and JSP usage in dynamic web design
5	Use best practices of advanced database technologies.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1			3														UN
CO2					3												AP
CO3						2											AP
CO4							2										AP
CO5														3			AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

Unit No 1	Fundamentals of JAVA	Hours 3	CO	BTL
	JVM, Java OOP Concepts (Constructor, Abstraction, Inheritance, Polymorphism, Interfaces), keywords, variable, Packages, Exceptional Handling, Multithreading, Collections.		1	UN
Unit No 2	JDBC	Hours 3	2	AP
	Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating, Database Programming using JDBC, Prepared Statements, Transaction Processing, Stored Procedures.			
Unit No 3	Servlets	Hours 3	3	AP

Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Developing and Deploying Servlets on Application Server.				
<b>Unit No 4</b>	<b>Jakarta Server Pages(JSP)</b>	<b>Hours 3</b>	<b>4</b>	<b>AP</b>
Basic JSP Architecture, Life Cycle of JSP (Translation, compilation), JSP Expressions, JSP Actions, Implicit Objects, JSP page Directive, The HttpServletRequest Object, The HttpServletResponse Object, Tag Libraries, Exception Handling.				
<b>Unit No 5</b>	<b>Hibernate</b>	<b>Hours 3</b>	<b>5</b>	<b>AP</b>
Introduction, Hibernate Architecture, ORM, Hibernate using XML, Web Application with Hibernate, Hibernate Query Language (HQL).				

**Textbooks**

<b>1</b>	<i>Advanced Java 2: development for enterprise applications”, Clifford J. Berg, Sun ISBN: 0130848751, Microsystems Press, 2000</i>
<b>2</b>	<i>“Advanced Java networking”, Dick Steflik, Prashant Sridharan, ISBN: 0130844667, Prentice Hall PTR, 2000.</i>

**Reference Books / Journal Articles / Weblink**

<b>1</b>	<i>“Java: The Complete Reference”, Herbert Schildt, McGraw Hill Publication, Seventh Edition, ISBN: 007063677X, 2006.</i>
<b>2</b>	<i>“Java generics and collections”, Thomas Powell, O&amp;#39;Reilly Media, ISBN:0596527756, 2006</i>
<b>3</b>	<i>“Java EE 7” for Beginners, Sharanam shah, Vaishali shah, SPD, ISBN:13:978-93-5110-349-3</i>
<b>4</b>	<a href="https://www.codecademy.com/learn/learn-java">https://www.codecademy.com/learn/learn-java</a> <a href="https://www.udemy.com/java-tutorial/">https://www.udemy.com/java-tutorial/</a> <a href="https://www.tutorialspoint.com/java/index.html">https://www.tutorialspoint.com/java/index.html</a>

**List of Experiments**

<b>1</b>	Design a java application to demonstrate the use of Core Java fundamentals.
<b>2</b>	Design a java application to demonstrate use of Collections.
<b>3</b>	Demonstrate use of methods, Exception Handling using try, catch, Multi catch and Finally block.
<b>4</b>	Design a java application to demonstrate use of Servlet using database.
<b>5</b>	Develop a java application using JSP.
<b>6</b>	Develop a java application using multithreading.
<b>7</b>	Implement hashtable and hashmap in java application.
<b>8</b>	Design a java application using Treemap.
<b>9</b>	Demonstrate the use of ArrayList in java.
<b>10</b>	Develop a java standalone application using Hibernate framework.
<b>11</b>	Mini Project:-Students have to implement the mini project which includes following concepts <ul style="list-style-type: none"> <li>➤ Java inheritance and Polymorphism</li> <li>➤ Exceptions</li> <li>➤ GUI</li> <li>➤ Collection and JDBC</li> </ul>

**BTECCE22407:: Advanced Web Technology Lab**

Course Type	PCC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	1Hr./Week	Lecture	1	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	3Hr./Week	Total	2		

**Course Description**

This course helps the student to understand the principles and methodologies of web-based application development processes and server-side scripting technologies

**Course Outcomes**

CO No.	Statement
1	Understanding the various steps in designing a creative and dynamic website
2	Develop the ability to design and implement modern web applications using AngularJS
3	Utilization of ReactJS to create dynamic, responsive web applications.
4	Developing applications using Node.js and MySQL full-stack server-side and database management, achieving proficiency in full-stack development

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1																	UN
CO2																	AP
CO3																	AP
CO4																	AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

## Course Content

Unit No 1	Introduction	Hours 3	CO	BTL
<b>HTML5:</b> Introduction ,Overview and basics  <b>AngularJS:</b> Introduction, Components and templates,services and dependency injection,Router,forms and validation,Modules,Data binding and directives,single page applications(SPA)			1	UN
Unit No 2	Front-end technology:ReactJS	Hours 4	2	AP
Introduction - Overview , Basics of JSX, Components and Props, Handling Events and forms, lists, router,Hooks,Integrating react with back end services, Introduction to Redux				
Unit No 3	Back-end Technologies: NodeJS and MySQL	Hours 3	3	AN
<b>Node.js :</b> Introduction to node.js,Overview and basics,Modules,HTTP module,File system,Node package Manager(NPM),File system,Debugging,Events,Database Connectivity <b>MySQL:</b> Introduction to jQuery, Overview and basics:Data Types,CRUD(Create,Read,Update,Delete) operations,Joins,node.js and MySQL connectivity				
Unit No 4	MEAN Stack	Hours 5	4	AP
<b>MEAN Stack</b> -Introduction,Overview; Stack components; <b>Mongo DB</b> -Introduction,NoSQL database,MongoDB architecture, CRUD operations with MongoDB; <b>Express.js</b> – Introduction,Routing,Middleware,error handling;CRUD operations with Express and MongoDB,Integrating Angular with Express				

## Textbooks

1.	<i>Achyut Godbole &amp; Atul Kahate, Web Technologies: TCP/IP to Internet Application Architectures</i> , McGraw Hill Education publications, ISBN, 007047298X, 97800704729832
2.	<i>Ralph Moseley &amp; M. T. Savaliya, —Developing Web Applications</i> , Wiley publications, ISBN 13 : 9788126538676
3.	<i>Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node</i> , 2nd Edition, A Press.

## Reference Books / Journal Articles / Weblink

1	<i>Adam Breetz &amp; Colin J Hiring, —Full Stack JavaScript Development with MEAN, SPD</i> , ISBN-13: 978-0992461256
2	<i>Giulio Zambon, — Beginning JSP, JSF and Tomcat</i> , Apress Publication, ISBN-10: 1430246235; ISBN-13: 978-1430246237
3	<i>Jeremy McPeak &amp; Paul Wilton, “Beginning JavaScript”</i> , Wrox Publication, ISBN-13: 978-0470525937
4	<i>Black Book, — Struts 2</i> , Dreamtech Press, ISBN 13, : 9788177228700
5	<i>Black Book, — JDBC 4.2, Servlet 3.1 &amp; JSP 2.3</i> , Dreamtech Press, ISBN-13: 978-8177228700
6	<i>Sandeep Panda, —Angular JS: Novice To Ninja</i> , SPD, First Edition 2014, ISBN-13: 978-0992279455

7	<i>B. V. Kumar, S. Sangeetha, S. V. Subrahmanya,, —J2EE Architecture, an illustrative gateway to enterprise solutions, Tata McGraw Hill Publishing Company. ISBN: 9780070621633</i>
8	<i>Brian Fling, —Mobile Design and Development, O'REILLY, ISBN: 13:978-81-8404-817-9</i>
9	<i>Robin Nixon, —Learning PHP, MySQL and Javascript with JQuery, CSS &amp; HTML", O'REILLY, ISBN: 13:978-93-5213-015-3</i>
10	<i>Allan Cole, Raeiva Jackson Armitage Brandon R. Jones Jeffrey Way, —Build Your Own Wicked Wordpress Themes, SPD, ISBN: 978-93-5213-154-9</i>
11	<i>Ed Burnette, —Hello , Android Introducing Google' Mobile Development Platform, SPD, ISBN: 13:978-93-5213-085-6</i>
12	<a href="https://www.w3schools.com/">https://www.w3schools.com/</a> <a href="https://www.tutorialspoint.com/">https://www.tutorialspoint.com/</a>
13	<a href="https://channels.theinnovationenterprise.com/articles/how-will-artificial-intelligence-improve-web-technology">https://channels.theinnovationenterprise.com/articles/how-will-artificial-intelligence-improve-web-technology</a>

## List of Experiments

1	Using AngularJS implement: <ul style="list-style-type: none"> <li>a. Input Validation</li> <li>b. Back-end building (Express.js)</li> </ul>
2	Create forms with validation using AngularJS.
3	Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
4	Create To-do Application using react and deploy it
5	Create a custom server using the http module and explore the other modules of Node JS like OS, path, event
6	Create a course management system using MySQL connectivity with node.js
7	Create a local MongoDB database, add sample data, and practice essential CRUD operations utilizing the MongoDB shell.
8	Develop an Angular service for data management and implement Angular routing for seamless navigation between distinct components or pages.
9	Develop an Angular application that pulls data from an Express.js API endpoint and displays it in the user interface.
10	Mini project based on above concepts



**BTECCE22408:: Application Security**

Course Type	PCC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	3Hr./Week	Lecture	3	CIE Marks	50
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	50
Practical/Studio	0Hr./Week	Practical/Studio	0	Total Marks	100
Total	3Hr./Week	Total	3		

**Course Description**

This course helps the student to identify the basic concepts of Application Security and input validation strategies. It will also focus on software development methodology, application security, effective authentication and authorization strategies. It will also involve cryptography, prevent parameter manipulation, and manage exceptions. It will also identify ways to secure an application's configuration management features and user sessions

**Course Outcomes**

CO No.	Statement
1	Explain the foundational theory behind application security
2	Conceptually clarify about Application Security elements
3	Compare authentication and authorization along with various possible network attacks.
4	Use the algorithms/techniques to achieve configuration management in an application by limiting unauthorized access to it.
5	Learn cryptographic algorithms and apply various auditing skills to identify weakness in an application

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1			3														UN
CO2					3												AP
CO3						2											AN
CO4							3										AP
CO5																3	AN

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No 1</b>	<b>Secure Software Development Life Cycle</b>	<b>Hours 9</b>	<b>CO</b>	<b>BTL</b>
Introduction to software development & application, Basics of programming languages, Compiled versus interpreted, Program utilities, Programming concepts, Distributed programming, Threats and malware, Importance of software development life cycle, Software development methods, Adherence to secure software development principles, Web application security principles, Application design & development security, Environment and controls, Essence of secure software development Auditing and assurance mechanisms			1	UN
<b>Unit No 2</b>	<b>Input Validation &amp; Sensitive Data</b>	<b>Hours 9</b>	<b>2</b>	<b>AP</b>
Introduction to input validation & sensitive data, Implementation of input validation, Practical solutions Input validation vulnerability, Buffer overflow, Cross-site scripting, SQL injection, Canonicalization, Sensitive data, Sensitive data access, Sensitive data in storage, Information disclosure, Data tampering				
<b>Unit No 3</b>	<b>Authentication &amp; Authorization</b>	<b>Hours 9</b>	<b>3</b>	<b>AN</b>
Introduction to authentication & authorization, Network eavesdropping, Brute force attack, Dictionary attack, Cookie replay attack, Credential theft, Elevation of privilege, Basics of authorization, Data tampering, Luring attack, Phishing attack				
<b>Unit No 4</b>	<b>Configuration Management &amp; Session Management</b>	<b>Hours 9</b>	<b>4</b>	<b>AP</b>
Introduction to configuration management & session management, Unauthorized access to administration interfaces, Unauthorized access to configuration stores, Retrieval of clear text configuration data, Lack of individual accountability, Over-privileged process and service accounts, Basics of Session Management, Hijacking attack, Session replay attack, Man in the middle attack, OWASP Application Security Verification Standard.				
<b>Unit No 5</b>	<b>Parameter Manipulation &amp; Application Penetration Test Cases</b>	<b>Hours 9</b>	<b>5</b>	<b>AN</b>
Introduction, Basics of Parameter Manipulation, Cookie Manipulation, HTTP Header Manipulation, OWASP Web Application Penetration Testing test cases with examples. Auditing & Logging, Countermeasures:Introduction to Auditing & Logging, Countermeasures, Basic Countermeasures.				

**Textbooks**

1	IT Application Security (IBM ICE Publication)
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**Reference Books / Journal Articles / Weblink**

1	Nina Godbole, "Information Systems Security", Wiley India Pvt. Ltd, ISBN -978-81-265-1692-6
2	Mark Merkow, "Information Security-Principles and Practices", Pearson Ed. 978-81-317-1288-7
3	William Stallings, "Cryptography and Network Security Principles and Practice", Fifth Edition, Pearson, 2011, ISBN 10:0-13-609704-9 BehrouzForouzan, "Cryptography and Network Security", McGraw Hill
4	<a href="https://github.com/patilkr?tab=repositories">https://github.com/patilkr?tab=repositories</a>

**BTECCE22409:: Application Security Lab**

Teaching Scheme		Credits		Examination Scheme	
Lecture	0Hr./Week	Lecture	0	CIE Marks	25
Tutorial	--Hr./Week	Tutorial	-	ESE Marks	25
Practical/Studio	2Hr./Week	Practical/Studio	1	Total Marks	50
Total	2Hr./Week	Total	1		

**List of Experiments**

1	Locating the malware
2	Analysing the Viruses and Impact
3	SQL Injection Attack
4	Unvalidated Inputs
5	Testing for Cross Site Scripting
6	Web Application Hacking
7	HTTPS for Website
8	Network Security with Automated Testing

**BTECCE22410:: Yoga**

Course Type	HSMC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2Hr./Week	Lecture	-	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	-
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	50
Total	2Hr./Week	Total	-		

**Course Description**

This course helps to students to gain knowledge about types of Yoga, Yoga postures. Identifies the importance of Yoga in stress management

**Course Outcomes**

CO No.	Statement
1	Understand the concept of Yoga in the modern age.
2	Execute different Yoga postures for good health.
3	Evaluate different human personalities.
4	Apply Yoga to reduce stress.
5	Build strength and fitness.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1						1											UN
CO2								2									UN
CO3											2						AP
CO4												2					AP
CO5														1			AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No 1</b>	<b>Introduction</b>	<b>Hours 6</b>	<b>CO</b>	<b>BTL</b>
Meaning and Definition of Yoga, Misconception of Yoga, Reality about Yoga, Eight folds of Yoga, Types and Style of Yoga, Application of Yoga in Modern age.			<b>1</b>	<b>UN</b>
<b>Unit No 2</b>	<b>Yoga Postures</b>	<b>Hours 6</b>	<b>2</b>	<b>UN</b>
Shatkarma/Surya Namaskar, Chakras, Bandhas, Aura, Leshya, Yognidra, Asana/Pranayama, Meditation.				
<b>Unit No 3</b>	<b>Personality Development and Yoga</b>	<b>Hours 6</b>	<b>3</b>	<b>AP</b>
Introduction, Types of Personality, Evaluation and discussion.				
<b>Unit No 4</b>	<b>Desktop Yoga and Stress Management</b>	<b>Hours 6</b>	<b>4</b>	<b>AP</b>
Joint loosening exercises, Stretching, Asana, Pranayama, Meditation and Relaxation.				
<b>Unit No 5</b>	<b>Power Yoga</b>	<b>Hours 6</b>	<b>5</b>	<b>AP</b>
Strength, Stamina, Fitness, Flexibility, Stress relief and Efficiency, Development/Enhancement with power yoga.				

**Textbooks**

<b>1</b>	<i>Swami Ramdev, "Yog Darshan"</i>
<b>2</b>	<i>Swami Vivekanda, "Complete Book Of Yoga", 1976</i>

**Reference Books / Journal Articles / Weblink**

<b>1</b>	<i>Swami Vivekanda, "Meditation and Its Methods"</i>
<b>2</b>	<i>Swami Satyananda, Swami Saraswati, "Asana Pranayama Mudra Bandha"</i>

**BTECCE22411:: Indian Constitution**

Course Type	HSMC	Semester	4
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Teaching Scheme		Credits		Examination Scheme	
Lecture	2Hr./Week	Lecture	-	CIE Marks	50
Tutorial	-- Hr./Week	Tutorial	-	ESE Marks	-
Practical/Studio	--Hr./Week	Practical/Studio	-	Total Marks	50
Total	2Hr./Week	Total	-		

**Course Description**

This course helps to students to acquaint fundamental rights and duties protected under the Constitution of India. Identifies origin and development of Constitutional Law and other legal mechanisms developed by the Constitution of India. Helps them to understand the enforcement of Fundamental Rights and Fundamental Duties. Highlights on restrictions and limitations on the Fundamental Freedoms ensured under the Constitution of India. Focuses on the importance of Fundamental Duties and Constitutional values.

**Course Outcomes**

CO No.	Statement
1	Imbibe the preamble of the constitution.
2	Understand the right to equality.
3	Comprehend the fundamental freedoms.
4	Understand the right to Life, Personal Liberty and Constitutional Remedies.
5	Imbibe the fundamental duties.

**Mapping of COs to POs and PSOs**

CO No	POs												PSOs				BTL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
CO1						1											UN
CO2								2									UN
CO3											1						AP
CO4												1					AP
CO5														1			AP

Affinity Level: 1- Slight, 2- Moderate, 3-Substantial, BTL: Bloom's Taxonomy Level

**Course Content**

<b>Unit No 1</b>	<b>The Preamble</b>	<b>Hours 6</b>	<b>CO</b>	<b>BTL</b>
	The Making of the Constitution, Salient features of the Constitution, Significance of the Preamble, The Text of the Preamble, Constitutional values enshrined in the preamble.		<b>1</b>	<b>UN</b>
<b>Unit No 2</b>	<b>The Right to Equality</b>	<b>Hours 6</b>	<b>2</b>	<b>UN</b>
	Equality before Law and Equal Protection of Law under Art. 14, No Discrimination under Art. 15, Exceptions to Equality under Art. 15 (1), Equality of Opportunity in Public Employment under Art. 16, Reservation and Equal opportunity.			
<b>Unit No 3</b>	<b>The Fundamental Freedoms</b>	<b>Hours 6</b>	<b>3</b>	<b>AP</b>
	The Freedom of Speech and Expression, The Freedom of Assembly and Freedom of Association, The Freedom of Movement and freedom of Residence, The freedom of Profession, Occupation, Trade or Business, Restrictions on the Fundamental Freedoms.			
<b>Unit No 4</b>	<b>The Right to Life, Personal Liberty and Constitutional Remedies</b>	<b>Hours 6</b>	<b>4</b>	<b>AP</b>
	Right to Personal Liberty, Right to Life and Right to Die, Right to Education, Right to Free Legal Aid, Restrictions and Limitations. Judicial Powers under Art. 32 and 226, Writ of Habeas Corpus, Writ of Mandamus, Writ of Certiorari and Writ of Prohibition 20, Writ of Quo Warranto.			
<b>Unit No 5</b>	<b>The Fundamental Duties</b>	<b>Hours 6</b>	<b>5</b>	<b>AP</b>
	Need of Fundamental Duties, Source of Fundamental Duties, Enforcement and implementation, Fundamental Duties under Art. 51 A, Relevance of fundamental Duties for the Rights.			

**Textbooks**

<b>1</b>	<i>J. N. Pandey, "The Constitutional Law of India".</i>
<b>2</b>	<i>V. N. Shukla, "The Constitution of India".</i>
<b>3</b>	<i>P. M. Baxi, "The Constitution of India".</i>
<b>4</b>	<i>P. K. Agrawal, "The Constitution of India".</i>
<b>5</b>	<i>Subhash Kashyap, "The Constitution of India".</i>
<b>6</b>	<i>Durga Das Basu, "Introduction to the Constitution of India".</i>

**Reference Books / Journal Articles / Weblink**

<b>1</b>	<i>M. P. Jain, "Indian Constitutional Law".</i>
<b>2</b>	<i>Rajeev Dhavan, "The Constitution of India".</i>
<b>3</b>	<i>Durga Das Basu, "Commentary on the Constitution of India".</i>
<b>4</b>	<i>Granville Austin, "The Indian Constitution: Cornerstone of the Nation".</i>