Department of Information Technology

Bachelor of Computer Application

L T P - Indicates Theory Lectures (L), Tutorial(T) and Practical (P) classes per week.
1L Earns 1 credits
1P Earns 0.5 credits
1T Earns 1 Credit

Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
			Semester III				
			Theory				
1	CC5	BCAC301 BCAC391	Object Oriented Programming	4	0	4	**6**
2	CC6	BCAC302 BCAC392	Operating Systems	4	0	4	**6**
3	CC7	BCAC303 BCAC393	Data Structure and Algorithm using Python	4	0	4	**6**
4	GE-3	**BCAG301** **BCAG302** **BCAG303** **BCAG304**	MOOCS Basket 1 MOOCS Basket 2 MOOCS Basket 3 MOOCS Basket 4	4/5	0/1	4/0	**6**
			Practical				
5	SEC-2	BCAS391	Web Design and Development	0	0	4	2
						Total Credit	26

CC: Core Course
GE: General Electives (To be selected from MOOCs Basket listed below)
AEC: Ability Enhancement Course
SEC: Skill Enhancement Course

Bachelor of Computer Application
Semester-3

Name of the Course: BCA Subject: Object Oriented Programming	
Course Code: BCAC301 + BCAC391	**Semester: 3rd**
Duration: 48 Hours	**Maximum Marks: 100 + 100**

Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	In-depth understanding of various concepts of object oriented programming language.
2	Ability to read, understand and trace the execution of programs
3	Skill to debug a program.
4	Skill to write program code in java to solve real world problems.

Objective:

Sl. No.	
1	To introduce students to a powerful programming language
2	To understand the basic structure of object oriented program
3	To gain knowledge of various programming errors.
4	To enable the students to make flowchart and design an algorithm for a given problem.
5	To enable the students to develop logics and programs

Pre-Requisite:

Sl. No.	
1	Understanding of basic programming logic.

Contents

Chapter	Name of the Topic	Hours	Marks
01	**Object oriented design**	6	10

	Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.		
02	**Object oriented concepts** Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism	6	10
03	**Basic concepts of object oriented programming using Java** Implementation of Object oriented concepts using Java. Language features to be covered:	6	10
04	**Class & Object properties** Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String [discuss charAt[] , compareTo[], equals[], indexOf[], length[] equalsIgnoreCase[], substring[], toCharArray[] , toLowerCase[], toString[], toUpperCase[] , trim[] , valueOf[] methods] & StringBuffer classes [discuss append[], capacity[], charAt[], delete[], deleteCharAt[], ensureCapacity[], getChars[], indexOf[], insert[], length[], setCharAt[], setLength[], substring[], toString[] methods], concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.	**8**	**10**
05	**Reusability properties** Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super[ ] method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.	**6**	**10**
06	**Exception handling & Multithreading [6L]** Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.	**6**	**10**
07	**Applet Programming [using swing]** Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint[], getDocumentBase[], getCodeBase[] methods, layout manager [basic concept], creation of buttons [JButton class only] & text fields.	**6**	**10**

	Sub Total:	**44**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**48**	**100**

Practical
Course Code: BCAC391
Credit: 2
Skills to be developed:
Intellectual skills:
1. Ability to read, understand and write object oriented programs.
2. Ability to analyze problems and provide program based solutions.

List of Practical:
1. Basic programming structures
2. Class and Objects
3. Constructors
4. Overloading
5. Inheritance
6. Overriding
7. Exception Handling
8. Applets
9. JDBC
10. Mini project

Assignments:
   Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E. Balaguruswamy	Object Oriented Modelling and Design		Tata McGraw-Hill
Ali Bahrami	Object Oriented System Development		Mc Graw Hill

Reference Books:			
Patrick Naughton, Herbert Schildt	The complete reference-Java2		TMH
Kenneth A. Reek	Pointers on C		Pearson
R.K Das	Core Java For		VIKAS

	Beginners		PUBLISHING

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	A programming language compiler

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	70
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-	
Signed Lab Note Book(for five experiments)	**5*2=10**
On Spot Experiment(one for each group consisting 5 students)	**10**
Viva voce	**5**

Name of the Course: BCA
Subject: Operating Systems

Course Code: BCAC302 + BCAC392	Semester: 3rd
Duration: 48 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	To understand the principles and tasks of operating systems.
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.

Objective:	
Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system –Operating System.
2	To understand the working of operating system as a resource manager.
3	To familiarize the students with Process and Memory management.
4	To describethe problem of process synchronization and its solution.
5	

Pre-Requisite:	
Sl. No.	**None**

Contents			
Chapte	**Name of the Topic**	**Hours**	**Marks**

r				
01	Introduction Importance of OS,Basic concepts and terminology,Types of OS,Different views,Journey of a command execution,Design and implementation of OS		6	10
02	Process Concept and views, OS view of processes, OS services for process management, Scheduling algorithms,Performance evaluation; Inter-process communication and synchronisation, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks		10	20
03	Resource Manager Memory management,File management,Processor management,Device management		8	20
04	Security and related Issues Security and protection,Authentication,Protection and access control,Formal models of protection ,Worms and viruses		8	5
05	**Multiprocessor System** Multiprocessor system,Classification and types,OS functions and Requirements, Introduction to parallel computing,Multiprocessor interconnection synchronization		6	10
06	Distributed OS Introduction to distributed processing		6	5
	Sub Total:		44	70
	Internal Assessment Examination & Preparation of Semester Examination		4	30
	Total:		48	100

Assignments:
     Based on the curriculum as covered by the subject teacher.

List of Practicals:
 1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement ll File Organization Techniques a
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC

11. Implement Paging Technique f memory management.
12. Implement Threading & Synchronization Applications

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A Silberschatz, P.B. Galvin, G. Gagne	Operating Systems Concepts	8th Edition	John Wiley Publications
A.S. Tanenbaum	Modern Operating Systems	3rd Edition	Pearson Education

Reference Books:

G. Nutt	Operating Systems: A Modern Perspective	2nd Edition	Pearson Education

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 6	10	10				
	1 to 6						
B				5	3	5	70
	1 to 6						
C				5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Name of the Course: BCA
Subject: Data Structure and Algorithm with Python
Course Code: BCAC303 and BCAC393   **Semester: 3**

Duration: 48 Hrs.	Maximum Marks: 100 + 100
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam:70
Tutorial: 0	Attendance: 5
Practical: 4	Continuous Assessment: 25
Credit: 4+2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	The point of this course is to give you a vibe for algorithms and data structures as a focal area of what it is to be a computer science student.
2.	You ought to know about the way that there are regularly a few calculations for some issue, and one calculation might be superior to another, or one calculation better in certain conditions and another better in others.
3.	You should have some idea of how to work out the efficiency of an algorithm.
4.	You will be able to use and design linked data structures
5.	You will learn why it is good programming style to hide the details of a data structure within an abstract data type.
6.	You should have some idea of how to implement various algorithm using python programming.

Objective:

Sl. No.	
1.	To impart the basic concepts of data structures and algorithms.
2.	To understand concepts about searching and sorting techniques.
3.	To understand basic concepts about stacks, queues, lists, trees and graphs.
4.	To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Pre-Requisite:

Sl. No.	
1.	Basics of programming language.
1.	Logic building skills.

Contents

Chapter	Name of the Topic	Hours	Marks
01	**Introduction to Data Structure** Abstract Data Type.	1	2
02	**Arrays** 1D, 2D and Multi-dimensional Arrays, Sparse Matrices. Polynomial representation.	3	4
03	**Linked Lists** Singly, Doubly and Circular Lists, Normal and Circular	6	7

	representation of Self Organizing Lists, Skip Lists, Polynomial representation.		
04	**Stacks** Implementing single / multiple stack/s in an Array, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another, Applications of stack, Limitations of Array representation of stack.	**6**	**10**
05	**Queues** Array and Linked representation of Queue, Circular Queue, De-queue, Priority Queues.	**4**	**7**
06	**Recursion** Developing Recursive Definition of Simple Problems and their implementation, Advantages and Limitations of Recursion, Understanding what goes behind Recursion (Internal Stack Implementation)	**6**	**5**
07	**Trees** Introduction to Tree as a data structure, Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals of Binary Search Trees), Threaded Binary Trees (Insertion, Deletion, Traversals), Height-Balanced Trees (Various operations on AVL Trees).	**6**	**15**
08	**Searching and Sorting** Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Merge Sort, Quick sort, Shell Sort, Comparison of Sorting Techniques	**6**	**15**
09	**Hashing** Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function.	**6**	**5**
	Sub Total:	**44**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**48**	**100**

Practical:
Skills to be developed:
Intellectual skills:
1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.

3. Ability to implement algorithms to perform various operations on data structures.

List of Practical:

1. Implementation of array operations.
2. Stacks and Queues: adding, deleting elements.
3. Circular Queue: Adding & deleting elements
4. Merging Problem : Evaluation of expressions operations on Multiple stacks & queues
5. Implementation of linked lists: inserting, deleting, and inverting a linked list.
6. Implementation of stacks & queues using linked lists:
7. Polynomial addition, Polynomial multiplication
8. Sparse Matrices: Multiplication, addition.
9. Recursive and Non Recursive traversal of Trees Threaded binary tree traversal. AVL tree implementation Application of Trees.
10. Application of sorting and searching algorithms Hash tables' implementation: searching, inserting and deleting, searching & sorting techniques.

Assignments:

Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Michael H. Goldwasser, Michael T. Goodrich, and Roberto Tamassia	Data Structures and Algorithms in Python	1118476735, 9781118476734	John Wiley & Sons
Rance D Necaise	Data Structures and Algorithms Using Python	9788126562169	John Wiley & Sons

Reference Books:			
Sartaj Sahni	DataStructures, Algorithms and applications in C++	Second Edition	Universities Press

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer with moderate configuration
2.	Python 2.7 or higher and other softwares as required.

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)	Subjective Questions

		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 9**	**10**	**10**				
B	**1 to 9**			**5**	**3**	**5**	**60**
C	**1 to 9**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			40

External Examination: Examiner-

Signed Lab Note Book	10	
On Spot Experiment	40	
Viva voce	10	60

Name of the Course: BCA	
Subject: Web Design and Development	
Course Code: BCAS391	**Semester: 3rd**
Duration: 48 Hrs.	**Maximum Marks:** 100
Teaching Scheme	**Examination Scheme**
Theory: 0	End Semester Exam:
Tutorial: 0	Attendance:
Practical: 4	Continuous Assessment:
Credit: 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Practical:

Skills to be developed:

Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.

2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.

List of Practical:

1. Design basic HTML pages with HTML tags.
2. Enhancing design with CSS
3. Include dynamic contents using javascript.
4. Understanding and working with JQuery.
5. Understanding server side programming.
6. Develop a website with frontend, backend and database connectivity.
7. Mini project.

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer with moderate configuration
2.	Javascript enabled browser.
3.	Database package and web service

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Note Book	**10**		
On Spot Experiment	**40**		
Viva voce	**10**	**60**	

Semester IV							
Sl. No.	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory + Practical							
1	CC8	BCAC401 BCAC491	Database Management System	**4**	**0**	**4**	**6**
2	CC9	BCAC402 BCAC492	Software Engineering	**4**	**0**	**4**	**6**
3	CC10	BCAC403 BCAC493	Design and Analysis of Algorithms	4	0	4	6
4	GE-4	BCAG401	MOOCS Basket 1 MOOCS Basket 2 MOOCS Basket 3 MOOCS Basket 4	4/5	0/1	4/0	**6**

Practical							
5	**SEC-3**	**BCAS481**	**Minor Project and Entrepreneurship II**	**0**	**0**	**4**	**2**
					Total Credit		26

Bachelor of Computer Application

Semester-4

Name of the Course: BCA Subject: Database Management System	
Course Code: BCAC401 + BCAC491	**Semester: 3rd**
Duration: 48 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1	Familiarization with Database Management System.
2	Comprehensive knowledge of database models.
3	Ability to code database transactions using SQL.
Objective:	
Sl. No.	

1	To introduce the students to the database system.
2	To learn how to design a database by using different models.
3	To enable the students to understand the database handling during execution of the transactions.
4	To understand the handling of database by concurrent users.
5	To gain complete knowledge of SQL and PL/SQL.

Pre-Requisite:

Sl. No.	
	None

Contents		
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.	**6**	**5**
02	E-R Model Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity,	**6**	**10**
03	SQL Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures,cursors and triggers.	**6**	**10**
04	Relational Model and Relational Database Design Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multivalued dependencies, 4NF,5NF, Centralized and distributed database.	**8**	**20**

05	File Organization and Query Optimization Concepts of File and Records, Fixed Length-Variable length Record, Query optimization.	**6**	**10**
06	Indexing Primary, secondary, clustering, Multilevel Indexes.	**6**	**5**
07	Transaction Management Transaction definition, properties, transaction state diagram, commit and rollback, Concurrency control,lock based protocols,two phase locking, Recovery management.	**6**	**10**
	Sub Total:	**44**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**48**	**100**

Practical
Course Code: BCAC491
Credit: 2
Skills to be developed:

List of Practical:

1. Basics of SQL and different types of queries that should cover major portion of DDL,DML structures.

Assignments:
Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Henry F. Korth and Silberschatz Abraham	Database System Concepts		Mc.Graw Hill
Ramez Elmasri, Shamkant B.Navathe	Fundamentals of Database Systems		Addison Wesley

Reference Books:			

List of equipment/apparatus for laboratory experiments:
Sl. No.

1.		Computer with Oracle/ any other DBMS package installed.					

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 7**	**10**	**10**				
B	**1 to 7**			**5**	**3**	**5**	**70**
C	**1 to 7**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)		**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)		**10**	
Viva voce		**5**	

Name of the Course: BCA	
Subject: Software Engineering	
Course Code: BCAC402 + BCAC492	Semester: 4th
Duration: 48 Hours	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	Familiarization with the concept of software engineering and its relevance.
2	Understanding of various methods or models for developing a software product.
3	Ability to analyze existing system to gather requirements for proposed system.
4	Gain skill to design and develop softwares.

Objective:	
Sl. No.	
1	To introduce the students to a branch of study associated with the development of a software product.
2	To gain basic knowledge about the pre-requisites for planning a software project.
3	To learn how to design of software
4	To enable the students to perform testing of a software.

Pre-Requisite:	
Sl. No.	
1.	None

Contents

Chapter	Name of the Topic	Hours	Marks
01	Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS Development Life Cycles- SDLC and its phases Models- Waterfall, Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS System analysis- DFD, Data Modeling with ERD	**12**	**20**
02	Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree. Concept of User Interface, Essence of UML. CASE tool.	**12**	**15**
03	Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing, acceptance testing Design methodologies: top down and bottom up approach, stub, driver, black box and white box testing.	**10**	**20**
04	ERP, MRP, CRM, Software maintenance SCM, concept of standards [ISO and CMM]	**10**	**15**
	Sub Total:	**44**	
	Internal Assessment Examination & Preparation of Semester Examination	**4**	
	Total:	**48**	**70**

Practical: BCAC492
Credit: 2
List of Practicals:

1: Develop requirements specification for a given problem (The requirements specification should include both functional and non-functional requirements).

2: Develop Structured Design for a given software in its requirement phase

3: Develop Object Modelling Using UML for a given software in its requirement phase

4: Develop Use Case Diagram for a given software in its requirement phase

5: Develop Class Diagrams for a given software in its requirement phase

6: Develop Interactive Diagram for a given software in its requirement phase

7: Develop Activity and State Chart Diagram for a given software in its requirement phase

8: Use of any testing tool and how to handle it.

9: Use of any configuration management tool and how to handle it

10: Use of any one project management tool and how to handle it

11: Complete documentation of developing the software using SDLC model -1

12: Complete documentation of developing the software using SDLC model -2

Assignments:
Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Igor Hawryszkiewycz	System analysis and design		PEARSON
V Rajaraman	Analysis and design of Information System		PHI
Ian Sommerville	Software Engineering		Addison-Wesley

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	MS-Project or similar software.

End Semester Examination Scheme.　　　**Maximum Marks-70.**　　　**Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks

A	1 to 4	10	10				
B	1 to 4			5	3	5	70
C	1 to 4			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	5*2=10	
On Spot Experiment(one for each group consisting 5 students)	10	
Viva voce	5	

Name of the Course: BCA Subject: Design and Analysis of Algorithms	
Course Code: BCAC403 + BCAC493	Semester: 4th
Duration: 48 Hours	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme

Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	To gain knowledge of algorithm complexity analysis.
2	To understand and apply several algorithm design strategies.
3	

Objective:

Sl. No.	
1	To be familiar with algorithm complexity analysis.
2	To understand and apply several algorithm design strategies.
3	
4	

Pre-Requisite:

Sl. No.	
1.	Basic knowledge of mathematics.
2.	Basic Knowledge of programming.

Contents

Chapter	Name of the Topic	Hours	Marks
01	Complexity Analysis Time and Space Complexity, Different Asymptotic notations big $O, \Omega, \emptyset$, Little o,,ω and their mathematical significance and proof.	**8**	**10**
02	Algorithm Design by Divide and Conquer Basic concept of divide and conquer, Merge sort, Quick sort ,heap sort and their complexity analysis in best case, worst case and average case.	**8**	**15**

03	Disjoint Set Data Structure Set Manipulation Algorithm by Union-Find, Union by Rank, Path Compression	8	10
04	Algorithm Design by Greedy Strategy Basic concept, Activity Selection Problem, Fractional Knapsack problem, Job sequencing with deadline,Prims, Kruskal.	6	10
05	Algorithm Design by Dynamic Programming Basic concept, 0/1 Knapsack Problem, Matrix Chain Multiplication, All Pair Shortest Path - Floyd Warshall Algorithm, Dijkstra's.	6	15
06	Algorithm Design by Backtracking Basic concept, Use - N-Queen Problem, Graph Coloring Problem, Hamiltonian Path Problem	8	10
	Sub Total:	44	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	48	100

Practical
Course Code: BCAC493
Credit: 2
Skills to be developed:
Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.
3. Ability to implement algorithms to perform various operations on data structures.

List of Practical:

1. Implement Merge sort, Implement Quicksort.

2. Find maximum and minimum elements from an array of integers using divide and conquer strategy.

3. Implement fractional knapsack,

4. Implement Job sequence with deadline

5. Implement Dijkstra's algorithm,

6. Implement Prim's algorithm

7. Implement Kruskal's algorithm.

8. Implement Matrix Chain Multiplication

9. Implement Floyd Warshall Algorithm

10. Implement Dijkstra's Algorithm

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E.Horowitz and Sahni	Fundamentals of Computer Algorithms		
T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein	Introduction to Algorithms		

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	Softwares as required.

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 6**	**10**	**10**				
B	**1 to 6**			**5**	**3**	**5**	**70**
C	**1 to 6**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3
Examination Scheme for Practical Sessional examination:				
Practical Internal Sessional Continuous Evaluation				
Internal Examination:				
Five No of Experiments				
External Examination: Examiner-				
Signed Lab Note Book(for five experiments)	**5*2=10**			
On Spot Experiment(one for each group consisting 5 students)	**10**			
Viva voce	**5**			

GE Basket 1		GE Basket 2		GE Basket 3		GE Basket 4	
Mathematics		Humanities and Social Sciences		General Science		Emerging Technologies, Innovation & Entrepreneurship	
1	Mathematics for Computing	1	Creative Writing	1	Climate Change and Health	1	Digital Marketing
2	Probability & Statistics	2	Business English	2	Environmental Law and Policy	2	Entrepreneurship Theory and Practice
3	Bayesian Statistics	3	Leadership	3	Environmental Informatics	3	Project Management

4	Operations Research	4	Professional Communication	4	Health Informatics	4	E-Commerce System Development
5	Data Analytics	5	E-Learning	5	Intelligence of Biological Systems	5	Effective Problem-Solving and Decision-Making
6	Applied Cryptography	6	Model Thinking	6	Simulation and Modelling Natural Processes	6	Business Analytics
7	Inferential Statistics	7	Digital Transformation and Industry 4.0	7	Bioinformatics	7	Design Thinking for Innovation