Department of Information Technology
Bachelor of Computer Application (Honours)

Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Semester IV							
			Semester IV				
			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	A. Digital Marketing B. Entrepreneurship Theory and Practice C. Project Management D. E-Commerce System Development	5	1	0	6
			Practical				
5	**SEC-3**	**BCAS481**	**Minor Project and Entrepreneurship II**	**0**	**0**	**4**	**2**
						Total Credit	26

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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

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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

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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

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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	

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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

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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	

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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	

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Examination Scheme for end semester examination:

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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**		

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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