



Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

Semester-4

Name of the Course: BCA			
Subject: Database Management System & DBMS Lab			
Course Code: BCA401 + BCA491		Semester: 4th	
Duration: 36 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		Continuous Assessment: 25	
Credit: 3 + 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			Hrs./week
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.	4	5
02	E-R Model Need for E-R Model, Various steps of database design, Mapping	6	10



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	Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity,		
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.	2	10
06	Indexing Primary, secondary, clustering, Multilevel Indexes.	4	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:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

Practical

Course Code: BCA491

Credit: 2

Skills to be developed:

List of Practical:

1. As compatible with theory syllabus.

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
Henry F. Korth and Silberschatz Abraham	Database System Concepts		Mc.Graw Hill
Ramez Elmasri,	Fundamentals of		Addison Wesley



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Shamkant B.Navathe	Database Systems						
Reference Books:							
List of equipment/apparatus for laboratory experiments:							
Sl. No.							
1.							
2.							
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	
<ul style="list-style-type: none"> 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 & Design and Analysis of Algorithms Lab			
Course Code: BCA402 + BCA492		Semester: 4th	
Duration: 36 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		Continuous Assessment: 25	
Credit: 3 + 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			
Pre-Requisite:			
Sl. No.			
1.	Basic knowledge of mathematics.		
2.	Basic Knowledge of programming.		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Complexity Analysis Time and Space Complexity, Different Asymptotic notations big O, Ω, θ , Little o, ω and their mathematical significance and proof.	6	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.	5	10
05	Algorithm Design by Dynamic Programming	6	15



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	Basic concept, 0/1 Knapsack Problem, Matrix Chain Multiplication, All Pair Shortest Path - Floyd Warshall Algorithm, Dijkstra's.		
06	Algorithm Design by Backtracking Basic concept, Use - N-Queen Problem, Graph Coloring Problem, Hamiltonian Path Problem	5	10
	Sub Total:	36 (38)	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

Practical

Course Code: BCA492

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. A compatible with theory syllabus.

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.



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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	
<ul style="list-style-type: none"> 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: Computer Networking & Computer Networking Lab			
Course Code: BCA403 + BCA493		Semester: 4th	
Duration: 36 Hours		Maximum Marks: 100 + 100	
Teaching Scheme		Examination Scheme	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical: 4 hrs./week		Continuous Assessment: 25	
Credit: 3 + 2		Practical Sessional internal continuous evaluation: 40	
		Practical Sessional external examination: 60	
Aim:			
Sl. No.			
1	To gain Knowledge of uses and services of Computer Network		
2	To enhance Ability to identify types and topologies of network.		
3	To gain Understanding of analog and digital transmission of data.		
4			
Objective:			
Sl. No.			
1	To deliver comprehensive view of Computer Network.		
2	To enable the students to understand the Network Architecture, Network type and topologies		
3	To understand the design issues and working of each layer of OSI model.		
4	To familiarize with the benefits and issues regarding Network Security.		
Pre-Requisite:			
Sl. No.			
1.	None		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Introduction Introduction to communication systems, Data, signal and Transmission: Analog and Digital, Transmission modes, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks: Classification, Components and Topology, categories of network [LAN, MAN, WAN]; Internet: brief history, internet today; Protocols and standards; OSI and TCP/IP model.	3	10
02	Data link layer: Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ	6	10
03	Medium access sub layer: Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: ALOHA, CSMA, FDMA, TDMA, CDMA; Ethernet	4	10



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04	Network layer: Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, Routing : techniques, static vs. dynamic routing, Protocols: IP, IPV6	6	10
05	Transport layer: Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, Quality of services [Qos]	6	10
06	Application Layer DNS, SMTP, FTP, HTTP & WWW; Security: Cryptography [Public, Private Key based], Digital Signature, Firewalls [technology & applications]	6	10
07	Physical Layer: Overview of data [analog & digital], signal [analog & digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch, TDM bus; Telephone Network	5	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

Practical

Course Code: BCA493

Credit: 2

List of Practical:

Implementation of practicals are adhered to the theoretical curriculum.

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
B. A. Forouzan	Data Communications and Networking		TMH
A. S. Tanenbaum	Computer Networks		Pearson Education/PHI
W. Stallings	Data and Computer Communications		PHI/ Pearson Education

Reference Books:



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List of equipment/apparatus for laboratory experiments:							
Sl. No.							
1		Computer with moderate configuration					
2		Network simulator package					
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	
<ul style="list-style-type: none"> 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: Numerical Analysis				
Course Code: BCA404		Semester: 4th		
Duration: 40 Hours		Maximum Marks: 100		
Teaching Scheme		Examination Scheme		
Theory: 3 hrs./week		End Semester Exam: 70		
Tutorial: 13 hr./week		Attendance : 5		
Practical: 0		Continuous Assessment: 25		
Credit: 4		Practical Sessional internal continuous evaluation: NA		
		Practical Sessional external examination: NA		
Aim				
1	To provide the student with numerical methods of solving the non-linear equations, interpolation, differentiation, and integration			
2	To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.			
3				
Objective:				
Sl. No.				
1	To provide the student with numerical methods of solving the non-linear equations, interpolation, differentiation, and integration			
2	To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.			
3				
Pre-Requisite:				
Sl. No.				
	Basic mathematical foundations.			
Contents				
Chapter		Name of the Topic		
		Hrs./week		
		Hours		
		Marks		
01	Numerical errors and their computations, Truncation and rounding-off errors Calculus of differences: Forward, Backward, Shift, Average, Central, Differential and Divided difference operators, Relation between the operators, Problems on missing terms Interpolation: Newton's forward and backward interpolation, Lagrange's interpolation, Newton's divided difference Numerical Integration: General quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Expression for corresponding error terms		18	40
02	Solutions of Nonlinear Equations: Bisection method, Regula-Falsi method, Method of Iteration Newton Raphson method Numerical solution of a system of linear equation Gauss elimination method, LU factorisation method, Gauss Seidel		18	30



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	method Numerical solution of ordinary differential equation: Euler's method, Modified Euler's method, Runga-Kutta method, Predictor-Corrector method		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

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
S.S.Sastry	Introductory Methods of Numerical Analysis		PHI
Jain,Iyenger & Jain	Numerical Methods		New Age International Publishers

Reference Books:

S.A.Mollah	Numerical Analysis and Computational Procedure		Books & Allied Pvt.Ltd
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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 & 2	10	10				
B	1 & 2			5	3	5	70
C	1 & 2			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