TELANGANA UNIVERSITY
NIZAMABAD-503322

B.Sc. Computer Science Syllabus
Under the

CHOICE BASED CREDIT SYSTEM
(With effect from 2016-17)

DEPARTMENT OF COMPUTER SCIENCE
University College,TU,Nizamabad-503322

Semester	Codes	Subject	Workload per week(Theory/Practical)		Credits
			T (100)	P (50)	
3	Core 3	Database management system	4	2	4+1=5
3	SEC1	A: SciLab – 1 B: Boolean Algebra	2	nil	2

UG (B.Sc.) Scheme of Examinations

Computer Science

(CBCS 2016-17)

Elaborations

Paper	Credits	Theory Exam		Practical Exam
		University Exam	Internal Exam	
DSC	4	80 Marks	20 Marks	25 Marks
DSE	3	60 Marks	15 Marks	25 Marks
SEC	2	40 Marks	10 Marks	No Practical Exam
GE	2	40 Marks	10 Marks	

DSC – Discipline specific core course

DSE – Discipline specific elective course

SEC – Skill enhancement course

GE – Generic elective

Core 3: Database Management System

Unit I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators.
Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Unit II

Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data, Other Aspects of Database Design.
Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process.

Unit III

Database-System Architectures: Centralized and Client –Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types.
Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database.

Unit IV

Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.
Advanced SQL: Accessing SQL From a Programming Language, Functions and Procedures, Triggers, Recursive Queries.

Text book:

1. A. Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 6th Ed., Tata McGraw Hill, 2011

References:

1. J. Morrison, M. Morrison and R. Conrad, *Guide to Oracle 10g*, Thomson Learning, 2005.

2. Loney and Koch, *Oracle 10g: The Complete Reference*, Tata McGraw Hill, 2006.

3. David Flanagan, Java Script, *The Definitive Guide*, O'Reilly Media, 2006.

4. Marty Hall, Larry Brown, and Yaakov Chaikin, *Core Servlets and Java Server Pages: Core Technologies* (Vol. II), 2nd Ed., Sun Microsystems Press, 2006.

5. S.K. Singh, *Database Systems Concepts, Design and Applications*, Pearson Education 2006.

6. Spoken Tutorial on "MySQL" as E-resource for Learning:- http://spoken-tutorial.org

Practical: Database Management System

NOTE:
All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.

Faculty must take care about UG standard programs it should be minimum 25 – 30.

In the external lab examination student has to execute at least three programs with compilation and deployment steps are necessary.

External Viva-voce is compulsory.

Example programs:
1. Create a database having two tables with the specified fields, to computerize a library system of a Delhi University College.

LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price)
IssuedBooks (Accession number, Borrower)
a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) Delete the record of book titled "Database System Concepts".
c) Change the Department of the book titled "Discrete Maths" to "CS".
d) List all books that belong to "CS" department.
e) List all books that belong to "CS" department and are written by author "Navathe".
f) List all computer (Department="CS") that have been issued.
g) List all books which have a price less than 500 or purchased between "01/01/1999" and "01/01/2004".

2. Create a database having three tables to store the details of students of Computer Department in your college.

Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number)
Paper Details (Paper code, Name of the Paper)
Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
c) List all students who live in "Delhi" and have marks greater than 60 in paper 1.
d) Find the total attendance and total marks obtained by each student.
e) List the name of student who has got the highest marks in paper 2.

3. Create the following tables and answer the queries given below:
Customer (CustID, email, Name, Phone, ReferrerID)
Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)
BicycleModel (ModelNo, Manufacturer, Style)
Service (StartDate, BicycleID, EndDate)
a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) List all the customers who have the bicycles manufactured by manufacturer "Honda".
c) List the bicycles purchased by the customers who have been referred by customer "C1".
d) List the manufacturer of red colored bicycles.
e) List the models of the bicycles given for service.

4. Create the following tables, enter at least 5 records in each table and answer the queries given below.

EMPLOYEE (Person_Name, Street, City)
WORKS (Person_Name, Company_Name, Salary)
COMPANY (Company_Name, City)
MANAGES (Person_Name, Manager_Name)
a) Identify primary and foreign keys.
b) Alter table employee, add a column "email" of type varchar(20).
c) Find the name of all managers who work for both Samba Bank and NCB Bank.
d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than $10,000.
e) Find the names of all employees who live in the same city as the company for which they work.
f) Find the highest salary, lowest salary and average salary paid by each company.
g) Find the sum of salary and number of employees in each company.

h) Find the name of the company that pays highest salary.

5. Create the following tables, enter at least 5 records in each table and answer the queries given below.

Suppliers (SNo, Sname, Status, SCity)
Parts (PNo, Pname, Colour, Weight, City)
Project (JNo, Jname, Jcity)
Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.
b) Get supplier numbers for suppliers in Paris with status>20.
c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
d) Get suppliers names for suppliers who do not supply part P2.
e) For each shipment get full shipment details, including total shipment weights.
f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
h) Get the names of cities that store more than five red parts.
i) Get full details of parts supplied by a supplier in Delhi.
j) Get part numbers for part supplied by a supplier in Allahabad to a project in Chennai.
k) Get the total number of project supplied by a supplier (say, S1).
l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

SEC–1 [A] SciLab – 1

Unit – I

Introduction to Scilab – what is scilab, downloading & installing scilab, a quick taste of scilab.

The Scilab Environment – manipulating the command line, working directory, comments, variables in memory, recording sessions, the scilab menu bar, demos.

Scalars & Vectors – introduction, initializing vectors in scilab, mathematical operations on vectors, relational operations on vectors, logical operations on vectors, built-in logical functions.

Unit – II

Scalars & Vectors – elementary mathematical functions, mathematical functions on scalars, complex numbers, trigonometric functions, inverse trigonometric functions, hyperbolic functions.

Matrices – introduction, arithmetic operators for matrices, basic matrix processing. Polynomials – introduction, creating polynomials, basic polynomial commands, finding roots of polynomial,polynomial arithmetic, miscellaneous polynomial handling.

Text Er. Hema Ramachandran, Dr. Achuthsankar S. Nair, Computer SCILAB–A Free Software to MATLAB

References

1. Digite, Introduction to Scilab
2. Digite, Optimization in Scilab
3. Scilab Enterprises, Scilab for Very Beginners
4. Digite, Introduction to Discrete Probabilities with Scilab
5. Spoken Tutorial on “Scilab” as E-resource for Learning:- http://spoken-tutorial.org

SEC–1[B] Boolean Algebra

Unit – I

Introduction Number Systems and Conversion: Digital Systems and Switching Circuits, Number Systems and Conversion, Binary Arithmetic, Representation of Negative Numbers, Binary Codes.

Boolean Algebra: Basic Operations, Boolean Expressions and Truth Tables, Basic Theorems, Commutative,Associative, Distributive, and DeMorgan's Laws, Simplification Theorems, Multiplying Out and Factoring,Complementing Boolean Expressions.

Unit – II

Boolean Algebra: Multiplying Out and Factoring Expressions, Exclusive-OR and Equivalence Operations, The Consensus Theorem, Algebraic Simplification of Switching Expressions, Proving Validity of an Equation,Programmed Exercises.

Applications of Boolean Algebra Minterm and Maxterm Expansions: Conversion of English Sentences to Boolean Equations: Combinational Logic Design Using a Truth Table, Minterm and Maxterm Expansions,General Minterm and Maxterm Expansions, Examples of Truth Table Construction, Design of Binary Adders and Subtracters.

Text Charles H. Roth, Jr. and Larry L. Kinney, Fundamentals of Logic Design (7e)

References

1. M. Morris Mano, Michael D. Ciletti, Digital Design (4e)
2. A. Saha and N. Manna, Digital Principles and Logic Design
3. M. Rafiquzzaman, Fundamentals of Digital Logic and Microcontrollers (6e)
4. Elliott Mendelson, Theory and Problems of Boolean Algebra and Switching Circuit
5. M. Morris Mano, Charles R. Kime, Tom Martin, Logic and Computer Design Fundamentals

Semester	Codes	Subject	Workload per week(Theory/Practical)		Credits
			T (100)	P (50)	
4	Core 4	Design and Analysis of Algorithms	4	2	4+1=5
4	SEC2	A: SciLab – 2 B: Digital Logic	2	nil	2

Core 4: Design and Analysis of Algorithms

Unit I

Fundamentals of the Analysis of Algorithm Efficiency: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes.

Divide-and-Conquer: maximum-subarray problem, Strassen's algorithm for matrix multiplication, The substitution method for solving recurrences, The recursion-tree method for solving recurrences, The master method for solving recurrences.

Dynamic Programming: Rod cutting, Matrix-chain multiplication, Elements of dynamic programming, longest common subsequence, Optimal binary search trees.

Greedy Algorithms: An activity-selection problem, Elements of the greedy strategy, Huffman codes, Matroids and greedy methods, task-scheduling problem as a matroid.

Unit II

Searching and Sorting Techniques: Review of elementary sorting techniques-selection sort, Bubble sort, insertion sort, more sorting techniques-quick sort, heap sort, merge sort, shell sort, external sorting.

Limitations of Algorithm: Lower-Bound Arguments, Decision Trees, *P*, *NP*, and *NP*-Complete Problems.

Polynomials and the FFT: Representing polynomials, The DFT and FFT, Efficient FFT implementations.

Number-Theoretic Algorithms: Elementary number-theoretic notions, Greatest common divisor(GCD), Modular arithmetic, Addition and Multiplication of two large numbers.

Unit III

String Matching: The naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata, The Knuth-Morris-Pratt algorithm.

NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-complete problems.

Approximation Algorithms: The vertex-cover problem, The traveling-salesman problem, The set-covering problem, Randomization and linear programming, The subset-sum problem.

Unit IV

Elementary Graph Algorithms: Representations of graphs, Breadth-first search, Depth-first search, Topological sort, strongly connected components.

Minimum Spanning Trees: Growing a minimum spanning tree, the algorithms of Kruskal and Prim.
Single-Source Shortest Paths: The Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra's algorithm, Difference constraints and shortest paths, Proofs of shortest-paths properties.

Text book:
1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, *Introduction to Algorithms*, MIT press, 3rd edition, 2009.

2. Anany Levitin, Introduction to the design and analysis of algorithms, 3rd edition, 2012.

References:
1. J. Kleinberg and E. Tardos, *Algorithms Design*, Pearson Education, 2006.

2. S. Baase, *Computer Algorithms: Introduction to Design and Analysis*, Addison Wesley, 1999.

3. A.V. Levitin, *Introduction to the Design and Analysis of Algorithms*, Pearson Education, 2006.

Practicals: Design and Analysis of Algorithms

NOTE:
All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.

Faculty must take care about UG standard programs it should be minimum 25 – 30.

In the external lab examination student has to execute at least three programs with compilation and deployment steps are necessary.

External Viva-voce is compulsory.

Example programs:
Sorting Algorithm:
1. To analyze time complexity of insertion sort
2. To analyze time complexity of Quick sort
3. To analyze time complexity of merge sort

Dynamic Algorithm:
4. To implement largest common subsequence
5. To implement optimal binary search tree
6. To implement martrix chain multiplication

Divide And Conquer:
7. Implement Binary Search Algorithm.
8. Implement Merge Sort Algorithm.
9. Implement Quick Sort Algorithm.
10. To implement strassen's martrix multiplication algorithm

The Greedy Method:
11. Implement activity selection problem
12. Implement fractional Knapsack Problem Algorithm.
13. Implement Job Sequencing with Deadlines Algorithm.
14. Implement Minimum-Cost Spanning Trees: Prim's Algorithm.
15. Implement Single Source Shortest Paths: Dijkstra's Algorithm.

Dynamic Programming:
16. Implement Single-Source Shortest Paths: Bellman-Ford's Algorithm.
17. Implement All-Pairs Shortest Paths: Floyd & Warshall's Algorithm.

Graphs:
18. Implement Dijkstra's algorithm
19. Implement Warshall algorithm
20. Implement Bellman Fords algorthim
21. Implement depth first search algorithm
22. Implement depth first search algorithm

String Matching Algorithm:
23. Implement Naïve string matching algorithm
24. Implement Rabin Karp string matching algorithm

Spanning Trees:
25. Implement prim's algorithm
26. Implement Kruskal's algorithm

SEC–2 [A] SciLab – 2

Theory 2 Hours/Week 2 credits

Unit – I

Programming in scilab – introduction, variables & variable names, assignment statements, arithmetic, relational, logical operators, input & output, flow control/branching/conditional statements, break and continue, handling matrices with loops, scripts, the concept of functions, user defined functions, special function commands.

Menus and Dialog Boxes – introduction, a simple menu example, scilab window with greetings menu added, executing submenus from command line, linking menus to scilab code from external files, entering data through dialog boxes, printing a message in a message box, dialog box for entering a matrix.

Unit – II

Graphic Output – introduction, 2d plotting, function versions for graphic commands, 3d plotting, other graphic primitives, other graphic commands.

String Handling Functions – symbolic processing in scilab, creation of a linear combination of arguments, string to ASCII conversion, creation of a string of blank characters, conversion of a string to uppercase and lowercase, string matching, string concatenation, reversing a string, replacement of a string by another, length of a string, type checking.

Statistics – introduction, basic statistical functions, applying statistical functions on matrices, distributions, frequency of values of a matrix or vector, centre, weighted centre, central moment, correlation, covariance,variance matrix, percentiles, frequencies, cumulative sum, difference of two independent samples, fisher test.

Text Er. Hema Ramachandran, Dr. Achuthsankar S. Nair, Computer SCILAB–A Free Software to MATLAB

References

1. Digite, Introduction to Scilab
2. Digite, Optimization in Scilab
3. Scilab Enterprises, Scilab for Very Beginners
4. Digite, Introduction to Discrete Probabilities with Scilab

SEC–2[B] Digital Logic

Theory 2 Hours/Week 2 credits

Unit – I

Karnaugh Maps: Minimum Forms of Switching Functions, Two- and Three-Variable Karnaugh Maps, Four-Variable Karnaugh Maps, Determination of Minimum Expressions Using Essential Prime Implicants, Other Uses of Karnaugh Maps, Other Forms of Karnaugh Maps, Programmed Exercises.
Multi-Level Gate Circuits NAND and NOR Gates: Multi-Level Gate Circuits, NAND and NOR Gates, Design of Two-Level NAND- and NOR-Gate Circuits, Design of Multi-Level NAND- and NOR-Gate Circuits, Circuit Conversion Using Alternative Gate Symbols, Design of Two-Level, Multiple-Output Circuits, Multiple-Output NAND- and NOR-Gate Circuits.

Unit – II

Combinational Circuit Design and Simulation Using Gates: Design of Circuits with Limited Gate Fan-In, Gate Delays and Timing Diagrams, Hazards in Combinational Logic, Simulation and Testing of Logic Circuits.
Multiplexers, Decoders: Multiplexers, Three-State Buffers, Decoders and Encoders, Read-Only Memories.

Text Charles H. Roth, Jr. and Larry L. Kinney, Fundamentals of Logic Design (7e)

References

1. M. Morris Mano, Michael D. Ciletti, Digital Design (4e)
   A. Saha and N. Manna, Digital Principles and Logic Design
2. M. Rafiquzzaman, Fundamentals of Digital Logic and Microcontrollers (6e)
3. Elliott Mendelson, Theory and Problems of Boolean Algebra and Switching Circuit
4. M. Morris Mano, Charles R. Kime, Tom Martin, Logic and Computer Design Fundamentals