SHIVAJI UNIVERSITY, KOLHAPUR.

****

Accredited By NAAC with 'A' Grade

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part – I

Computer Science (Optional)

SEMESTER I AND II

(Syllabus to be implemented from June, 2018 onwards.)

B.Sc. Computer Science (Optional) Semester-I & II
CBCS Syllabus to be implemented from June 2018 Onwards.

1. **TITLE: Computer Science**
2. **YEAR OF IMPLEMENTATION:** Revised Syllabus will be implemented from June 2018 onwards.
3. **DURATION:** B.Sc. in Computer Science Part- I The duration of course shall be one year and Two semesters.
4. **PATTERN:** Pattern of examination will be semester.
5. **STRUCTURE OF COURSE:**

STRUCTURE OF COURSE

Sr. No.	Paper	Name of Paper	Marks
		Computer Science (Semester I)	
1	DSC-11A	Problem Solving using Computers	50 (Theory)
2	DSC-12A	Database Management System	50 (Theory)
		Computer Science (Semester II)	
3	DSC-11B	Programming Skills Using 'C'	50 (Theory)
4	DSC-12B	Relational Database Management System	50 (Theory)
		Practical (Annual)	
5	Practical Paper-I	Computer Science Practical Paper Based on DSC-11A and DSC-11B DSC-12A and DSC-12B	50 (Practical)

6. **EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS**

(FOR REVISED SYLLABUS)

Sr.No.	Title of old paper	Sr.No.	Title of New paper
		SEMESTER I	
1	Computer Fundamentals-I	1	Database Management System
2	Programming in C -I	2	Problem Solving using Computers
		SEMESTER – II	
3	Computer Fundamentals-II	3	Relational Database Management System
4	Programming in C -II	4	Programming Skills Using 'C'
		PRACTICAL (ANNUAL PATTERN)	
5	Computer Science Practical Paper-I	5	Computer Science Practical Paper-I

B. Sc. Part – I Semester – I

COMPUTER SCIENCE

DSC-11A : PROBLEM SOLVING USING COMPUTERS

Theory: 30 hrs. (37 lectures of 48 minutes)

Marks-50 (**Credits: 02**)

Unit – 1 Problem Solving Using Computers   (15 hrs.)

(A) Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

(B) Logical Continuum of Program of Programming : Linux Operating System and C Language, Introduction to GCC Compiler, Components of Compilation Process, Getting Used to the Data Types , Built-In Standard Library, Nitty-Gritty of Programming, structures, Algorithm, Pseudocode, Procedure, Program, C Program Structure, Vi Editor, Whittling the First 'C' Program, Checking Whether the Compiler Is Working, Execution of Make file, Variable Declaration , Input / Output Statement, Format Specifiers, Escape Sequences.

Unit – 2 Control Structures and Arrays   (15 hrs.)

(A) Decision Making and Looping Constructs: Introduction, The if Statement, The if-else Statement, Nested if-else, The Switch Case Statement, The while Loop, The odd Loop(do while), the for Loop, Loop Control Statements, Infinite Loop.

(B) Arrays: Features, Definition, Types of Arrays, Single-Dimensional Array, Two-Dimensional Array, Multi-Dimensional Array.

DSC-12A Database Management System

Theory: 30 hrs. (37 lectures of 48 minutes)

Marks-50 (**Credits: 02**)

Unit – 1 Introduction to Database Management Systems   (15 hrs.)

Characteristics of database approach. Data models: Hierarchical, Network, Relational, Schema and Instances, DBMS architecture: Three Schema Architecture, Internal, Conceptual, External, Data independence: Logical, Physical.

Unit – 2 Entity Relationship and Enhanced ER Modeling   **(15 hrs.)**

Entity : Entities: Domain, Attributes, Tuples, Relations,Entity Relationships: one-one, one-many, many-one, many-many, SQL-99: Schema Definition, Constraints: Domain Integrity, Entity, Referential, And Concept of Object modeling.

Reference Books:

(For Unit-1 and Unit-2)

1. "C Programming in an Open Source Paradigm: A Hands on approach", K.S.Oza, S.R.Patil, R.K.Kamat River Publisher Series in Information Science and Technology, Netherland 978-87-93237-67-4 , 2015

2. ANSI C – E. Balgurusamy

3. Let us C – Y.C. Kanetkar

4. 'C' programming – Dennis Ritchie

5. Programming in 'C' - Venugopal

(For Unit-3 and Unit-4)

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

B. Sc. Part – I Semester – II

COMPUTER SCIENCE (OPTIONAL)

DSC-11B Programming Skills Using 'C'.
Theory: 30 hrs. (37 lectures of 48 minutes)
Marks-50 (**Credits: 02**)

Unit – 1 Pointers and Functions: (15 hrs.)

(A)Pointers**:** Pointer Data Type, Pointer Declaration, Pointer Initialization, Arrays and Pointers, Pointers and One-Dimensional Arrays, Pointers and Two-Dimensional Arrays
(B)Programming for Functional Functions**:** Introduction, Function Declaration, Function Definition, Function Call, Nested Functions Recursion.

Unit – 2 Structures and File Handling: (15 hrs.)

(A)Structure and Dynamic Memory Allocation **:** User-Defined Data Types, Defining Structure, Nesting of Structure, Dynamic Memory Allocation,.
(B)File Handling**:** Defining and opening a file, File opening modes- read, write, append, closing a file, Input/Output Operations on file: getc(), putc(), getw(), putw(), fprintf(), fscanf(), ftell(), fseek(), rewind().

DSC-12B Relational Database Management System
Theory: 30 hrs. (37 lectures of 48 minutes)
Marks-50 (**Credits: 02**)

Unit – 1 Relational Data Model (15 hrs.)

Basic concept, Relational constraint: not null, unique, primary, foreign, check, Relational. algebra: Select, Project, Union, Intersection, Difference, SQL queries: DDL : create, alter, drop, DML : insert, update, delete, DQL : select. SQL operator: Logical, relational, in, between, like, not, is null.   SQL Clauses: Where, Order by, Group by , Having, Aggregate Functions :SUM, MAX, MIN, COUNT, AVG.

Unit – 2 Database design (15 hrs.)

Entity Relationship (ER) : Basic Structures of Entity Relationship (ER), Symbols, Construction of ER Diagram, Example: Library Management System, EER to relational mapping: Concept of Extended Entity Relationship Diagram (EER), Specialization, Generalization, Aggregation. Functional dependencies: Key, Primary, Super Key, Candidate Key, Functional Decomposition. Normal forms : First NF (1NF), Second NF (2NF), Boyce-Codd NF (BCNF) Third NF (3NF).

Reference Books:

(For Unit-1 and Unit-2)

1. "C Programming in an Open Source Paradigm: A Hands on approach", K.S.Oza, S.R.Patil, R.K.Kamat River Publisher Series in Information Science and Technology, Netherland 978-87-93237-67-4 , 2015

2. ANSI C – E. Balgurusamy

3. Let us C – Y.C. Kanetkar

4. 'C' programming – Dennis Ritchie

5. Programming in 'C' - Venugopal

(For Unit-3 and Unit-4)

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

PRACTICAL PAPER – I (Maximum Marks: 50) (Credits 02)
Computer Science Practical Paper
Based on DSC-11A and DSC-11B , DSC-12A and DSC-12B .

Practical: Four lectures of 48 minutes (3.2 hrs) per week per batch.

Practical Experiments:

Based on Based on DSC-11A And DSC-11B .

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage >=80

Grade B: Percentage>=70 and <80

Grade C: Percentage>=60 and <70

Grade D: Percentage>=40 and <60

Grade E: Percentage<40

3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

4. WAP to display the first n terms of Fibonacci sequence.

5. WAP to print palindrome numbers between given range.

6. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!

7. WAP to sort given array in ascending as well as descending order.

8. WAP to calculate the sum and product of two compatible matrices.

9. WAP to check whether a given number is prime or not using nested function by introducing factorial function."P is prime number if and only if (P-1)! + 1 is divisible by P".

10. WAP to calculate factorial of given number using recursive function.

11. WAP to dynamically allocate memory of n items to an integer pointer, display their sum and average.

12. WAP to swap two numbers using function (call by reference).

13. WAP to dynamically allocate memory of n items to a character array, end it with '\0' and count number of vowels, consonants and spaces in it.

14. WAP to using user defined data type structure to store information of a student rollno, name, percentage. Create array of 10 students and display students having percentage > 70.

15. WAP to copy contain of text file into another text file.

16. WAP to count number of lines and characters of given text file.

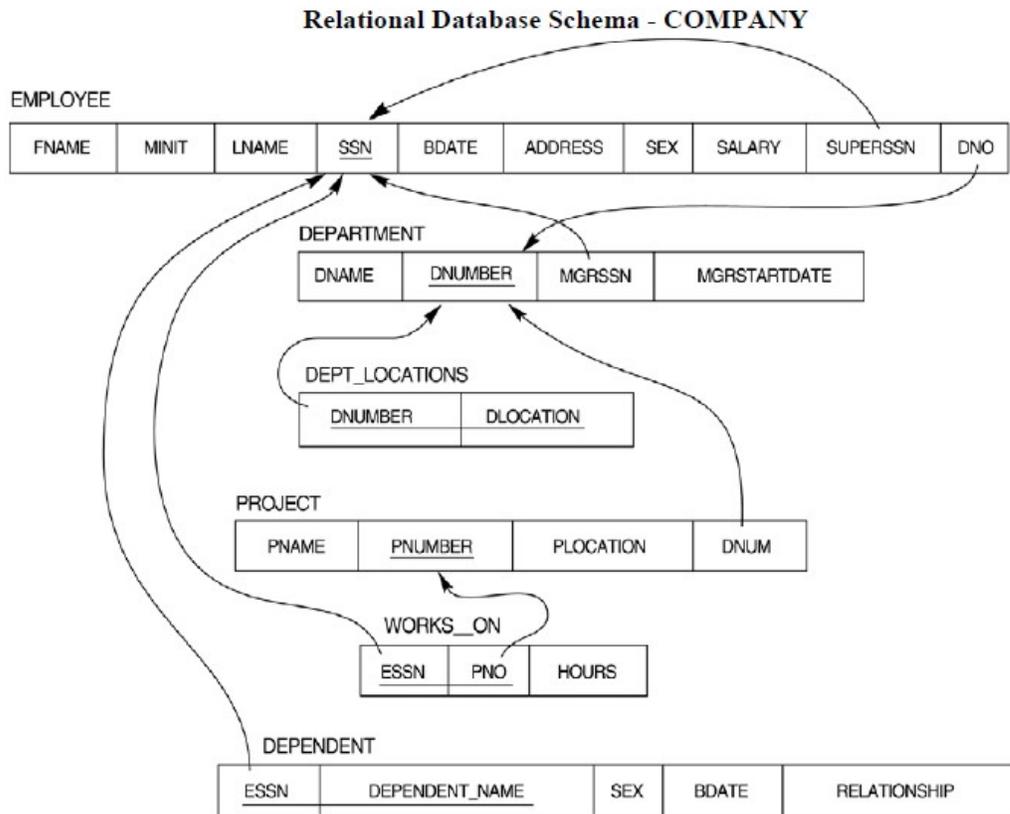**Based on Based on DSC-12A And DSC-12B .**

Note: MySQL may be used.

The following concepts must be introduced to the students:

DDL Commands

• Create table, alter table, drop table

DML Commands

• Select , update, delete, insert statements

• Condition specification using Boolean and comparison operators (and, or,not,=,<>,>,<,>=,<=)

• Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)

• Multiple table queries (join on different and same tables)

• Nested select statements

• Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)

• Categorization using group by……..having

• Arranging using order by

Relational Database Schema - COMPANY

EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

DEPARTMENT

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE

DEPT_LOCATIONS

DNUMBER	DLOCATION

PROJECT

PNAME	PNUMBER	PLOCATION	DNUM

WORKS_ON

ESSN	PNO	HOURS

DEPENDENT

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP

Questions to be performed on above schema

1. Create tables with relevant foreign key constraints

2. Populate the tables with data

3. Perform the following queries on the database :

    1. Display all the details of all employees working in the company.

    2. Display ssn, lname, fname, address of employees who work in department no 7.

    3. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'

    4. Retrieve the name and salary of every employee

    5. Retrieve all distinct salary values

    6. Retrieve all employee names whose address is in 'Bellaire'

    7. Retrieve all employees who were born during the 1950s

    8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)

    9. Retrieve the names of all employees who do not have supervisors

    10. Retrieve SSN and department name for all employees

    11. Retrieve the name and address of all employees who work for the 'Research' department

    12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.

    13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.

    14. Retrieve all combinations of Employee Name and Department Name

    15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.

    16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.

    17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.

    18. Select the names of employees whose salary does not match with salary of any employee in department 10.

19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.

20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.

21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.

22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.

24. For each department, retrieve the department number, the number of employees in the department, and their average salary.

25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.

27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.

28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.

29. Delete all dependents of employee whose ssn is '123456789'.

30. Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL.

31. Perform a query using alter command to drop/add field and a constraint in Employee table.

7.EXAMINATION SCHEME

Theory: Theory examination will be conducted at the end of each semester.

Paper: Duration: 2 Hrs. Maximum Marks: 50. Minimum for passing: 35%.

Practical: Practical Examination will be conducted annually towards the end of Second Term of every Academic year. Duration: 4 hours, Maximum Marks: 50. Minimum for passing: 35%.

Nature of Each Theory Question Paper: (Maximum Marks 50)

1. Choose correct alternatives.	10 Marks(Each 1 mark)
2. Attempt any two (out of three sub questions).	20 Marks(Each 10 marks)
3. Attempt any four out of six sub questions.	20 Marks(Each 5 marks)

Nature of Practical Examination: (Maximum Marks 50) (Credits 02)

The Practical Examination in Computer Science is conducted at end of each Academic year which will be based on Paper **DSC-11A and DSC-11B , DSC-12A and DSC-12B** of 4 hours duration and of 50 maximum marks. There will be four questions, out of these student has to attempt Any Two questions. The marks distribution for the practical paper is given below:

Practical Paper - I

Each question carries	: 20 marks(20 x 2 = 40 marks)
Certified Journal carries	: 5 marks.
Viva based on practical carries	: 5 marks.

****