

# M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

## SCHEME OF TEACHING AND EXAMINATION M.SC (COMPUTER SCIENCE) CHOICE BASED CREDIT SYSTEM (CBCS) W.E.F 2016-17

### I Semester

S.NO	Subject Code	Subject Title	Internal Marks	External Marks	Total Marks	No.of Hours per week	No.of Credits/Week
1	MCS10116	Object Oriented Programming Systems	30	70	100	4	4
2	MCS10216	Computer Organization	30	70	100	4	4
3	MCS10316	Discrete Mathematical Structures	30	70	100	4	4
4	MCS10416	Database Management Systems	30	70	100	4	4
5	MCS10516	Data Structures	30	70	100	4	4
6	MCS10616	Data Structures Lab using JAVA	30	70	100	6	3
7	MCS10716	DBMS Lab	30	70	100	6	3
8	MCS10816	Object Oriented Programming Lab	50		50	3	2
Total			260	490	750	36	28

### II Semester

S.NO	Subject Code	Subject Title	Internal Marks	External Marks	Total Marks	No.of Hours per week	No.of Credits/Week
1	MCS20116	Computer Networks	30	70	100	4	4
2	MCS20216	Operations Research	30	70	100	4	4
3	MCS20316	Theory of Computation	30	70	100	4	4
4	MCS20416	Object Oriented Software Engineering	30	70	100	4	4
5	MCS20516	Operating Systems	30	70	100	4	4
6	MCS20616	Object Oriented Software Engineering Lab	30	70	100	6	3
7	MCS20716	Operating System & Networks Lab	30	70	100	6	3
8	MCS20816	Technical Report Writing	50		50	3	2
Total			260	490	750	36	28

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### III Semester

S.NO	Subject Code	Subject Title	Internal Marks	External Marks	Total Marks	No.of Hours per week	No.of Credits/Week
1	MCS30116	Cryptography & Network Security	30	70	100	4	4
2	MCS30216	Design & Analysis of Algorithms	30	70	100	4	4
3	MCS30316	Data Warehousing & Data Mining	30	70	100	4	4
4	MCS30416	Web Technologies	30	70	100	4	4
5	MCS305.116	Advanced Database Management System	30	70	100	4	4
	MCS305.216	TCP/IP					
	MCS305.316	Software Testing					
	MCS305.416	Simulation and Analysis					
	MCS305.516	Artificial Intelligence					
	MCS305.616	Compiler Design					
6	MCS30616	Web Technologies Lab	30	70	100	6	3
7	MCS30716	Data Mining Lab	30	70	100	6	3
8	MCS30816	Testing Tools Lab	50		50	3	2
Total			260	490	750	36	28

### IV Semester

S.NO	Subject Code	Subject Title	Internal Marks	External Marks	Total Marks	No.of Hours per week	No.of Credits/Week
1	MCS40116	DotNet Programming	30	70	100	4	4
2	MCS40216	Mobile Computing	30	70	100	4	4
3	MCS403.116	Cloud Computing	30	70	100	4	4
	MCS403.216	Artificial Intelligence					
4	MCS40416	DotNet Programming Lab	30	70	100	6	3
5	MCS40516	Project Work	100	200	300	18	10
Total			220	480	700	36	25

# DETAILED SYLLABUS

I SEMESTER

MCS 10116: OBJECT ORIENTED PROGRAMMING SYSTEMS

Unit 1	<b>Object Oriented Programming:</b> Introduction to OOP, Objects and Classes, Characteristics of OOP, Difference between OOP and Procedure Oriented Programming. <b>Introduction to Java Programming:</b> Introduction, Features of Java, Comparing Java and other languages, Applications and Applets, Java Development Kit, More Complex Programs, Java Source file structure, Prerequisites for Compiling and Running Java Programs.
Unit 2	<b>Java Language Fundamentals:</b> The building Blocks of Java, Data types, variable declarations, wrapper classes, Operators and Assignment, Control structures, Arrays, Strings, The String Buffer Class. <b>Java as an OOP Language:</b> Defining classes, Modifiers, Packages, Interfaces.
Unit 3	<b>Exception Handling:</b> Introduction, Basics of Exception Handling in Java, Exception Hierarchy, Constructors and Methods in Throwable class, Unchecked and Checked Exceptions, Handling Exceptions in Java, Exception and Inheritance, Throwing User-defined Exceptions, Redirecting and Rethrowing Exceptions, Advantages of Exception – Handling Mechanism. <b>Multithreading:</b> An Overview of Threads, Creating Threads, Thread Life-cycle, Thread Priorities and Thread Scheduling, Thread Synchronization, Daemon Threads, Thread groups, Communication of Threads.
Unit 4	<b>Files and I/O Streams:</b> An Overview of I/O streams, Java I/O, File Streams, FileInputStream and FileOutputStream, Filter streams, Random Access File, Serialization. <b>Applets:</b> Introduction, Java applications versus Java Applets, Applet Life-cycle, Working with Applets, The HTML Applet Tag. <b>Database Handling Using JDBC:</b> An Overview of DBMS, JDBC Architecture, Working with JDBC
Unit 5	<b>Servlets:</b> Introduction, How to run servlets, The Life-cycle of the servlet, servlet API, Multitier Applications using JDBC from a servlet. <b>Networking and Remote Method Invocation:</b> Introduction to Networking, Understanding Ports, Networking Classes in JDK, Introduction to RMI, RMI Architecture – Implementing Remote class and interface – security.

Text books

	Author	Title	Publisher
1	P. Radha Krishna	Object Oriented Programming through Java	Universities Press (2008) <b>Chapters:</b> 1,2,3,4,5,6.1-6.5,6.7,6.8,7,8.1- 8.5,9.1-9.3,12.1-12.5, 13

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### Reference books

	Author	Title	Publisher
1	Cay S. Horstmann Gray Cornell	CoreJava ,Volume 1 Fundamentals	Eighth Edition, Pearson Education
2	E.Balagurusamy	Programming with Java	3e, TMH (2007)
3	H.M.Deitel, P.J.Deitel	Java How to Program	Sixth Edition, Pearson Education (2007)
4	Debasish Jana	Java and Object Oriented Programming Paradigm	PHI (2005).
5	ISRD Group	Introduction to Object Oriented Programming through Java	TMH (2007).

**MCS 10216: COMPUTER ORGANIZATION**

Unit 1	<p><b>Digital Logic Circuits:</b> Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-flops, Sequential Circuits.</p> <p><b>Digital Components:</b> Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.</p> <p><b>Data Representation:</b> Data types, Complements; Fixed-point Representation, Floating-point representation, other binary codes, Error detection Codes.</p>
Unit 2	<p><b>Register Transfer and Micro operations:</b> Register transfer language, Register transfer, Bus &amp; memory Transfers, Arithmetic micro operations, logic micro operations, Shift micro operations, Arithmetic Logic Shift Unit</p> <p><b>Basic Computer Organization and Design:</b> Instruction Codes, Computer registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-output Interrupt</p>
Unit 3	<p><b>Micro programmed Control:</b> Control memory, Address Sequencing, Micro program Example, Design of control Unit.</p> <p><b>Central Processing Unit:</b> General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control</p>
Unit 4	<p><b>Computer Arithmetic:</b> Introduction, Addition and subtraction, Multiplication algorithm, Floating point arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.</p>
Unit 5	<p><b>Input-Output Organization:</b> Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt</p> <p><b>Memory Organization:</b> Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory</p>

## M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

### Text books

	Author	Title	Publisher
1	M. Morris Mano	Computer System Architecture	3 <sup>rd</sup> Edition, Pearson Education (2008).  <b>Chapters :</b> 1, 2, 3, 4, 5.1 to 5.7, 7, 8.1 to 8.7, 10.2 to 10.5, 11.1 to 11.5, 12.1 to 12.5

### Reference books

	Author	Title	Publisher
1	V. Rajaraman, T. Radha Krishnan	Computer Organization and Architecture	PHI
2	Behrooz Parhami	Computer Architecture	Oxford (2007)
3	ISRD group	Computer Organization	ace series, TMH (2007)
4	William Stallings	Computer Organization and Architecture – Designing for Performance	Pearson Education (2005)
5	P.Chakraborty	Computer Architecture and Organization	Jaico Books (2008)

**MCS10316: DISCRETE MATHEMATICAL STRUCTURES**

Unit 1	<p><b>The Foundations: Logic and Proofs:</b> Propositional Logic – Propositional Equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy</p> <p><b>Basic Structures: Sets, Functions, Sequences and Sums:</b> Sets – Set Operations – Functions – Sequences and Summations</p> <p><b>The Fundamentals : Algorithms , The Integers and Matrices:</b> Algorithms – The Growth of Functions – Complexity of Algorithms – The Integers And Divisions – Primes and Greatest Common Divisors – Integers and Algorithms – Applications of Number Theory – Matrices</p>
Unit 2	<p><b>Introduction and Recursion :</b> Mathematical Induction – Strong Induction and Well-Ordering – Recursive Definitions and Structural Induction – Recursive Algorithms – Program Correctness</p> <p><b>Counting:</b> The Basics of Counting – The Pigeon Hole Principle – Permutations and Combinations – Binomial Coefficients – Generalized Permutations and Combinations – Generating Permutations and Combinations</p>
Unit 3	<p><b>Advanced Counting Techniques:</b> Recurrence Relations – Solving Linear Recurrence Relations – Divide and Conquer Algorithms and Recurrence Relations – Generating Functions – Inclusion – Exclusion – Applications of Inclusion &amp; Exclusion</p> <p><b>Relations :</b> Relations and Their Properties – n-ary Relations and Their Applications – Representing Relations – Closures of Relations – Equivalence Relations – Partial Orderings</p>
Unit 4	<p><b>Graphs:</b> Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism's – Connectivity – Euler and Hamilton Paths – Shortest Path Problems – Planar Graphs - Graph Coloring</p>
Unit 5	<p><b>Trees:</b> Introduction to Trees – Applications of Trees – Tree Traversal – Spanning Trees – Minimum Spanning Trees</p> <p><b>Boolean Algebra:</b> Boolean Functions – Representing Boolean Functions – Logic Gates – Minimization of Circuits</p>



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### Text books

	Author	Title	Publisher
1	Kenneth H Rosen	Discrete Mathematics and its Applications	6 <sup>th</sup> Edition, McGraw-Hill (2007) Chapters(1-10)

### Reference books

	Author	Title	Publisher
1	Ralph P. Grimaldi, B.V. Ramana	Discrete and Combinational Mathematics	5 <sup>th</sup> Edition, Pearson Education (2008).
2	Swapan Kumar Sarkar	A Text Book of Discrete Mathematics	S.Chand (2008)
3	D.S.Malik and M.K.Sen	Discrete Mathematical Structures	Thomson (2006)

**MCS 10416: DATABASE MANAGEMENT SYSTEMS**

<b>Unit 1</b>	<p><b>Databases and Database Users:</b> Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach.</p> <p><b>Database System Concepts and Architecture:</b> Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.</p> <p><b>Data Modeling Using the ER Model:</b> Conceptual Data models, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural Constraints, Weak Entity types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database.</p> <p><b>The Enhanced Entity-Relationship Model:</b> Sub classes, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of Union Types using Categories, An Example University ERR Schema, Design Choices and Formal Definitions.</p>
<b>Unit 2</b>	<p><b>The Relational Data Model and Relational Database Constraints:</b> Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations.</p> <p><b>The Relational Algebra and Relational Calculus:</b> Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus.</p> <p><b>SQL-99: Schema Definition, Constraints, Queries and Views:</b> SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views.</p>
<b>Unit 3</b>	<p><b>Functional Dependencies and Normalization for Relational Databases:</b> Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms</p>

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	<p>Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.</p> <p><b>Relational Database Design Algorithms and Further Dependencies:</b> Properties of Relational Decompositions, Algorithms fro Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.</p>
<b>Unit 4</b>	<p><b>Disk Storage, Basic File Structures and Hashing:</b> Introduction, Secondary Storage Devices, Buffering of Blocks, Placing file Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access using RAID Technology.</p> <p><b>Indexing Structures for Files:</b> Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B<sup>+</sup> Trees, Indexes on Multiple Keys, Other Types of Indexes.</p>
<b>Unit 5</b>	<p><b>Introduction to Transaction Processing Concepts and Theory:</b> Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability.</p> <p><b>Concurrency Control Techniques:</b> Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation concurrency control Techniques, Granularity of Data Items and multiple Granularity Locking.</p> <p><b>Distributed Databases and Client Server Architectures:</b> Distributed Database Concepts, Data Fragmentation, Replication, and allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, An Overview if 3 Tier Client Server Architecture.</p>

## M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

### Text books

	Author	Title	Publisher
1	Elmasri.R and Navathe.S	Fundamentals of Database Systems.	Pearson Education (2007) <b>Chapters:</b> 1.1 to 1.6, 2, 13.1 to 13.10, 14, 3.1 to 3.6, 3.9, 4.1 to 4.5, 5, 6, 8, 10, 11, 17, 18.1 to 18.5, 25.1 to 25.3, 25.6

### Reference books

	Author	Title	Publisher
1	Peter Rob, Carlos Coronel	Database Systems– Design, Implementation and Management	Eighth Edition, Thomson (2008)
2	C.J. Date, A.Kannan, S.Swamynathan	An Introduction to Database Systems	VII Edition Pearson Education (2006).
3	Raman A Mata – Toledo, Panline K. Cushman	Database Management Systems	Schaum’s Outlines, TMH (2007)
4	Steven Feuerstein	Oracle PL/SQL – Programming	10 <sup>th</sup> Anniversary Edition, OREILLY (2008)

**MCS 10516 : DATA STRUCTURES**

<b>Unit 1</b>	<b>Introduction and Overview-</b> Elementary Data Organization, Data Structures, Data Structure Operations, Algorithms: Complexity, Time-Space Tradeoff <b>Preliminaries-</b> Mathematical Notation and Functions, Algorithmic Notation, Control Structures, Complexity of Algorithms. Other Asymptotic Notations, Sub algorithms, Variables, Data Types
<b>Unit 2</b>	<b>String Processing</b> – Storing Strings, Character Data Type, String Operations, Word Processing, Pattern Matching Algorithms <b>Arrays, Records and Pointers</b> – Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting, Bubble Sort, Linear Search, Binary Search, Multidimensional Arrays, Pointer Arrays, Record Structures, Representation of records in memory, Parallel Arrays, Matrices, Sparse Matrices
<b>Unit 3</b>	<b>Linked Lists</b> – Representation, Traversing, Searching, Memory Allocation: Garbage Collection, Insertion, Deletion, Header Linked Lists, Two-Way Lists <b>Stacks, Queues, Recursion-</b> Stacks, Array representation, Linked List representation, Arithmetic Expressions; Polish notation, Quick sort, Recursion, Towers of Hanoi, Implementation of recursive procedures by stacks, Queues, Linked representation of Queues, Deques, Priority Queues
<b>Unit 4</b>	<b>Trees-</b> Binary trees, Representing and traversing binary trees, Traversal algorithms using stacks, Header nodes, Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, AVL Search Trees, Insertion and Deletion in AVL trees, m-way search trees, searching, insertion and deletion in m-way search tree, B Trees, searching, insertion and deletion in a B-tree, Heap: Heap Sort, Huffman’s Algorithms, General Trees
<b>Unit 5</b>	<b>Graphs-</b> Terminology, Sequential representation of Graphs, Warshall’s Algorithm, Linked representation of Graphs, Operations on Graphs, Traversing a Graph, Topological Sorting <b>Sorting and Searching-</b> Insertion Sort, Selection sort, Merging, Merge sort, Radix sort, Searching and Data modification, Hashing

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### Text books

	Author	Title	Publisher
1	Seymour Lipschutz	Data Structures	McGraw Hill (Schaum's Outlines)

### Reference books

	Author	Title	Publisher
1	Seymour Lipschutz	Theory and Problems of Data Structures	McGraw Hill (Schaum's Outlines)
2	Aho, Hopcroft & Ullman	Data Structures & Algorithms	
3	M.A.Weiss	Data Structures & Algorithms in C	Addison Wisley

**MCS 10616: DATA STRUCTURES USING JAVA LAB**

<b>Cycle – I : Java Programming</b>	
1.	Write a Java Program that has a method for the calculation of the fourth power of 2.
2.	Write a Java Program that prints different Time Zones available with TimeZone Class.
3.	Write a Java Program to <ol style="list-style-type: none"> <li>Test equality between two strings</li> <li>Find the length of the strings</li> <li>Convert the given strings to upper case</li> </ol>
4.	Create a class called <b>Numera</b> that accepts an array of 10 numbers. Create a sub class called <b>NumPlay</b> which has a menu as follows <ol style="list-style-type: none"> <li>Display numbers entered</li> <li>Sum of the Numbers</li> <li>Average of the Numbers</li> <li>Maximum of the Numbers</li> <li>Minimum of the Numbers</li> </ol> Create appropriate methods in the sub class to execute the operations as per choice and it should continue until we press <b>ctrl + Z</b> .
5.	Write a Java program to accept two names as command line parameters. Check whether each of them exist in <b>c:\java</b> directory. If it exists, display its name and size, else display the message that it does not exist. Further, if the extension of the file is <b>html</b> , then it has to be deleted.
6.	Write a Java program to sort the elements of array in ascending order.
<b>Cycle – II : Linear Data Structures : Sequential and Linked Storage Representations</b>	
1.	Write a Java Program to create a class called <b>Stack</b> and implement stack operations.
2.	Write a Java Program to create a class called <b>Queue</b> and implement queue operations.
3.	Write a Java class to perform the following operations : <ol style="list-style-type: none"> <li>Polish Notation</li> <li>Infix to Polish Notation</li> </ol>
4.	Write a Java Class to implement the operations of a Singly linked list.
5.	Write a Java Class to implement the operations of a Doubly linked list.
6.	Write a Java Class to implement the operations of a Circular linked list.
<b>Cycle – III : Non Linear Data Structures</b>	
1.	Write a Java program to implement operations on Binary Trees
2.	Write a Java program to implement linked storage representation for binary trees
3.	Write a Java program for symbol table construction
4.	Write a Java Program to implement Sparse Matrix
5.	Write a Java Program to implement DFS algorithm
6.	Write a Java Program to implement BFS algorithm
<b>Cycle – IV : Sorting &amp; Searching</b>	
1.	Write a Java program to implement the Following sorting techniques : <ol style="list-style-type: none"> <li>Bubble Sort</li> <li>Merge Sort</li> <li>Quick Sort</li> </ol>
2.	Write a Java program to implement the Following search techniques : <ol style="list-style-type: none"> <li>Binary Search</li> <li>Height Balanced Tree</li> </ol>

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	c. Weight Balanced Tree
3.	Write a Java Program to implement the following methods : a. Hashing Functions b. Collision Resolution Techniques
<b>Cycle – V : File Structures</b>	
1.	Write a Java Program to implement sequential file processing.
2.	Write a Java Program to create and retrieve 'n' objects of the following classes : a. Rectangle b. Circle c. Ellipse



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### MCS 10716: DATABASE MANAGEMENT SYSTEMS LAB

Cycle-I: Aim: Marketing company wishes to computerize their operations by using following tables.

Table Name: Client- Master

Description: Used to store client information

Column Name	Data Type	Size	Attribute
CLIENT_NO	Varchar2	6	Primary key and first letter must start with 'C'
NAME	Varchar2	20	Not null
ADDRESS 1	Varchar2	30	
ADDRESS S	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
BAL_DUE	Number	10,2	

Table Name: Product\_Master

Description: Used to store product information

Column Name	Data Type	Size	Attribute
PRODUCT_NO	Varchar2	6	Primary key and first letter must start with 'P'
DESCRIPTION	Varchar2	15	Not null
PROFIT_PERCENT	Number	4,2	Not null
UNIT_MEASUE	Varchar2	10	
QTY_ON_HAND	Number	8	
REORDER_LVL	Number	8	
SELL_PRICE	Number	8,2	Not null, cannot be 0
COST_PRICE	Number	8,2	Not null, cannot be 0

Table Name: Salesman\_master

Description: Used to store salesman information working for the company.

Column Name	Data Type	Size	Attribute
SALESMAN_NO	Varchar2	6	Primary key and first letter must start with 'S'
SALESMAN_NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	

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STATE	Vachar2	20	
SAL_AMT	Number	8,2	Not null, cannot be 0
TGT_TO_GET	Number	6,2	Not null, cannot be 0
YTD_SALES	Number	6,2	Not null
REMARKS	Varchar2	20	

Table Name: SALES-ORDER

Description: Used to store client's orders

Column Name	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primary key and first letter must start with 'S'
CLIENT_NO	Varchar2	6	Foreign Key
ORDER_DATE	Date		
DELY_ADDRESS	Varchar2	25	
SALESMAN_NO	Varchar2	6	Foreign Key
DELY_TYPE	Char	1	Delivery: part(p)/ full(f) and default 'F'
BILL_YN	Char	1	
DELY_DATE	Date		Can't be less than order date
ORDER_STATUS	Varchar2	10	Values ("In Process", "Fulfilled", "Back Order", "Cancelled.

Table Name: SALES\_ORDER\_DETAILS

Description: Used to store client's order with details of each product ordered.

Column Name	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primary key references SALES_ORDER table
PRODUCT_NO	Varchar2	6	Foreign Key references SALES_ORDER_table
QTY_ORDERED	Number	8	
QTY_DISP	Number	8	
PRODUCT_RATE	Number	10,2	Foreign Key

Solve the following queries by using above tables.

1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product\_master table.
4. Find the names of sales man who have a salary equal to Rs.3000.
5. List the names of all clients having 'a' as the second letter in their names.
6. List all clients whose Bal due is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.

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9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.
11. Find the products in the sorted order of their description.
12. Find the products with description as '540HDD' and 'Pen drive'.
13. Count the total number of orders.
14. Print the description and total qty sold for each product.
15. Calculate the average qty sold for each client that has a maximum order value of 15,000.
16. Find all the products whose quantity on hand is less than reorder level.
17. List the order number and day on which clients placed their order.
18. Find out the products and their quantities that will have to deliver in the current month.
19. Find the names of clients who have placed orders worth of 10000 or more.
20. Find the client names who have placed orders before the month of June,2008.

### Cycle-II

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows.

Supplier (Supplier\_No, Sname, City, status)

Part( Part\_no, pname, color, weight, city, cost)

Shipment (supplier\_No, Part\_no, city)

JX( project\_no, project\_name, city)

SPJX (Supplier\_no, part\_no, project\_no, city)

1. Get supplier numbers and status for suppliers in Chennai with status > 20.
2. Get project names for projects supplied by supplier S.
3. Get colors of parts supplied by supplier S<sub>1</sub>.
4. Get part numbers for parts supplied to any project in Mumbai.
5. Find the id's of suppliers who supply a red or pink parts.
6. Find the pnames of parts supplied by London supplier and by no one else.
7. Get the names of the parts supplied by the supplier 'Mart' and 'Miller'.
8. Get supplier names for suppliers who do not supply part P<sub>2</sub>.
9. Get all pairs of supplier numbers such that the suppliers concerned are "colocated".
10. Get suppliers names for the suppliers who supply at least one red part.

### Cycle -III Employee Database

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into a certain departments and each department consists of employees. The following two tables describes the automation schemas.

Emp(Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno)

Dept(Deptno, Dname, Loc)

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1. List the details of employees who have joined before the end of September' 81.
2. List the name of the employee and designation of the employee, who does not report to anybody.
3. List the name, salary and PF amount of all the employees (PF is calculated as 10% of salary)
4. List the names of employees who are more than 2 years old in the organization.
5. Determine the number of employees, who are taking commission.
6. Update the employee salary by 20% , whose experience is greater than 12 years.
7. Determine the department does not contain any employees.
8. Create a view, which contains employee name and their manager names working in sales department.
9. Determine the employees, whose total salary is like the minimum salary of any department.
10. List the department numbers and number of employees in each department.
11. Determine the employees, whose total salary is like the minimum salary of any department.
12. List average salary for all departments employing more than five people.
13. Determine the names of employees, who take highest salary in their departments.
14. Determine the names of employees, who earn more than their managers.
15. Display ename, dname, even if no employee belongs to that department ( use outer join)

### Cycle- IV

An Airline system would like to keep track their information by using the following relations.

FLIGHTS( fl\_no: integer, from: string, to: string, distance: integer, price: integer)

AIRCRAFT(aid: integer, aname: string, cruising\_range: integer)

CERTIFIED(eid: integer, aid: integer)

Employees( eid: integer, ename: string, salary: real)

Note that the employees relation describes pilots and other kinds of employees as well; every pilot is certified for aircraft and only pilots are certified to fly. Resolve the following queries.

1. Find the names of pilots whose salary is less than the price of the cheapest route from Newyork to Chicago.
2. For each pilot who is certified for more than 2 aircraft, find the eid's and the maximum cruising range of the aircraft that he or she certified for.
3. For all aircraft with cruising range over 1,500 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
4. Find the aid's of all aircraft than can be used from chicaga to LosAngels.
5. Find the name of the pilots certified from some Boeing aircraft.
6. Print the enames of pilots who can operate planes with cruising range greater than 3,500 miles, but are not certified by Boeing aircraft.
7. Find the eid's of employees who are certified for exactly 2 aircrafts.

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- Find the total amount paid to employees as salaries.
- Find the aid's of all than can be used on non-stop flights from Chennai to Dubai.
- Find the eid's of employee who make second highest salary.

### PL/SQL PROGRAMS

- Write a PL/SQL program to check the given number is strong or not.
- Write a PL/SQL program to check the given string is palindrome or not.
- Write a PL/SQL program to swap two numbers without using third variable.
- Write a PL/SQL program to generate multiplication tables for 2, 4, 6.
- Write a PL/SQL program to check the given number is Armstrong or not.
- Write a PL/SQL code to find the factorial of any number.
- Write a PL/SQL program to display sum of even numbers and sum of odd numbers in the given range.
- Write a PL/SQL program to check the given number is palindrome or not.
- The HRD manager has decide to raise the employee salary by 15% write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in Emp table.
- Write a PL/SQL program to display to 10 rows in Emp table based on their job and salary.
- Write a PL/SQL program to raise the employee salary by 10% for department number 30 people and also maintain the raised details in the raise table.
- Write a procedure to update the salary of Employee, who are not getting commission by 10%.
- Write a PL/SQL procedure to prepare an electricity bill by using following table.

Table used: Elect

Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

- Write a PL/SQL program to prepare an telephone bill by using following table and print the monthly bills for each customer.

Table used: Phone

Name	Null?	Type
TEL_NO	NOT NULL	NUMBER(6)
CNAME		VARCHAR2(20)
CITY		VARCHAR2(10)
PR_READ		NUMBER(5)

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CUR_READ	NUMBER(5)
NET_AMT	NUMBER(5)
TOT-AMT	NUMBER(8,2)

15. Write a PL/SQL program to raise the employee salary by 10 %, who are completed their 25 years of service and store the details at appropriate tables  
(Define the Retair\_Emp\_Table)
16. Write a PL/SQL program to evaluate the grade of a student with following conditions:  
 For pass: all marks > 40  
 For I class: Total % > 59  
 For II Class: Total % between >40 and < 60  
 For III class: total % = 40  
 And also maintain the details in abstract table.

### 1. Table Std

Name	Null?	Type
NO	NOT NULL	NUMBER
NAME		VARCHAR2(10)
INTNO		NUMBER
CLASS	NOT NULL	VARCHAR2(10)
M1		NUMBER
M2		NUMBER
M3		NUMBER
M4		NUMBER
M5		NUMBER

### 2. Table Abstract

Name	Null?	Type
STDNO		NUMBER
STDNAME		VARCHAR2(10)
CLASS		VARCHAR2(10)
MONTH		VARCHAR2(10)
INTNO (INTEGER NUMBER)		NUMBER
TOT		NUMBER
GRADE		VARCHAR2(10)
PERCENT		NUMBER
DAT_ENTER		DATE

**MCS 10816: OBJECT ORIENTED PROGRAMMING LAB**

1. Write a java program to find the Area and Volume of a Rectangle
2. Write a Java Program to implement Exception Handling using predefined classes
3. Write a Java Program to implement Exception Handling using **final** keyword
4. Write a Java Program to implement Multithreading
5. Write a Java Program to implement Interfaces
6. Write a Java Program to demonstrate the following :
  - a. Public derivation of a class
  - b. Private derivation of a class
  - c. Protected derivation of a class
7. Write a Java Program to demonstrate StreamInput and StreamOutput.
8. Write a Java Program to create a Package (Static and Dynamic link Library).
9. Write a Java Program to create help file.
10. Write a Java Program to create a component and register in windows.

# M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

**KRISHNA UNIVERSITY: MACHILIPATNAM**

**I Semester M.Sc. (Computer Science) Examination**

**MCS10116: OBJECT ORIENTED PROGRAMMING SYSTEMS**

**(Regulation 2016-17)**

**Time: Three hours**

**Maximum: 70 marks**

**Answer ALL questions**

**All questions carry equal marks**

1. a) What is object oriented programming? Discuss the characteristics of object Oriented programming.  
b) What are the differences between applications and applets in Java. Give examples.  
**OR**  
c) Discuss and distinguish between object oriented programming and procedure Oriented programming.  
d) Describe the features of Java programming language.
2. a) Explain various operators available in Java.  
b) What is an interface? Write a program to demonstrate how interfaces can be extended.  
**OR**  
c) Explain the Control structures in Java with examples.  
d) What is a Constructor? Explain Constructor Overloading with an example program.
3. a) Write about Exception handling mechanism in Java.  
b) Explain with an example how Java performs thread synchronization.  
**OR**  
c) Give the advantages of Exception handling.  
d) Explain the life cycle of a thread.
4. a) Explain the life cycle of an applet.  
b) Explain JDBC architecture and different types of devices available.  
**OR**  
c) What is stream class? Explain the streams used in Java.  
d) Explain two-tier and three- tier architecture associated with client- server communication.
5. a) What is a servlet? Discuss about the servlet API.  
b) Explain about RMI architecture.  
**OR**  
c) Explain the life- cycle of a servlet.  
d) What is a socket? Write a Java program to establish a socket connection



**M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)**

**KRISHNA UNIVERSITY: MACHILIPATNAM**  
**I Semester M.Sc. (Computer Science) Examination**  
**MCS10216: COMPUTER ORGANIZATION**  
**(Regulation 2016-17)**

**Time : Three hours**

**Maximum: 70 marks**

**Answer ALL questions**

**All questions carry equal marks**

1. a) Explain the operation of 4x1 multiplexer with logic diagram and truth table.  
b) Simplify F together with its don't care condition d in  
(i) sum of products form                      (ii) products of sums form  
$$F(A, B, C, D) = \sum(0,1,2,8,9,12,13)$$
$$d(A, B, C, D) = \sum(10,11,14,15)$$

**OR**

c) Discuss the operation of SR flip flop with logic diagram.  
d) Explain about fixed point and floating point data representation.
2. a) What is a register? Explain register transfer using block diagram and Timing diagram.  
b) Explain the memory- reference instruction.

**OR**

c) Draw the block diagram of an ALU and explain the operations performed by it.  
d) What is an interrupt? Explain the interrupt cycle with diagram.
3. a) Describe the organization of Microprogrammed control with block diagram.  
b) Explain about instruction format.

**OR**

c) Explain about different types of addressing modes.  
d) Explain about control memory in detail.
4. a) What is BCD adder? Explain with block diagram.  
b) Explain about Booth's multiplication algorithm.

**OR**

c) With a flow chart explain Hardware algorithm.  
d) Explain about Floating point arithmetic operations.
5. a) What is an input – output interface? What is the difference between isolated I/o and memory- mapped I/o.  
b) Write a note on memory – hierarchy.

**OR**

c) What is Asynchronous data transfer?  
d) What is locality of reference? Discuss various organizations of cache memory.

# M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

KRISHNA UNIVERSITY: MACHILIPATNAM

I Semester M.Sc. (Computer Science) Examination

MCS10316 : DISCRETE MATHEMATICAL STRUCTURES

(Regulation 2016-17)

Time : Three hours

Maximum: 70 marks

Answer ALL questions

All questions carry equal marks

1. a) Prove the relation  $(p \vee q) \wedge (\neg p \vee r) \rightarrow (p \vee r)$  is a tautology.  
b) Define Greatest Common Divisor (GCD) and Find the GCD (123, 277), GCD (414, 662) using the Euclidean algorithm.  

**OR**

  
c) Use set builder notation prove the Demorgan laws.  
(i)  $\overline{A \cup B} = \overline{A} \cap \overline{B}$ , (ii)  $\overline{A \cap B} = \overline{A} \cup \overline{B}$   
d) Define (i) Biconditional statement ( $\leftrightarrow$ ) (ii) Exclusive or ( $\oplus$ ) (iii) conditional statement ( $\rightarrow$ ) with the truth tables.
2. a) Use Induction to prove  $1^2 + 3^2 + 5^2 + \dots + (2n+1)^2 = (n+1)(2n+1)(2n+3)/3$  wherever n is a non negative integer.  
b) What is the expansion of  $(2x+3y)^4$  using Binomial theorem and find the coefficient of  $x^{12}y^{13}$  in the expansion of  $(x+y)^{25}$ .  

**OR**

  
c) How many different license plates are available if each plate contains a sequence of three letters followed by three digits without repeat ion  
d) Find the values of following  
(i) C (12, 6) (ii) C (30, 6) (iii) P (10, 9) (iv) P (15, 5)
3. a) Solve the recurrence relation  $a_n = a_{n-1} + f(n)$ ,  $n \geq 1$  by substitution where  $a_0 = 1$   
b) Write properties of relations with examples.  

**OR**

  
c) Solve the recurrence relation  $a_n - 3a_{n-1} - 4a_{n-2} = 3^n$  given  $a_0 = 1, a_1 = 2$ .  
d) Write about reflexive closures, Transitive closures of relations with examples.
4. a) Define the Graphs and Explain the Graphs Models.  
b) Explain the Bipartite Graphs.  

**OR**

  
c) Define Isomorphism between two graphs. Explain Isomorphism of two graphs with an examples.  
d) Explain the Dijkstra's algorithm to find a shortest path with an example.
5. a) Explain how to produce minimum spanning tree using Prim's algorithm with an examples.  
b) Write the applications of trees.

**OR**

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c) Construct the circuits that produce the following outputs

(i)  $(x+y)\bar{x}$  (ii)  $\overline{x(y+z)}$  (iii)  $(x+y+z)(\overline{xyz})$

d) Use Karnaugh maps to minimize these sum-of products expansions.

(i)  $\overline{xyz} + \overline{x\overline{y}z} + \overline{x\overline{y}\overline{z}} + \overline{x\overline{y}z}$

(ii)  $\overline{x\overline{y}z} + \overline{x\overline{y}\overline{z}} + \overline{x\overline{y}z} + \overline{x\overline{y}\overline{z}} + \overline{x\overline{y}z}$

(iii)  $\overline{xyz} + \overline{x\overline{y}z} + \overline{x\overline{y}\overline{z}} + \overline{x\overline{y}z}$

# M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

**KRISHNA UNIVERSITY: MACHILIPATNAM**  
**I Semester M.Sc. (Computer Science) Examination**  
**MCS10416: DATABASE MANAGEMENT SYSTEMS**  
**(Regulation 2016-17)**

**Time : Three hours**

**Maximum: 70 marks**

**Answer ALL questions**

**All questions carry equal marks**

1. a) Explain DBMS systems Architecture with neat diagram.  
b) Write the advantages of using the DBMS approach.  
**OR**  
c) Explain Entity, Attributes types with examples.  
d) Explain about Specialization and Generalization with examples.
2. a) Explain about Relational models constraints and Relational Database Schemas.  
b) Write about Relational Algebra operations.  
**OR**  
c) Write about Attribute Data Types and Domains in SQL.  
d) Explain Join operations.
3. a) What is Normalization? What it is required?  
b) Define 3NF and BCNF. How BCNF is different from 3NF? Explain with a suitable examples.  
**OR**  
c) Define fourth normal form, why is it useful.  
d) Explain properties of Relational Decompositions.
4. a) Explain the Hashing techniques in files organization.  
b) Write about Operations on files.  
**OR**  
c) Write types of single – level ordered indexes.  
d) Describe the structure of B<sup>+</sup> tree.
5. a) Write about Desirable properties of transactions.  
b) Write about 3- tier client-server Architecture.  
**OR**  
c) Explain about concurrency control.

# M. Sc., Computer Science -Syllabus Regulation 2016-17 (CBSC)

**KRISHNA UNIVERSITY: MACHILIPATNAM**  
**I Semester M.Sc. (Computer Science) Examination**  
**MCS10516: DATA STRUCTURES**  
**(Regulation 2016-17)**

**Time: Three hours**

**Maximum: 70 marks**

**Answer ALL questions**  
**All questions carry equal marks ( 5 x 14 marks )**

- 1) a) Explain Space and Time analysis of algorithm with an example.  
b) What are various operations performed on data structures?  
**OR**  
c) What is complexity of an algorithm? Explain the Asymptotic notations for Complexity of algorithms.  
d) Define local and global variables.
- 2) a) Explain in detail about the operations performed on strings.  
b) Explain about Binary Search process with an example and give the complexity of the algorithm  
**OR**  
c) Explain about First Pattern matching algorithm  
d) Write short notes on Records
- 3) a) What is a Linked List? Write algorithms to perform operations in Single linked list.  
**OR**  
b) Define Queue. Implement the queue operations using arrays.  
c) Explain the process of converting an arithmetic expression from infix notation to postfix notation with an example.
- 4) a) Define Binary tree and write non-recursive algorithm for in order traversal of binary tree.  
b) What is a heap? Construct a heap with the following elements  
33, 5, 12, 43, 71, 6, 45, 21, 30  
**OR**  
c) Define Binary Search Tree and write an algorithm to search an element in a Binary Search tree.  
d) What are AVL search trees? Give example.
- 5) a) Explain the Graph traversal techniques.  
b) Illustrate the process of Quick sort algorithm over the following elements  
52, 45, 12, 64, 7, 56, 68, 10, 61  
**OR**  
c) Write an algorithm for Merge sort and give an example  
d) Explain Warshall's algorithm to find shortest paths in a weighted graph