

**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR.**

**B. Sc. Part – I CBCS Syllabus with effect from June, 2018**

**COMPUTER SCIENCE - DSC-1006A and DSC-1006B**

**SEMESTER I**

<b>Course:</b> <b>DSC-1006A</b>	<b>TOPICS (Credits : 4 Lectures/Week: 5)</b> <b>Problem Solving using Computers &amp; Database Management System-I</b>	
<b>Objectives – The objective of this course is to introduce various concepts of programming to the students using Python.</b> <b>Expected Learning Outcomes of this course:</b> <b>Students should be able to..</b> 1) Learn and understand the related and extended concepts of Python Programming and Database Management System. 2) Design complex problems using Python Programming Language and DBMS Environment 3) Recognize and identify the different concepts available in Python programming and DBMS 4) Solve and Analyze complex problems with different problem-solving techniques. 5) Explain and Justify problem solving techniques and concepts 6) Formulate, Construct and Demonstrate case studies.		
<b>SECTION - I</b>		
<b>Unit-I</b>	<b>Introduction to Programming Languages:</b> Programming languages-their classification and characteristics, language translators and language translation activities <b>Planning the Computer Program:</b> What is program and programming paradigms Concept of problem Solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. <b>Techniques of Problem Solving:</b> Algorithms, Flowcharting, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming	10L
<b>Unit II</b>	<b>Building Blocks of Program:</b> Data, Data Types, Data Binding, Variables, Constants, Declaration, Operations on Data such as assignment, arithmetic, relational, logical or boolean, ternary, bitwise, increment or decrement operators. <b>Introduction to Python Programming:</b> Features, Structure of a Python Program(Python Shell Indentations, Comments), Python Interpreter, Writing and executing simple program, Basic Data Types: numbers( int, long, float, complex), strings, Declaring variables, Performing assignments, arithmetic operations, Sequence Control – Precedence of operators, Type conversion, Simple input-output (print(), raw_input(), input())	10L

<b>Unit III</b>	<p><b>Conditional Statements:</b> if, if-else, nested if –else</p> <p><b>Looping:</b> for, while, nested loops, else clause with while and for loop</p> <p><b>Control statements:</b> Terminating loops, skipping specific conditions( break, continue, pass)</p> <p><b>Numeric Functions:</b> abs(), ceil(), floor(), max(), min(), pow(), sqrt()</p> <p><b>String Manipulation:</b> Declaring strings, String immutability, unicode string (u'String'), escape sequences(), Operations on String ( Concatenation (+), Repetition (*), Slicing ([index]), Range Slicing([start:end] or [:end] or [start:] , Member ship operator (in, not in) ), String Functions : capitalize(), len(), lower(), swapcase(), upper()</p>	18L
<b>SECTION II</b>		
<b>Unit I</b>	<p><b>Introduction to DBMS :</b></p> <p><b>Introduction of DBMS</b> – Database, DBMS – Definition, Overview of DBMS, File processing system vs DBMS, Limitation of file processing system, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture, Users of DBMS,</p> <p><b>Data models</b> - Object Based Logical Model, Record Based Logical Model ( relational, hierarchical, network)</p>	10 L
<b>Unit II</b>	<p><b>Entity Relationship Model</b> - Entities, attributes, entity sets, relations, relationship sets , Additional constraints ( key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER ( entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER), Entity Relationship Diagram (ERD)</p>	10 L
<b>Unit III</b>	<p><b>MySQL -</b></p> <p><b>DDL Statements</b> - Creating Databases, Using Databases, MySQL datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring databases</p> <p><b>DML Statements</b> – Viewing the structure of a table insert, update, delete, <b>Select</b> – all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having clause.</p> <p><b>Functions</b> – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse)</p> <p><b>DCL Statements</b> (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges)</p>	18 L

**Text books:**

- 1) Charles Dierbach, *Introduction to Computer Science using Python*, Wiley, 2013
- 2) James Payne , *Beginning Python: Using Python 2.6 and Python 3*, Wiley India, 2010
- 3) Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014

**Additional References:**

1. Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014
2. Adesh Pandey, *Programming Languages – Principles and Paradigms*, Narosa, 2008
- 3) A. Lukaszewski, *MySQL for Python: Database Access Made Easy*, Pact Publisher, 2010

**SEMESTER II**

<b>Course:</b> <b>DSC-1006B</b>	<b>TOPICS (Credits: 4 Lectures/Week: 5)</b> <b>Problem Solving using Computers &amp; Database Management System-II</b>	
<b>Objectives – The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from DBMS.</b>		
<b>Expected Learning Outcomes of this course:</b>		
<b>Students should be able to...</b>		
<ol style="list-style-type: none"> <li>1) Learn and Understand Basics of Programming Languages and Database Management Systems</li> <li>2) Learn and understand basics of Python Programming and Concepts of Database Management System</li> <li>3) Design small problems using Python Programming Language and DBMS Environment</li> <li>4) Solve and analyze small problems with different problem-solving techniques.</li> <li>5) Explain and Justify problem solving techniques and concepts</li> <li>6) Create simple programs and build simple database queries</li> </ol>		
<b>SECTION - I</b>		
<b>Unit I</b>	<p><b>Lists:</b> Creating a list, Displaying list(print()), Basic Operation( Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list. Compare (cmp()), Maximum(max()) and minimum (min()), List Methods (Append ( list.append()), Count (list.count()), Insert object (list.insert()), Remove (list.remove(), list.pop()), Reverse (list.reverse()))</p> <p><b>Tuples (sequence of immutable objects) :</b> Creating tuples(using () brackets) and Deleting tuple(del), empty tuple, Displaying( print()), Basic Operation( Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list, Compare (cmp()), Maximum(max()) and minimum (min()))</p>	10 L

<b>Unit II</b>	<p><b>Dictionaries</b> – Concept of dictionary, Creating Dictionary ({Key:Value,...}), Values are mutable objects but keys are immutable object, Properties of Dictionary keys, Basic Operation( Length (len()), Compare (cmp() ) , Dictionary Methods( Clear (dict.clear())), Existance of Key (dict.has_key()), List of dictionaries tuple pairs ( dict.items()), List of keys (dict.keys()), Add dictionary (dict.update()), Dictionary Values (dict.values() )</p> <p><b>Functions:</b> Defining Functions(def, name, arguments, : , function suite, return statement), calling a function, Pass arguments by value or by reference(using list), Advantages of functions, types of functions, function parameters( required, keyword, default ) , anonymous functions or ternary operator(lambda), Scope of a variable( global and local )</p> <p><b>Modules:</b> Importing module, Creating &amp; exploring modules, Math module, Random module, Time module, rules of locating module, namespace and scope (local and global), Functions for Modules ( List of elements (dir()), List of Local elements (locals()), List of Global elements (globals()), Re importing module (reload() )</p>	17 L
<b>Unit III</b>	<p><b>Algorithm, Searching and Sorting</b> – Searching(Linear, Binary) and sorting techniques ( Bubble, Insertion, Merge ), Efficiency of algorithms</p> <p><b>Python File Input-Output:</b> Opening and closing file, Various types of file modes, reading and writing to files</p>	10L
<b>SECTION II</b>		
<b>Unit I</b>	<p><b>Relational data model</b>– Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint</p>	10 L
<b>Unit II</b>	<p><b>ER to The Relational Model</b> - Entity to Table, Relationship to tables with and without key constraints.</p> <p><b>Introduction to Functional Dependencies and Normalization</b> – 1NF, 2NF, 3NF</p> <p><b>Relational Algebra</b> operations (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division)</p>	10 L
<b>Unit III</b>	<p><b>MySQL Joining Tables</b> – inner join, outer join (left outer, right outer, full outer)</p> <p><b>Subqueries</b> – sub queries with IN, EXISTS, sub queries restrictions, Nested sub queries, ANY/ALL clause, correlated sub queries</p> <p><b>Database Protection:</b> Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control</p> <p><b>MySQL</b> – Stored functions, procedures, cursor, trigger, views (creating, altering dropping, renaming and manipulating views)</p>	18 L

**Text books:**

- 1) Ramez Elmasri & ShamkantB.Navathe, *Fundamentals of Database Systems*, Pearson Education, Sixth Edition, 2010.
- 2) Joel Murach, *Murach's MySQL*, Murach, 2012

**Additional References:**

1. Robert Sheldon, Geoff Moes, *Begning MySQL*, Wrox Press, 2005.
2. Ramakrishnam, Gehrke, *Database Management Systems*, McGraw-Hill, 2007

## Semester I & II Practicals

DSC- 6A (Lab-I)	Practicals of DSC6A (Credits: 2, Pract/Week: 4)
	<p><b>Python Programming</b> Using the Operating system (logging, creating – deleting folders, creating-deleting files, using editors etc.)</p> <ol style="list-style-type: none"><li>(1) Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.</li><li>(2) Simple programs containing variable declaration and arithmetic operations</li><li>(3) Programs based on conditional constructs</li><li>(4) Programs based on loops</li><li>(5) Programs related to string manipulation</li><li>(6) Programs related to Lists, Tuples</li><li>(7) Programs related to dictionaries</li><li>(8) Programs to read &amp; write file.</li><li>(9) Programs to do searching and sorting</li></ol>

DSC6B(LAB-II)	Practicals of DSC6B (Credits: 2, Pract/Week: 4)
	<p><b>Introduction to Database Management Systems</b></p> <p><b>(1) Practical No. 1</b></p> <ul style="list-style-type: none"> <li>• Viewing all databases</li> <li>• Creating a Database</li> <li>• Viewing all Tables in a Database</li> <li>• Creating Tables (With and Without Constraints)</li> <li>• Inserting/Updating/Deleting Records in a Table</li> <li>• Saving (Commit) and Undoing (rollback)</li> </ul> <p><b>(2) Practical No. 2</b></p> <ul style="list-style-type: none"> <li>• Altering a Table</li> <li>• Dropping/Truncating/Renaming Tables</li> <li>• Backing up / Restoring a Database</li> </ul> <p><b>(3) Practical No. 3</b></p> <ul style="list-style-type: none"> <li>• Simple Queries</li> <li>• SIMPLE Queries with Aggregate functions</li> <li>• Queries with Aggregate functions (group by and having clause)</li> </ul> <p><b>(4) Practical No. 4</b></p> <ul style="list-style-type: none"> <li>• Queries involving</li> <li>• Date Functions</li> <li>• String Functions</li> <li>• Math Functions</li> </ul> <p>(On previously created tables and/or the dual table)</p> <p><b>(5) Practical No. 5</b></p> <p>Creating a savepoint  Commit &amp; Roll back  Granting and revoking permissions</p> <p><b>(6) Practical No. 6</b></p> <ul style="list-style-type: none"> <li>• Join Queries <ul style="list-style-type: none"> <li>○ Using 2 related tables</li> <li>○ More than 2 related tables</li> </ul> </li> </ul> <p><b>(7) Practical No. 7</b></p> <p>Sub Queries</p>