Kerala Technological university KTU First year B.tech Syllabus for**BE101-05 INTRODUCTION TO COMPUTING AND PROBLEM SOLVING**

Course No. : BE101-05

Course Name: INTRODUCTION TO COMPUTING AND PROBLEM SOLVING
L-T-P-Credits: 2-1-0-3

Year of Introduction: 2015

Course Objectives:

1. To learn basics of digital computers
2. To develop problem solving skills
3. To learn programming and to solve problems using computers

Syllabus:

Introduction to digital computer, Introduction to programming languages, Op erating systems, Problem Solving strategies, Examples for algorithms and flow charts, Introduction to C language, Operators and expressions. Data input and output, Functions, Scope rules and storage classes, Arrays and strings, Examples of two dimensional array - matrix operations etc., Pointers, Memory allocation functions, Bitwise operations, Data files, Command line arguments.

Expected outcome:

1. Ability to design algorithmic solution to problems.
2. Ability to convert algorithms to Python programs.
3. Ability to design modular Python programs using functions
4. Ability to design programs with Interactive Input and Output, utilizing arithmetic expression repetitions, decision making, arrays.
5. Ability to design programs using file Input and Output.
6. Ability to develop recursive solutions.

Text Book:

1. Computer Fundamentals, Anita Goel, Pearson Education
2. Computer Basics and C Programming, V. Rajaraman, Prentice-Hall India
3. How to think like a Computer Scientist: Learning with Python, Allen Downey et al., Green TeaPress

References:

1. Prelude to Programming: Concepts & Design, Stewart Venit and Elizabeth Drake, Pearson India.
2. How to solve it by Computer, R.G. Dromy, Pearson India.
3. Fundamentals of Computers, V. Rajaraman, Pretice Hall India
4. Problem Solving & Programming Concepts, Maureen Sprankle , Pearson India
5. Introduction to Computing and Programming in Python, Mark J Guzdial, Pearson India
6. Think Python, Allen Downey, Shroff Publisher Oreilly
7. Head First Python, Paul Barry, Oreilly Publishers
8. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc

Module 1 Contents

Introduction to digital computer – Von Newman concept – A simple model of computer with acquisition of data, storage of data, processing of data, output of processed data. Details of functional units of a computer. Storage – primary storage and secondary storage. (The discussion should focus more on the functionalities of the units and their interaction than on specific hardware details. However, concepts like memory cells and their addressability (need not be binary), registers, inter- connections (buses) have to introduced at an abstract level. For storage devices – primary and secondary –, various categories have to be introduced along with their distinguishing features. For I-O devices also,

various categories are to be introduced. The Von Newman concept should be effectively introduced. History computers need not be taught. However, students have to be encouraged to read the relevant sections of the text book. Chapters 1 – 4 of the first text book may be used to guide teaching and learning.) Introduction to programming languages: types of programming languages - high level language , assembly language and machine language System software - Operating systems – objectives of operating systems, compiler, assembler and interpreter. (For all the above topics, focus more on the concepts, significance and objectives. Chapter 6 and 7 (up to 7.4) of the first text book may be used to guide the teaching-learning process.)

Module 2 Contents

Problem Solving strategies – Problem analysis – formal definition of problem – Solution – top- down design – breaking a problem into sub problems- overview of the solution to the sub problems by writing step by step procedure (algorithm) - representation of procedure by flowchart - Implementation of algorithms – use procedures to achieve modularity. (This part should initially look into problems in general instead of looking into computer-solvable problems alone.) Examples for algorithms and flow charts - at least 10 problems (starting with non numerical examples, and numeric problems like factorial, largest among three numbers, largest among N, Fibonacci etc.) must be discussed in detail. (Class assignments and/or tutorials may be used to strengthen understanding of this part. Chapters 4 and 5 of the second text book may be used for the teaching-learning process.)

Module 3 Contents

Introduction to Python – variables, expressions and statements, evaluation of expressions, precedence, string operations (Note:- the instructor can demonstrate simple programs to the students and encourage them to

develop similar ones. Chapters 1 and 2 of the third text book have to be covered.) Functions, calling functions, type conversion and coercion, composition of functions, mathematical functions, user-defined functions, parameters and arguments. (Note: - Chapter 3 of the second text book has to be covered. The instructor should demonstrate each aspect of the function with real examples and encourage students to develop their own.)

Module 4 Contents

Control statements, Boolean expressions and logical operators, conditional and alternative executions (Note: - Chapter 4 of the third text book up to Section 4.9 has to be covered. The instructor should demonstrate each of these concepts with real examples and encourage students to develop as many as possible.) Iteration - while statement and tables. (Note: - Chapter 6 of the third text book has to be covered.)

Module 5 Contents

Strings and lists – string traversal and comparison with examples. (Note: - Chapter 7 of the third text book has to be covered.) List operations with examples (Note: - Chapter 8 of the third text book up to Section 8.6 has to be covered.); tuples and dictionaries – operations and examples (Note: - Chapters 9 & 10 of the third text have to be covered.)

Module 6 Contents

Files and exceptions – text files, directories (Note: - Chapter 11 of the thirdtext book has to be covered.). Introduction to classes and objects – attributes, instances (Note: - Chapter 12 of the third text book up to Section 12.6 has to be covered.). Hence the B.tech Syllabus for KTU .