MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
(Formerly West Bengal University of Technology)
Syllabus of B. Sc. in IT
(Effective from 2023-24 Academic Sessions)

SEMESTER: II

Paper: Programming with Python + Programming with Python Lab
Code: BSCITM201 + BSCITM291
Contacts Hours/ Week: 3L + 4P
Credits: 3+2

Course Objectives:

CO1: To understand and identify the different types of data.
CO2: To learn the use of Python variables, expressions, statements.
CO3: To learn how to use Python function.
CO4: To understand different types of conditional operators.
CO5: To understand different types of Iteration loops.
CO6: To understand different types of Python recursion.
CO7: To understand different uses of string.
CO8: To learn the concept of List in python.
CO9: To learn the concept of dictionaries & lists in python.
CO10: To learn the concept of tuple in python.
CO11: To learn the concept of Classes and Objects in python.

Course Outcomes:

Sl. No.	Course Outcome	Mapped Module
1	Ability to understand the basics of Python.	Module 1
2	Ability to understand and use of Python variables, expressions, statements.	Module 1
3	Ability to understand Python Functions.	Module 1
4	Ability to understand different types of conditional operators.	Module 2
5	Ability to understand different types of Iteration loops.	Module 2
6	Ability to understand different types of Python recursion.	Module 3
7	Ability to use Accessing values in string, Updating strings, Slicing strings using string methods.	Module 3
8	Ability to grasp the concept of List in python	Module 3
9	Ability to understand brief idea of dictionaries & lists	Module 3
10	Ability to understand Tuples	Module 3
11	Ability to understand Classes and Objects	Module 4

Module I: Introduction to Python (12L)

1. Introduction to Python
2. Python variables, expressions, statements: Variables, Keywords, Operators& operands, Expressions, Statements, Order of operations, String operations, Comments, Keyboard input, Example programs
3. Functions: Type conversion function, Math functions, Composition of functions, defining own function, parameters, arguments, Importing functions, Example programs

Module II: Conditions Iterations (8L)
1. Conditions: Modulus operator, Boolean expression, Logical operators, if, if-else, if-elseif-else, Nested conditions, Example programs
2. Iteration: while, for, break, continue, Nested loop, Example programs

Module III: Recursion, Strings, List, Dictionaries, Tuples(10L)
1. Recursion: Python recursion, Examples of recursive functions, Recursion error, Advantages & disadvantages of recursion
2. Strings : Accessing values in string, Updating strings, Slicing strings, String methods – upper(), find(), lower(), capitalize(), count(), join(), len(), isalnum(), isalpha(), isdigit(), islower(), isnumeric(), isspace(), isupper() max(), min(),replace(), split(), Example programs
3. List: Introduction, Traversal, Operations, Slice, Methods, Delete element, Difference between lists and strings, Example program
4. Dictionaries: Introduction, Brief idea of dictionaries & lists
5. Tuples: Introduction, Brief idea of lists & tuples, Brief idea of dictionaries & tuples

Module IV: Classes & Objects (10L)
Classes &Objects: Creating class, Instance objects, Accessing attributes, Built in class attributes, destroying objects, Inheritance, Method overriding, Overloading methods, Overloading operators, Data hiding, Example program.

Reference Books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Introduction to Computing and Problem Solving with Python, J. Jose, Khanna Publications
3. Python Programming, Seema Thareja, Pearson
4. Learn Python The Hard Way, Zed A. Shaw, ADDISON-WESLEY
5. Learning Python, Mark Lutz, O'REILY
6. Programming In Python, Dr. Pooja Sharma, BPB
7. Python Programming - Using Problem Solving Approach, Reema Thareja, OXFORD UNIVERSITY PRESS

Module No.	Content	Total Hours	% of questions	Covered CO
Module 1	Basics of Python	2	5	1
Module 2	Python variables, expressions, statements	5	12.5	2
Module 3	Python Functions	5	12.5	3
Module 4	Conditional operators	4	10	4
Module 5	Iteration	4	10	5
Module 6	Recursion	2	5	6
Module 7	Strings	2	5	7
Module 8	List	2	5	8
Module 9	Dictionaries	2	5	9
Module 10	Tuples	2	5	10
Module 11	Classes & Objects	10	25	11

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PAPER NAME: Study of Computer Architecture and organization
CREDIT: 5
PAPER CODE: BSCITM202
CONTACTS HOURS/ WEEK: 5L

COURSE OBJECTIVE:

The course "Computer Architecture" aims to provide students with a profound understanding of the essential principles, components, and design concepts governing modern computer systems. Throughout the program, students will explore the intricate workings of computer hardware, its structural organization, and its dynamic interaction with software. The primary goals of the course are to equip students with the ability to comprehend the inner workings of computers, critically analyze their performance, and foster the skills needed to make informed design decisions, ultimately contributing to the development of efficient and reliable computing systems.

COURSE OUTCOME	
CO1	To enable the students to understand the functionality and implementation of computer system.
CO2	To familiarize with the various instruction codes and formats of different CPUs.
CO3	To introduce the students to I/O and memory organization of computer system
CO4	To deliver an overview of Control Unit of a computer system
CO5	To learn the usage of parallel and vector processing.

DETAILED SYLLABUS:

Module No:	**NAME OF THE TOPIC**	**HOURS**	**MARKS**

M1	Data Representation: Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2' complement, 9's complement, 10' complement, [r-1]'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation	**4**	**5**
M2	Computer arithmetic: Addition algorithm of sign magnitude numbers, Subtraction algorithm of sign magnitude numbers, Addition algorithm of signed 2's complement data, Subtraction algorithm of signed 2's complement data, Multiplication algorithm, Booth's algorithm, Division algorithm	**4**	**5**
M3	Register transfer and micro-operations: Register transfer language, Register transfer, Bus system for registers, Memory transfers – memory read, memory write, Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, Binary adder, binary adder-subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, One stage logic circuit, Selective set, Selective complement, Selective clear, ask, Insert, Clear	**5**	**5**
M4	Basic Computer organization and design: Instruction codes, Direct address, Indirect address & Effective address, List of basic computer registers, Computer instructions: memory reference, register reference & input – output instructions, Block diagram & brief idea of control unit of basic computer, Instruction cycle	**4**	**5**
M5	Micro programmed control: Control memory, Address sequencing, Micro program examples	**4**	**5**
M6	Central processing unit: General register organization, Stack organization, Register stack, Memory stack, Stack operations – push & pop, Evaluation of arithmetic expression using stack, Instruction format, Types of CPU organization [single accumulator, general register & stack organization] & example of their instructions, Three, two, one & zero address instruction, Definition and example of data transfer, data manipulation & program control instructions, Basic idea of different types of interrupts [external, internal & software interrupts], Difference between RISC & CISC	**6**	**5**

M7	Pipeline and vector processing: Parallel processing, Flynn's classification, Pipelining, Example of pipeline, space time diagram, speedup, Basic idea of arithmetic pipeline, example of floating point addition/ subtraction using pipeline	**6**	**10**
M8	Input – output organization: Peripheral devices, Input – output interface, Isolated I/O, Memory mapped I/O, Asynchronous data transfer: strobe & handshaking, Programmed I/O, Interrupt initiated I/O, Basic idea of DMA & DMAC Input – output processor	**6**	**10**
M9	Memory organization: Memory hierarchy, Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, Cache memory, Cache memory mapping – Direct, Associative, Set Associative, CAM, hardware organization of CAM, Virtual memory, mapping using pages, page fault, mapping using segments, TLB, Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, Definitions of seek time, rotational delay, access time, transfer time, latency	**6**	**20**
	INTERNAL EXAMINATION	**3**	**30**
	TOTAL	**48**	**100**

SUGGESTED READING:

1. V. Carl, G. Zvonko and S. G. Zaky, "Computer organization", McGraw Hill, 1978.
2. B. Brey and C. R. Sarma, "The Intel microprocessors", Pearson Education, 2000.
3. J. L. Hennessy and D. A. Patterson, "Computer Architecture A Quantitative Approach", Morgan Kauffman, 2011.
4. W. Stallings, "Computer organization", PHI, 1987.
5. M. Morris Mano "Computer System Architecture " PEARSON
6. Rajaraman – "Computer Organization & Architecture", PHI
7. B.Ram – "Computer Organization & Architecture", Newage Publications
8. J.P. Hayes " Computer Architecture & Organization", TATA MCGRAW HILL