

University of Mumbai



No. AAMS_UGS/ICC/2024-25/16

CIRCULAR:-

Attention of the Principals of the Affiliated Colleges and Directors of the Recognized Institutions in Faculty of Science & Technology is invited to this office Circular No. UG/08 of 2018-19 dated 12th June, 2018 relating to the revised syllabus as per the (CBCS) for the T.Y.B.Sc. in Physics including Applied Component – Electronic Instrumentation (EI) & Computer Course (CS) (Sem –V & VI).

They are hereby informed that the recommendations made by the **Board of Studies in Physics** at its meeting held on 29th February, 2024 and subsequently passed by the Board of Deans at its meeting held on 18th April, 2024 vide item No. 6.4 (R) have been accepted by the Academic Council at its meeting held on 20th April, 2024 vide item No. 6.4 (R) and that in accordance therewith the **revised syllabus T.Y. B.Sc. Applied Component (Computer Science) – (Sem V & VI) (CBCS)** has been brought into force with effect from the academic year 2024-25.

(The said circular is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
01st July, 2024

Baliram
(Prof. (Dr.) Baliram Gaikwad)
I/c. REGISTRAR

To.

The Principals of the Affiliated Colleges and Directors of the Recognized Institutions in Faculty of Science & Technology.

A.C/6.4 (R) /20/04/2024

Copy forwarded with Compliments for information to:-

- 1) The Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies **Physics**,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Director, Department of Information & Communication Technology,
- 6) The Co-ordinator, MKCL,
- 7) The Deputy Registrar, Admissions, Enrolment, Eligibility & Migration Department (AEM),
- 8) The Deputy Registrar, Result Unit,
- 9) The Deputy Registrar, College Affiliations Development Department (CAD)

Copy for information and necessary action :-

1. The Deputy Registrar, College Affiliations & Development Department (CAD),
2. College Teachers Approval Unit (CTA),
3. The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),
4. The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA)
5. The Deputy Registrar, Research Administration & Promotion Cell (RAPC),
6. The Deputy Registrar, Executive Authorities Section (EA)
He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
7. The Deputy Registrar, PRO, Fort, (Publication Section),
8. The Deputy Registrar, Special Cell,
9. The Deputy Registrar, Fort Administration Department (FAD) Record Section,
10. The Deputy Registrar, Vidyanagari Administration Department (VAD),

Copy for information :-

1. The Director, Dept. of Information and Communication Technology (DICT), Vidyanagari,
He is requested to upload the Circular University Website
2. The Director of Department of Student Development (DSD),
3. The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,
4. All Deputy Registrar, Examination House,
5. The Deputy Registrars, Finance & Accounts Section,
6. The Assistant Registrar, Administrative sub-Campus Thane,
7. The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,
8. The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,
9. P.A to Hon'ble Vice-Chancellor,
10. P.A to Pro-Vice-Chancellor,
11. P.A to Registrar,
12. P.A to All Deans of all Faculties,
13. P.A to Finance & Account Officers, (F & A.O),
14. P.A to Director, Board of Examinations and Evaluation,
15. P.A to Director, Innovation, Incubation and Linkages,
16. P.A to Director, Department of Lifelong Learning and Extension (DLLE),
17. The Receptionist,
18. The Telephone Operator,

Copy with compliments for information to :-

19. The Secretary, MUASA
20. The Secretary, BUCTU.

University of Mumbai



**Revised Syllabus for
T.Y.B.Sc. Applied Component
(Computer Science)
Semester – (Sem. V and VI)
(Choice Based Credit System)**

(With effect from the academic year 2024-25)

University of Mumbai



Syllabus for Approval

O: _____	Title of Course	T.Y.B.Sc. Applied Component (Computer Science)
O: _____	Eligibility	As per University Ordinance
R: _____	Passing Marks	40
No. of years/Semesters:		1 Year (2 Semesters)
Level:		U.G.
Pattern:		Semester
Status:		Revised
To be implemented from Academic Year :		From Academic Year: 2024-25

Chairman,
Dr. T.N.GHORUDE
Board of Studies in
Physics

Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

Sign of the
Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology

SEMESTER V**Theory**

USACCS501	Advanced Microprocessor, Microcontrollers & Python Programing		No of Credits	Lectures/ Week
Units	I	Advanced 8085 Microprocessor Programming	2	4
	II	Introduction to 8051 microcontroller , instruction set & Programming		
	III	Python Programming Language		
	IV	Python Programming Language		

Practicals

USACCS5P1	Microprocessors , Microcontrollers , Python Programming	2	4
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SEMESTER VI**Theory**

USACCS601			No of Credits	Lectures/ Week
Units	I	8051 microcontroller	2	4
	II	Python Programming		
	III	Python Programming		
	IV	Python Programming		

Practicals

USACC6P1	Microcontroller , Python Programming	2	4
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The revised syllabus under the credit based grading system in the subject of Computer Science (Applied Component) for Third Year B.Sc. Physics (Single/Twin major subject) **will be implemented from the academic Year 2024-2025**

The scheme of examination in the subject of Computer Science (Applied Component) will be as follows:

Semester V & VI: Theory

Course Code: USACCS501 & USACS601

(A) External Examination : 75 marks

- Duration of each Theory paper will be three **hours**.
- Each theory paper shall consist of **five questions**, **one** from each unit and the **fifth question** will be from all the units. All questions are compulsory and will have internal choice.

SEMESTER V

Theory: Advanced 8085 Programing, Introduction to Microcontrollers & Python Programming

Version : 3.x for Python

Unit	Details	Lectures
I	Advanced 8085 Programming and 8255(PPI) (i) Introduction to advanced instructions and applications Ref. RG: 10.7 (entire) (ii) Stack and Subroutines: Stack, Subroutine Ref. RG: 9.1, 9.1.1, 9.2&9.2.1 (iii) The 8255 Programmable Peripheral Interface Block Diagram of the 8255, Mode 0 – Simple Input or Output mode, BSR (Bit Set/Reset Mode) Ref. RG: 15.1.1, 15.1.2& 15.1.3	15
II	Introduction to Microcontrollers (i) Introduction, Microcontrollers and Microprocessors, History of Microcontrollers and Microprocessors, Block diagram of 8051 Microcontroller*, Embedded Versus External Memory Devices, 8-bit & 16-bit Microcontrollers, CISC and RISC Processors, Harvard and Von Neumann Architectures, Commercial Microcontrollers. Ref. AVD-Ch: 1 Ref. MMM - For * Refer 1.2 The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R.D.Mckinlay, Second Edition, Pearson (ii) 8051 Microcontrollers: Introduction, MCS-Architecture, Registers in MCS-51, 8051 Pin Description, 8051 Connections, 8051 Parallel I/O Ports, Memory Organization. AVD-Ch: 2, 3 (iii) 8051 Instruction Set and Programming: MCS-51 Addressing Modes and Instructions: 8051 Addressing modes, MCS-51 Instruction Set, 8051 Instructions and Simple Programs, Using Stack Pointer AVD-Ch: 4 Ref. AVD: - Microcontrollers (Theory and Applications) by Ajay V Deshmukh, The Tata-McGraw-Hill Companies Ref. Intel's 8031/8051 Data sheet	15

III	<u>Introduction:</u> What is a Program, The Python Programming Language, History, features, Installing Python, Running a Python program, the first program , Arithmetic operators , Values and types, Formal and Natural Languages AD: Think Python , 2nd Edition : Chapter 1 <u>Variables , Expressions and Statements :</u> Assignment statements , Variable Names and Keywords, Expressions and statements , Script mode , Order of Operations , String operations , Comments , Debugging : Syntax Errors, Runtime Errors, Semantic Errors. AD: Think Python , 2nd Edition : Chapter 2 <u>Functions:</u> Function basics, Function Calls, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Local variables and parameters, Stack Diagrams, Fruitful Functions and void Functions , return values , composition , incremental development , Boolean functions AD: Think Python , 2nd Edition : Chapter 3 AD: Think Python , 2nd Edition : Chapter 6 : Art : 6.1 , 6.2 , 6.3 and 6.4 <u>Conditionals and recursion :</u> Floor division and modulus, Boolean expression , Logical operators, Conditional expression, Alternative execution , chained conditionals , Nested conditionals, Recursion , Stack diagrams for recursive functions , infinite recursion , keyboard input. Programs on recursion AD: Think Python , 2nd Edition : Chapter 5 AD: Think Python , 2nd Edition : Chapter 6 : Art : 6.5 ,6,6 ,6,7 & 6.8	15
IV	<u>Iterations :</u> Reassignment , updating variables , while statement, break statement AD: Think Python , 2nd Edition : Chapter 7 up to 7.4 <u>Strings:</u> A String is a Sequence, len built in function , for Loop traversal , String Slicing , Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparisons. AD: Think Python , 2nd Edition : Chapter 8 <u>Lists:</u> Sequences, Introduction to Lists, Lists are mutable, Traversing a List, List operations, List Slicing, List methods, Deleting elements, Lists & Strings, Objects & Values , Aliasing , List arguments. AD: Think Python , 2nd Edition : Chapter 10	15

References:

For units I and II

RG : Ramesh Gaonkar "Microprocessor Architecture Programming and Applications with the 8085" (RG) 5th edition Penram

AVD: Microcontrollers (Theory and Applications) by Ajay V Deshmukh, The Tata-McGraw-Hill Companies.

Intel's 8031/8051 Data sheet

For Units III and IV

Official Python Web site : <https://www.python.org/>

AD : Think Python by Allen Downey , 2nd Edition

Additional References:

1. The 8051 Microcontroller & Embedded Systems-Dr. Rajiv Kapadia (Jaico Pub. House)
2. 8051 Micro-controller by K.J.Ayala, Penram International.
3. Programming & customizing the 8051 microcontroller By MykePredko, TMH.
4. The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R.D.Mckinlay, Second Edition, Pearson
5. Paul Gries, et al., Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014

In addition to the reference books **internet web-sites & MOOC** can be used wherever necessary.

List of Practicals

Group A: Advanced 8085 microprocessor & Microcontrollers

A1. Experiments for 8085 and 8255

Any one experiment from 1 & 2 and 3 & 4

1. 16-bit Data manipulation (Addition, subtraction) Display result on Address field
2. Write ALP for Addition, Subtraction of two, 8-bit hex numbers. Note: Use Read Keyboard Utility for inputting the hex numbers and display for the result on the Address field.
3. Interfacing 8 LEDs to 8255
 - (i) Write ALP to alternately flash 8 LEDs

- (ii) Write ALP to display binary count in UP sequence on the 8 LEDs
4. Interfacing 8 switches and 8 LEDs to 8255
- Write ALP read the status of the switches and display on the LEDs.
 - Write ALP so that when the first switch is made ON all the LEDs should glow and when the second switch is made OFF all the LEDs should become off.

A2. Experiments for 8031/8051/89C51

Any two experiments from 1, 2 and 3

- 8031/51/89C51 assembly language programming:
Simple data manipulation programs.
(8/16-bit addition, subtraction, multiplication, 8/16-bit data transfer, cubes of nos., to rotate a 32- bit number, finding greatest/smallest number from a block of data, decimal / hexadecimal counter)
- Study of IN and OUT port of 8031/51/89C51 by Interfacing switches, and LEDs:
Interface 4 LEDs to one of the microcontrollers PORT.
Write ALP to display bit pattern on LED's.

(i) 1000 0100 0010 0001 continuously	(ii) 1100 0110 0011 continuously
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- Interface 4 switches and 4 LEDs to one of the microcontrollers PORT.
Develop various types of logic to control LEDs depending on the status/states/conditions of the 4 switches.
For example:
Write ALP such that when all four switches are ON all four LEDs should glow.
But when any two switches become OFF then all four LEDs should become OFF.
And so on.....

Group B: Python Programming Exercises

B1 : Perform minimum two experiment from B1:

- Write a program to generate the Fibonacci series.
- Write a program to generate if a three digit number entered is an Armstrong number or not
- Write a function that reverses the user defined value.

- Write a recursive function to print the factorial for a given number.

B2 : Perform minimum one experiment from B2:

- Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise.
- Define a function that computes the *length* of a given list or string.

B3: Perform minimum two experiments from B3:

- Write a program that takes two lists and returns True if they have at least one common member.
- Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.
- Write a Python program to clone or copy a list

SEMESTER VI

Theory:

Version : 3.x for Python

Unit	Details	Lectures
I	8051 microcontroller: Timer/Counters, Serial Communication, Interrupts Programming 8051 Timers, Counter Programming, Basics of Serial Communication, 8051 Connection to RS232, 8051 Serial Port Programming in assembly, 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts Ref. MMM - Ch 9: 9.1, 9.2, 10.1, 10.2, 10.3, 11.1, 11.2, 11.3 Ref. MMM - The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R.D.Mckinlay, Second Edition, Pearson Ref. Intel's 8031/8051 Data sheet	15
II	Dictionaries : Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods , in operator Tuples: Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions Files: Text Files, The File Object Attributes, Directories Exceptions: Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions	15
III	Classes and Objects: Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Data Hiding Multithreaded Programming: Thread Module, creating a thread, synchronizing threads, multithreaded priority queue Modules: Importing module, Creating and exploring modules, Math module, Random module, Time module	15

IV	Creating the GUI Form and Adding Widgets: Widgets: Tkinter module , Label , Buttons , Checkbutton, Radiobuttons, Text box , Canvas , Entry, Frame, Text, Menu, LabelFrame, Scrolled Text Widgets , Message boxes , Spinbox . Handling Standard attributes and Properties of Widgets. Layout Management: Designing GUI applications with proper Layout Management features. Look and Feel Customization: Enhancing Look and Feel of GUI using different appearances of widgets. Storing Data in Our MySQL Database via Our GUI: Connecting to a MySQL database from Python, Configuring the MySQL connection, Designing the Python GUI database, Using the INSERT command, Using the UPDATE command, Using the DELETE command, Storing and retrieving data from MySQL database.	15
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References:

For units I

- MMM - The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R.D.Mckinlay, Second Edition, Pearson
- Intel's 8031/8051 Data sheet

For Units II , III and IV

- Official Python Web site : <https://www.python.org/>
- AD : Think Python by Allen Downey , 2nd Edition
- Paul Gries , Jenifer Campbell , Jason Montojo : Practical Programming , Introduction to Computer Science using Python 3 , Second Edition.
- Burkhard Meier : Python GUI Programming Cookbook , Packt Publishing
- Michael H. Goldwasser, David Letscher ,Object-oriented Programming in Python , Michael H. Goldwasser

In addition to the reference books **internet web-sites & MOOC** can be used wherever necessary.

List of Practicals

Group A: Microcontrollers

Any two experiments from the following:

1. Study of TIMER0/1 in Mode 0.
2. Study of TIMER0/1 in Mode 1.
3. Study of TIMER0/1 in Mode 2.
4. Study of External Interrupts INT0 / INT1.

Group B: Python Programming Exercises

B1 : Perform minimum two experiment from B1:

- Write a Python script to sort (ascending and descending) a dictionary by value.
- Write a Python script to concatenate following dictionaries to create a new one.
- Write a Python program to sum all the items in a dictionary.
- Write a Python program to read an entire text file.
- Write a Python program to append text to a file and display the text.
- Write a Python program to read last n lines of a file.

B2 : Perform minimum one experiment from B2:

- Design a class that store the information of student and display the same
- Implement the concept of inheritance using python
- Write a program to implement exception handling.

B3: Perform minimum two experiments from B3:

- Try to configure the widget with various options like: bg="red", family="times", size=18
- Try to change the widget type and configuration options to experiment with other widget types like Message, Button, Entry, Checkbutton, Radiobutton, Scale etc.
- Design a simple database application that stores the records and retrieve the same.
- Design a database application to search the specified record from the database.
- Design a database application to that allows the user to add, delete and modify the records.



Chairman,
Dr. T.N.GHORUDE
Board of Studies in
Physics

Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
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Technology

Sign of the
Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology