

The University of Burdwan



Syllabus of 3 Years Degree / 4 Years Honours in B.C.A

***Under Curriculum and Credit Framework
for Undergraduate Programme (CCFUP) in
B.C.A as per NEP, 2020.***

Preamble

The new curriculum of the four-year undergraduate program under NEP, for Computer Application aims to develop the core competence in computing and problem solving amongst its graduates. Informally, “Learning to learn” has been the motto of the department since its inception. The curriculum thus focuses on building theoretical foundations in Computer Application to enable its pupils to think critically when challenged with totally different and new problems. It imbibes the following **Student-Centric** features of NEP2020:

Flexibility to Exit: In order to support early exits, the curriculum aims to develop employability skills early. This has been done so that the outcomes of the 4 yr degree is not compromised as we believe that all but a few students will go for the full 4-year degree. As programming is at the heart of computing it is proposed to have two programming courses early so that the students can develop good programming skills in the first year. At the same time students are familiarized with the hardware of computers early on.

Employability: Industry demand in the IT sector has changed considerably in the past few years. With the humongous amount of data coming from all the domains like medical data, social networking data, astronomical data, education, etc., automating information extraction and analysis of data is the only way forward to leverage the available data for the future. The curriculum aims to equip the students with tools and techniques of Artificial Intelligence, Machine Learning and a pathway on Data Science if the student so desires. Having said this, there is no replacement for the foundational courses like programming, data structures and algorithms. With two courses on programming and three courses on data structures and algorithms together, a strong foundation will be laid down for problem solving.

Multidisciplinary/Minor: The curriculum provides two pathways one of Computer Application minor and the other of interdisciplinary, to the students from other disciplines. Those who want to earn a minor in CS will be required to choose the first pathway whereas those who simply want to apply IT in the domain of their interest can choose the second path way.

Research: With the option to obtain specialization in an area of their choice, the curriculum prepares the students to take up research projects in their final year.

Semester	Course Type & Course Code	Name of the Course	Credit	Lect.	Tuto.	Pract./ Viva	Full Marks	Distribution of Marks		
								Theory	Pract. / Tuto./ Viva-voce	Internal Assessment
I	Major/DS Course (Core) BCA 1011	Computer Fundamentals and Introduction to C Programming	4	3	0	1	75	40	20	15
	Minor Course BCA 1021	Mathematics-I (Only for BCA Students)	4	3	1	0	75	60	0	15
	Multi/Interdisciplinary BCA 1031	Basic IT tools (For other discipline)	3	2	1	0	50	40	0	10
	Ability Enhancement Course (AEC) [L ₁ -1 MIL] AEC 1041	Arabic/ Bengali/ Hindi/ Sanskrit/ Santali/ Urdu or Equvnt. Course from SWAYAM or UGC recognized others	2	2	0	0	50	40	0	10
	Skill Enhancement Course (SEC) BCA 1051	PC Software	3	0	0	3	50	0	40	10
	Common Value Added (CVA) Course CVA1061	Environmental Science/ Education	4	3	0	1	100	60	20	20
	Total		20				400			

Semester	Course Type & Course Code	Name of the Course	Credit	Lect.	Tuto.	Pract. /Viva	Full Marks	Distribution of Marks		
								Theory	Pract. / Tuto./ Viva-voce	Internal Assessment
II	Major/DS Course (Core) BCA 2011	Data Structures	4	3	0	1	75	40	20	15
	Minor Course BCA 2021	Mathematics-II (Only for BCA Students)	4	3	1	0	75	60	0	15
	Multi/Interdisciplinary BCA 2031	Introduction to Internet (For other discipline)	3	2	1	0	50	40	0	10
	Ability Enhancement Course (AEC)[L₂-1] ENGL 2041	Functional English or Equvlt. Course from SWAYAM or UGC recognized others	2	2	0	0	50	40	0	10
	Skill Enhancement Course (SEC) BCA 2051	Python Programming	3	0	0	3	50	0	40	10
	Common Value Added (CVA) Course CVA 2061		4	3/3	1/0	0/1	100	80/60	0/20	20
	Total		20				400			

Students exiting the programme after securing 40 credits will be awarded UG Certificate in Computer Application provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester.

SEMESTER - I

BCA 1011: Computer Fundamentals and Introduction to C Programming

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- **Learn about basic Components of a Computer.**
- **Develop problem solving skills coupled with top-down design principles.**
- **Become skilled at developing simple algorithms and flow charts.**
- **Convert the algorithms into simple C programs.**
- **Develop simple C programs for solving real life problems.**

Credit :3

45 Hours

Introduction – Introduction to computers – Evolution – Generation of Computers – Computers Hierarchy – Applications of Computers – Number System – Binary, Hexa, Octal, BCD System - Boolean Algebra – laws – logic gates – simplification of Boolean expression – k-map – sum of products – product of sums.
15hours

Introduction to computers and operating environment, program development cycle, Algorithm - Representation of Algorithms, Pseudocode, Flowchart & Decision tables, Structured Programming and Modular Programming, Introduction to C.
10hours

Data Types and sizes, variable declaration, operators, type conversion, conditional expressions, special operators, precedence rule. Control Structures- statements and blocks, if, switch, while, for, do-while, break, continue, goto and labels. [20%]
10hours

Functions & Program structure, recursion, arrays and pointers, structures and unions, standard I/O,formatted I/O, standard library functions. Files handling and pre-processing. String processing in C.
10hours

Books:

1. Programming in C-B.S. Gottfried (Sahaum Series)
2. Programming in ANSI C- E. Balaguruswami(TMH)

BCA 1011: Computer Fundamental and Introduction to C Programming (Practical)

Credit :1

30 Hours

1. WAP to print the sum and product of digits of an integer.

2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series $S = 1 + 1/2 + 1/3 + 1/4 + \dots$
4. WAP to compute the sum of the first n terms of the following series $S = 1 - 2 + 3 - 4 + 5 \dots$
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```

*
***
*****
*****
*****

```

10. WAP to perform following actions on an array entered by the user:

- i) Print the even-valued elements
- ii) Print the odd-valued elements
- iii) Calculate and print the sum and average of the elements of array
- iv) Print the maximum and minimum element of array
- v) Remove the duplicates from the array
- vi) Print the array in reverse order

The program should present a menu to the user and ask for one of the options. The menu should also

include options to re-enter array and to quit the program.

11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as

command line arguments.

12. Write a program that swaps two numbers using pointers.

13. Write a program in which a function is passed address of two variables and then alter its contents.

14. Write a program which takes the radius of a circle as input from the user, passes it to another

function that computes the area and the circumference of the circle and displays the value of area and

circumference from the main() function.

15. Write a program to find sum of n elements entered by the user. To write this program, allocate

memory dynamically using malloc() / calloc() functions or new operator.

16. Write a menu driven program to perform following operations on strings:

- a) Show address of each character in string
- b) Concatenate two strings without using strcat function.
- c) Concatenate two strings using strcat function.
- d) Compare two strings
- e) Calculate length of the string (use pointers)
- f) Convert all lowercase characters to uppercase
- g) Convert all uppercase characters to lowercase
- h) Calculate number of vowels
- i) Reverse the string

17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered

array.

18. WAP to display Fibonacci series (i) using recursion, (ii) using iteration

19. WAP to calculate Factorial of a number (i) using recursion, (ii) using iteration

20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.

21. Create Matrix class using templates. Write a menu-driven program to perform following Matrix

operations (2-D array implementation):

- a) Sum
- b) Difference
- c) Product
- d) Transpose

BCA 1021: Mathematics-I

This course introduces the students to the fundamental concepts and topics of linear algebra and vector calculus, whose knowledge is important in other computer courses. The course aims to build the foundation for some of the core courses in later semesters.

Course Learning Outcomes After successful completion of this course, the student will be able to:

- **Perform operations on matrices and sparse matrices**
- **Compute the determinant, rank and eigenvalues of a matrix**
- **Perform operations on vectors, the dot product and cross product**
- **Represent vectors geometrically and calculate the gradient, divergence, curl**
- **Apply linear algebra and vector calculus to solve problems in sub-disciplines of computer science**

Credit :4 **60 Hours**

Algebra: Sets, Union and Intersection, Complement, Mapping, Composition, notion of a Group, Ring , Field with simple examples. **10hours**

Complex Number: Modulus and amplitude, De Moiver's theorem **05hours**

Polynomials, Division algorithm, Fundamental theorem of classical algebra (Proof not required),Descartes rule of sign and their application, Relation between roots and coefficients; symmetric function of roots, Transformation of polynomial equation, Cardon's solution of cubic equation, Determinants, Addition and Multiplication of Matrices, Inverse of a Matrix ; Solution of linear equations in three variables by Cramer's rule and solution of three line linear equations by matrix inversion methods. **20hours**

Vector spaces, Subspaces, Bases and Dimensions, Co-ordinates, Linear Transformation, The Algebra of Linear Transformations. Vector Algebra: Scalars & vectors, vector addition, linear combination of vectors, condition of colinearity of three points, scalar and vector products, scalar triple product and vector triple product. **15hours**

Analytical Geometry: Translation and rotation of rectangular axes, invariants, general equation of second degree-reduction to standard forms and classification. Plane polar equation of a straight line, circle, ellipse, parabola and hyperbola. **10hours**

Books:

1. A Text book of Algebra- B.K. Lahiri & K. C. Roy
2. Linear Algebra- Das & Roy
3. Co-ordinate Geometry- S. L. Loney
4. Differential Calculus- Das and Mukherjee
5. Integral Calculus - Das and Mukherjee

Multi/Interdisciplinary courses

(For other discipline)

Semester-I

BCA 1031: Basic IT Tools(Theory)

Credit: 03

45 Hours

The goal of this course is to present overview of IT tools used in day-to-day use of computers and data base operations. The Course has been designed to provide knowledge on various hardware and software components of computer, operating system, various packages used for different applications, data base concepts & operations and various issues related to IT and application of IT.

Course Learning Outcomes:

On successful completion of the Course, a student will:

- i. Acquire the foundation level knowledge required to understand computer and its operations.
- ii. Understand the hardware and software components of the computer.
- iii. Understand the basic concept of operating system and get knowledge about various different operating systems.
- iv. Understand to use the packages of word processing, spread sheet and presentation in detail.
- v. Understand various data base concepts and operations.
- vi. Understand the issues related to IT and IT applications
- vii. Prepare research and academic related presentations.

Syllabus

Introduction – Introduction to computers – Evolution – Generation of Computers – Computers Hierarchy – Applications of Computers. (5 Hrs)

Windows Basics – Introduction to word – Editing a document - Move and Copy text - Formatting text & Paragraph

– Enhancing document – Columns, Tables and Other features. (10 Hrs)

Introduction to worksheet and shell – getting started with Excel – Editing cell & using Commands and functions – Moving & Copying, Inserting & Deleting Rows & Columns - Printing work sheet. (5 Hrs)

Creating charts – Naming ranges and using statistical, math and financial functions, database in a worksheet – Additional formatting commands and drawing toolbar – other commands & functions – multiple worksheet and macros. (10 Hrs)

Introduction to Database Development: Database Terminology, Objects, Creating Tables, working with fields, understanding Data types, changing table design, Assigning Field Properties, Setting Primary Keys, select data with queries: Creating simple Query by design & by wizard (10 Hrs)

Overview of Power point – presenting shows for corporate and commercial using Power point –Introduction to Desktop publishing – Computer viruses – Introduction to Internet – Web features. (5 hrs)

Reference Books:

- i. Swinford, E., Dodge, M., Couch, A., Melton, B. A. (2013). Microsoft OfficeProfessional 2013. United States: O'Reilly Media.
- ii. Wang, W. (2018). Office 2019 For Dummies. United States: Wiley. Microsoft
- iii. Lambert, J. (2019). Microsoft Word 2019 Step by Step. United States: Pearson Education.
- iv. Jelen, B. (2013). Excel 2013 Charts and Graphs. United Kingdom: Que.
- v. Alexander, M., Jelen, B. (2013). Excel 2013 Pivot Table Data Crunching. UnitedKingdom: Pearson Education.
- vi. Alexander, M., Kusleika, R. (2018). Access 2019 Bible. United Kingdom: Wiley.

BCA 1051: PC Software (Practical)

Course Learning Outcomes: After successful completion of the Course:

- **Learners will be able to claim proficiency in MS-Office.**
- **Learners will able to independently create professional-looking documents and presentations.**
- **Learners will be familiar with some advanced Word Power Point and Excel functions.**
- **Learners will be able to prepare research and academic related presentations.**

Credit :3

45 Hours

DOS: Introduction to DOS, internal and external commands, batch files (Autoexec.bat, config.sys), Line editors.

MS Windows: Desk top cell user interface action, icon on desktop, closing windows, renaming icons, resizing windows(maximizing and minimizing), control panel.

MS Word: Overview, creating, saving, opening, importing, exporting, and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size, editing, positioning, viewing texts, searching and replacing text, inserting page breaks, page numbers, bookmarks, symbols, and dates. Using tabs and tables, header, footer, and printing,

MS Excel: Worksheet overview, entering information, worksheet creation, opening and saving workbook, formatting numbers and texts, protecting cells, producing charts, and printing operations.

MS Access: Introduction, understanding databases, creating tables, queries, forms, reports, adding graphs to your reports. PowerPoint: Slide creation with PowerPoint.

BOOKS:

1. Computer Fundamentals – Raja Raman – Prentice Hall of India .
2. Digital Circuits & Design – S.Salivahanan, S.Arivazhagan – Vikas Publishing House Pvt Ltd.
3. Digital logic & Computer Design- M.Mano- Prentice Hall of India

SEMESTER – II

BCA 2011: Data Structures

Course Learning Outcomes: (After the completion of course, the students will have ability to):

- To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles
- To have knowledge of complexity of basic operations like insert, delete, search on these data structures.
- Ability to choose a data structure to suitably model any data used in computer applications.
- Design programs using various data structures Binary and general search trees, heaps etc.
- Ability to assess efficiency tradeoffs among different data structure implementations.

Implement and know the applications of algorithms for sorting, searching etc.

Credit :3	45Hours
Introduction: Introduction to algorithm, analysis for space and time requirements.	5hours
Linear data structures and their sequential representation: Array, Stack, queue, circular queue, dequeue and their operation's and applications.	10hours
Linear data structures and their linked representation: linear linked list, doubly linked list, linked stack and linked queue and their operation's and applications.	10hours
Nonlinear data structure: Binary trees, binary search trees, representations and operations. Thread representations, sequential representations, graphs, and their representation.	10hours
Searching: linear search and binary search	5hours
Sorting: bubble, insertion, selection, quick and merge sort.	5hours
Books:	

1. Data Structure using C- A.M. Tanenbaum (PHI)

BCA 2011: Data Structures C (Practical)

Credit :1

30Hours

All programs should be developed in C

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12. (ii) WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree:
 - (a) Insertion (Recursive and Iterative Implementation)
 - (b) Deletion by copying
 - (c) Deletion by Merging
 - (d) Search a no. in BST
 - (e) Display its preorder, postorder and inorder traversals Recursively

- (f) Display its preorder, postorder and inorder traversals Iteratively
 - (g) Display its level-by-level traversals
 - (h) Count the non-leaf nodes and leaf nodes
 - (i) Display height of tree
 - (j) Create a mirror image of tree
 - (k) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
 16. WAP to reverse the order of the elements in the stack using additional stack.
 17. WAP to reverse the order of the elements in the stack using additional Queue.
 18. WAP to implement Diagonal Matrix using one-dimensional array.

BCA 2021: Mathematics-II

This course introduces the students to the fundamental concepts and topics of probability and statistics, whose knowledge is important in other computer science courses.

Course Learning Outcomes After successful completion of this course, the student will be able to:

- **Use probability theory to evaluate the probability of real-world events.**
- **Describe discrete and continuous probability distribution functions and generate random numbers from the given distributions.**
- **Find the distance between two probability distributions**
- **Define and quantify the information contained in the data.**
- **Describe various algorithms of Numerical Methods.**

Credit :4

60Hours

Probability and Statistics: Permutation and Combinations, Probability, Classical definition of probability. Conditional probability. Statistical independence of events. Random variable and its expectation and variance, joint dispersion of attributes. 10 hours

Collection and presentation of data. Frequency distribution. Measures of central tendency. Measures of dispersion. Binomial, Poission and Normal distribution. 5 hours

Bivariate Frequency Distributions (scatter Diagram, Correlation coefficient and its properties, regression lines, correlation index and correlation ratio, rank correlation). 5 hours

Multiple linear regression, multiple correlation, partial correlation (for 3 variables only).

5 hours

Random sampling, expectations and standard error of sampling mean. Expectation and standard error of sampling proportions. 5 hours

Test of significance based on t, F, and CHI square distribution. 5 hours

Numerical Methods and Algorithms Solution of non-linear equations: Bisection, Newton-Raphson, Regular-Falsi and Secant method. Interpolation and approximation- Lagrange Interpolation, Newton's Forward Interpolation and Newton's backward Interpolation methods. Integration: Trapezoidal and Simpson's 1/3 rules. Solution of linear equations: Gaussian elimination, Gauss Seidal method Solution of different equations; Euler's, Taylor's series, Runge-kutta (order-2) 25 hours

Books:

1. C Language and Numerical Methods C Xaviers, New Age International
2. Fundamentals of Statistics – Goon, Gupta, DasGupta

**Multi/Interdisciplinary courses
(For Other discipline)
Semester-II
BCA 2031: Introduction to Internet**

Credit: 03

45 Hours

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML and the fundamental principles of how the Internet and the Web function.

Course Learning Outcomes

On successful completion of the course, students will be able to:

- i. Discuss elementary Internet concepts and history.
- ii. Make a successful Internet connection.
- iii. Demonstrate simple principles of Internet Protocol (IP) addressing.
- iv. Use and customize a web browser.
- v. Comprehend the basics of the internet and web terminologies.

Introduction : Evolution of Internet, concept of Intranet and Internet, Applications of Internet, Types of Connectivity such as dial – up, leased, VSAT. etc., Internet Server and Clients module in various Operating Systems.(5 Hrs)

Usenet and Internet Relay Chart Introduction to World Wide Web: Evolution of WWW, Basics Features, WWW Browsers, WWW servers, HTTP & URL's. (5 Hrs)

Browsers: Basic features, Bookmarks, history. Progress indicators, Personalization of Browsers, Printing displayed pages and forms, Saving Web pages, Netscape Communicators, Internet Explorer, Search and Downloads.(5 Hrs)

Search Engines: Technology overview, Popular Search Engines.How to register a website in search engine. (5 Hrs)

Internet Security: Overview of Internet Security threats, Firewalls, Introduction to AAA (5 Hrs)

HTML: (20 Hrs)

- **Unit-I: Introduction**
- **Unit-II: The Basics**
 - The Head, the Body
 - Colors, Attributes
 - Lists, ordered and unordered
- **Unit-III: Links**
 - Introduction
 - Relative Links,
 - Absolute Links
 - Link Attributes
 - Using the ID Attribute to Link Within a Document
- **Unit-IV: Images**
 - Putting an Image on a Page
 - Putting an Image in the Background
- **Unit V: – Tables**
 - Creating a Table
 - Table Headers Captions
 - Spanning Multiple Columns
 - Styling Table

Reference Books

1. Internetworking with TCP/IP – by D.E.Comer, PHI
2. Introduction to HTML and CSS -- O'Reilly

BCA 2051 : Python Programming

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- **Learn the basic knowledge of Python. • Students will be able to acquire programming skills in core Python.**
- **Students will be able to acquire Object Oriented Skills in Python.**

- **Students will be able to solve problems requiring the writing of well-documented programs in The Python language, including use of the logical constructs of that language.**

Credit :3

90Hours

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. **06hours**

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming. **10hours**

Overview of Programming: Structure of a Python Program, Elements of Python **04hours**

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator). **10hours**

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions. **10hours**

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries. Data Structures: Arrays, list, set, stacks and queues. **20hours**

Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion sorting. **04 hours**

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessingelements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists. **14hours**

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries. **04hours**

Data Structures: Arrays, list, set, stacks and queues. **04hours**

Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion sorting. **04hours**

Software Lab Based on Python:

Section: A (Simple programs)

- Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon users choice.
- WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage ≥ 80

Grade B: Percentage ≥ 70 and < 80 Grade C:

Percentage ≥ 60 and < 70 Grade D:

Percentage ≥ 40 and < 60 Grade E:

Percentage < 40

Section: B (Visual Python):

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects I. curve
II. sphere
III. cone
IV. arrow
V. ring
VI. cylinder.
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m = 60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m,

where $t \geq 0$.

6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows

as follows:

$$P(t) = (15000(1+t))/(15 + e^t)$$

where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:

I. velocity wrt time ($v = u + at$)

II. distance wrt time ($s = ut + 0.5at^2$)

III. distance wrt velocity ($s = (v^2 - u^2) / 2a$)

Books:

(i) T. Budd, Exploring Python, TMH, 1st Ed, 2011

ii. How to think like a computer scientist : learning with Python / Allen Downey, Jeffrey Elkner, Chris

Meyers. 1st Edition – Freely available online. 2012

1. <http://docs.python.org/3/tutorial/index.html>

2. <http://interactivepython.org/courselib/static/pythonds>