

UNIVERSITY OF DELHI

BACHELORS OF VOCATION- SOFTWARE DEVELOPMENT
(SEMESTER-I)

based on

Undergraduate Curriculum Framework 2022 (UGCF)

(Effective from Academic Year 2022-23)



University of Delhi

BACHELORS OF VOCATION- SOFTWARE DEVELOPMENT

DSC –I: PROGRAMMING USING PYTHON

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/Prerequisite
PROGRAMMING USING PYTHON	DSC –I	4	L	T	P	Class XII Pass

Contents of the course and reference is in Annexure-I

DSC –2: COMPUTER FUNDAMENTALS

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/Prerequisite
COMPUTER FUNDAMENTALS	DSC –2	4	L	T	P	Class XII Pass

Contents of the course and reference is in Annexure-II

DSC –3: LINEAR ALGEBRA

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/Prerequisite
LINEAR ALGEBRA	DSC –3	4	L	T	P	Class XII Pass

Contents of the course and reference is in Annexure-III

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GE -I: WEB DESIGNING (HTML, CSS AND PHP)

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/Prerequisite
			L	T	P	
WEB DESIGNING (HTML, CSS AND PHP)	GE -I	4				Class XII Pass

Contents of the course and reference is in Annexure-IV

Annexure ADetailed Syllabus – Discipline Specific CoreSEMESTER 1 - DSC 1Programming using Python

Credits: 04

Learning Outcomes:

1. Describe the components of a computer and notion of an algorithm.
2. Apply suitable programming constructs and built-in data structures to solve a problem.
3. Develop, document, and debug modular python programs.
4. Use classes and objects in application programs and visualize data.

Unit 1:

Introduction to Python Programming: Python interpreter/shell, indentation; identifiers and keywords; literals, numbers, and strings; operators (arithmetic operator, relational operator, Boolean operator, assignment, operator, ternary operator and bitwise operator) and expressions.

Unit 2:

Creating Python Programs: Input and output statements, defining functions, control statements (conditional statements, loop control statements, break, continue and pass, exit function.), default arguments, errors and exceptions.

Unit 3:

Strings and Lists: String class, built-in functions for string, string traversal, string operators and operations; Lists creation, traversal, slicing and splitting operations, passing list to a function.

Unit 4:


Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries, File handling through libraries.

Unit 5:

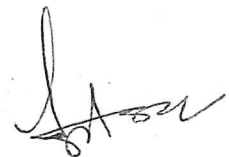
Built-in data structures: Tuples, sets, dictionary, stacks, and queues; searching and sorting.

Reference Books:

1. Liang, Y. D. (2013). *Introduction to Programming using Python*. Pearson Education.
2. Kamthane, A. N., & Kamthane, A.A. (2017) *Programming and Problem Solving with Python*, McGraw Hill Education


(Dr. Kamlesh Kr. Raghuvanshi
Director B/oc)





List of Practicals:

1. Execution of expressions involving arithmetic, relational, logical, and bitwise operators in the shell window of Python IDLE.
2. Write a Python program to illustrate the various functions of math module.
3. Write a Python program to produce a table of sines, cosines and tangents. Make a variable x in range from 0 to 10. For each value of x, print the value of sin(x), cos(x) and tan(x).
4. Write a program that reads an integer value and prints "leap year" or "not a leap year".
5. Write a Python function that takes a number as an input from the user and computes its factorial.
6. Write a Python function to generate the Fibonacci sequence till a given number "n".
7. Write a function that takes a number as an input and finds its reverse and computes the sum of its digits.
8. Write a function that takes two numbers as input parameters and returns their least common multiple.
9. Write a function that takes a number as an input and determine whether it is prime or not.
10. Write a function that finds the sum of the:
 - a. First n odd terms
 - b. First n even terms
 - c. 1, 4, 9, 16 Upto n terms
11. Write a Python function that takes a string as an input from the user and determines whether it is palindrome or not.
12. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
13. Write a Python function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys.
14. Consider a tuple t1=(1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
 - a. Print half the values of tuple in one line and the other half in the next line
 - b. Print another tuple whose values are even numbers in the given tuple
 - c. Concatenate a tuple t2=(11,13,15) with t1
 - d. Return maximum and minimum value from this tuple
15. Write a function called "check_duplicates" that takes a list and returns true if there is any element that appears more than once. Also find the frequency of that element. The original list should not be modified.
16. Write a program to implement a class for finding area and perimeter of a rectangle. Write constructor, destructor, and functions for calculating area and perimeter.
17. Write a menu driven program to perform the following functions on strings:
 - a. Find the length of string
 - b. Return maximum of three strings
 - c. Accept a string and replace every successive character with '#' Example For Given string 'Hello World' returned string is 'H#l#o W#r#d'
 - d. Find number of words in the given string
18. Write a Python program to perform the following using list:
 - a. Check if all elements in list are numbers or not
 - b. If it is a numeric list, then count number of odd values in it
 - c. If list contains all Strings, then display largest String in the list
 - d. Display list in reverse form
 - e. Find a specified element in list
 - f. Remove the specified element
19. Implementation of Linear and binary search techniques.
20. Implementation of selection sort, insertion sort, and bubble sort techniques.



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 Director Ramenujan College

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SEMESTER 1 - DSC 2
Computer Fundamentals

Credits: 04

Learning Outcomes:

1. Bridge the fundamental concepts of computers with the present level of knowledge of the students.
2. Familiarize operating systems, programming languages, peripheral devices, networking, multimedia and internet.
3. Understand binary number system.
4. Understand use of computers in education and research.

UNIT-I

Computer Fundamentals: Generations of Computers, Definition, Block Diagram along with its components, characteristics & classification of computers, Limitations of Computers, Applications of computers in various Fields.

UNIT- II

Data Representation: Number systems and character representation, binary arithmetic, definition of software, types of software, operating systems as user interface, utility programs.

UNIT-III

Devices: Input-Output Devices (with connections and practical demo), memory, primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disk, optical disk.

UNIT-IV

Computer Organization and Architecture: CPU, registers, system bus, main memory unit(MMU), cache memory, inside a computer, SMPS, motherboard, ports and interfaces, expansion code, ribbon cables, memory chips, processors, overview of emerging technology

UNIT-V

Use of Computers in Education and Research: Data analysis, heterogeneous storage, e-Library, Google scholar, Domain specific packages such as SPSS, mathematica etc.

Reference Books:

1. Gill Nasib Singh: *Computing Fundamentals and Programming in C*, Khanna Books Publishing Co., New Delhi.
2. Balagurusamy E, *Computing Fundamentals and C Programming*, Tata McGraw Hill.
3. Norton, Peter, *Introduction to Computer*, McGraw-Hill
4. Leon, Alexis & Leon, Mathews, *Introduction to Computers*, Leon Tech World
5. Rajaraman, V., *Fundamentals of Computers*, PHI
6. Ram, B., *Computer Fundamentals, Architecture & Organization*, New Age International
7. Chhillar, Rajender Singh: *Application of IT to Business*, Ramesh Publishers, Jaipur

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List of Practicals:

The practical assignment must include connecting parts of a computer and assembling it to an extent, media formatting and installation of some software. Practical exercises based on Open Office tools using document preparation and spreadsheets handling packages.

A. Text Editor

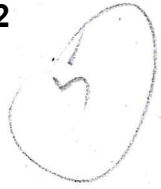
1. Prepare a **grocery list** having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.
 - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
 - The headings of the columns should be in 12-point and bold.
 - The rest of the document should be in 10-point Times New Roman.
 - Leave a gap of 12-points after the title.
2. Design a **time-table form** for your college.
 - The first line should mention the name of the college in 16-point Arial Font and should be bold.
 - The second line should give the course name/teacher's name and the department in 14-point Arial.
 - Leave a gap of 12-points.
 - The rest of the document should use 10-point Times New Roman font.
 - The footer should contain your specifications as the designer and date of creation.
3. Create the following **one page documents**.
 - a. Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.
 - b. Design a certificate in landscape orientation with a border around the document.
 - c. Design a Garage Sale sign.
 - d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
4. Create the following documents:
 - (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
 - (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.
5. Convert **following text to a table**, using comma as delimiter Type the following as shown

Color,	Style,	Item
Blue,	A980,	Van
Red,	X023,	Car
Green,	YL724,	Truck
Name,	Age,	Sex
Bob,	23,	M
Linda,	46,	F
Tom,	29,	M



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 (Dr. Animesh K. Raghuram)
 Director - B.A.E.



B. Spreadsheet

1. Enter the Following data in Excel Sheet

REGIONAL SALES PROJECTION

State	Qtr1	Qtr2	Qtr3	QTR4	QTR Total	Rate	Amount
Delhi	2020	2400	2100	3000		15	
Punjab	1100	1300	1500	1400		20	
U.P.	3000	3200	2600	2800		17	
Haryana	1800	2000	2200	2700		15	
Rajasthan	2100	2000	1800	2200		20	
TOTAL AVERAGE							

(a) Apply Formatting as follow:

- i. Title in TIMES NEW ROMAN
- ii. Font Size - 14
- iii. Remaining text - ARIAL, Font Size -10
- iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.
- v. Numbers in two decimal places.
- vi. Qtr. Heading in center Alignment.
- vii. Apply Border to whole data.

- (b) Calculate State and Qtr. Total
- (c) Calculate Average for each quarter
- (d) Calculate Amount = Rate * Total.

2. Given the following worksheet

	A	B	C	D
1	Roll No.	Name	Marks	Grade
2	1001	Sachin	99	
3	1002	Sehwag	65	
4	1003	Rahul	41	
5	1004	Sourav	89	
6	1005	Harbhajan	56	

Calculate the grade of these students on the basis of following guidelines:

If Marks	Then Grade
≥ 80	A+
$\geq 60 < 80$	A
$\geq 50 < 60$	B
< 50	F



(Dr. Kamlesh K. Raghunans)
 Director - BRC

3. Given the following worksheet

	A	B	C	D	E	F	G	
1	Salesman	Sales in (Rs.)						
2	No.	Qtr1	Qtr2	Qtr3	Qtr4	Total	Commission	
3	S001	5000	8500	12000	9000			
4	S002	7000	4000	7500	11000			
5	S003	4000	9000	6500	8200			
6	S004	5500	6900	4500	10500			
7	S005	7400	8500	9200	8300			
8	S006	5300	7600	9800	6100			

Calculate the commission earned by the salesmen on the basis of following Candidates:

If Total Sales	Commission
< 20000	0% of sales
> 20000 and < 25000	4% of sales
> 25000 and < 30000	5.5% of sales
> 30000 and < 35000	8% of sales
>= 35000	11% of sales

The total sales is sum of sales of all the four quarters.

4. A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions. The details of allowances and deductions are as follows:

Allowances

- HRA Dependent on Basic :
 - 30% of Basic if Basic \leq 1000
 - 25% of Basic if Basic $>$ 1000 & Basic \leq 3000
 - 20% of Basic if Basic $>$ 3000
- DA Fixed for all employees :
 - 30% of Basic
- Conveyance Allowance :
 - Rs. 50/- if Basic is \leq 1000
 - Rs. 75/- if Basic $>$ 1000 & Basic \leq 2000
 - Rs. 100 if Basic $>$ 2000
- Entertainment Allowance :
 - NIL if Basic is \leq 1000
 - Rs. 100/- if Basic $>$ 1000

Deductions

- Provident Fund :
 - 6% of Basic
- Group Insurance Premium :
 - Rs. 40/- if Basic is \leq 1500
 - Rs. 60/- if Basic $>$ 1500 & Basic \leq 3000
 - Rs. 80/- if Basic $>$ 3000



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Calculate the following:

Gross Salary = Basic + HRA + DA + Conveyance + Entertainment

Total deduction = Provident Fund + Group Insurance Premium

Net Salary = Gross Salary – Total Deduction

5. The following table gives year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

- Calculate total sale year wise.
- Calculate the net sale made by each salesman
- Calculate the maximum sale made by the salesman
- Calculate the commission for each salesman under the condition.
 - If total sales > 4, 00,000 give 5% commission on total sale made by the salesman.
 - Otherwise give 2% commission.
- Draw a bar graph representing the sale made by each salesman.
- Draw a pie graph representing the sale made by salesman in 2000.



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SEMESTER 1 – DSC 3**Linear Algebra**

Credits: 04

Learning Outcomes:

1. Understand the various types of matrices, operations of matrices and to solve a system of linear equations.
2. Visualize the space R^n in terms of vectors and interrelation of vectors with matrices.
3. Method to find echelon form, Rank, Eigen values and Eigen vectors of a matrix.

Unit 1

Fundamental operation with vectors in Euclidean space R^n , Linear combination of vectors, Dot product and their properties, Cauchy-Schwarz inequality, Triangle inequality, Projection vectors.

[1] Chapter 1 (Sections 1.1 and 1.2)

Unit 2

Matrices, Basic concepts and algebraic operations, Types of matrices, Transpose of a matrix, Symmetric and skew-symmetric matrices, Matrix multiplication and its properties, Powers of square matrices.

[1] Chapter 1 (Sections 1.4, and 1.5).

Unit 3

Matrices: Gauss–Jordan row reduction, Reduced row echelon form, Homogenous Systems, Row equivalence, Rank, Linear combination of vectors, Row space.

[1] Chapter 2 (Section 2.2, 2.3)

Unit 4

Eigenvalues, Eigenvectors, Eigenspace, Characteristic polynomials, Diagonalization of matrices.

[1] Chapter 3 (Section 3.4)

References:

1. Andrilli, S., & Hecker, D. (2016). *Elementary Linear Algebra (5th ed.)*. Academic Press, Elsevier India Private Limited.



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Annexure B

Detailed Syllabus – Generic Elective

GENERIC ELECTIVE – SEMESTER 1

Web Designing (HTML, CSS and PHP)

Credits: 04

Learning Outcomes:

1. Structure and implement HTML/CSS.
2. Understanding of the principles of creating an effective web page, including an in-depth consideration of information architecture.
3. Apply intermediate and advanced web development practices.
4. Implement basic JavaScript.
5. Create webpages that function using external data.
6. Basic understanding of PHP.

Unit 1: Introduction to Internet

Concept of WWW, internet and WWW, protocols and programs, secure connections, application and development tools, web browser, URL, web server, web site designing principles, Domain Name.

Unit-2: Introduction to HTML

Development process, HTML Tags and Attributes, HTML Basic Tags, forms and website structure, HTML Color Coding, Div and Span Tags, hyperlinks, lists, tables, images, URL, character entities, frames and frame sets, overview and features of HTML5.

Unit-3: Cascading Style Sheets (CSS)

Introduction to CSS, Features and benefits of CSS, basics, CSS syntax and structure, using and linking CSS, using selectors, background images, colours and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS and CSS2, overview and features of CSS3.

Unit-4: Introduction to JavaScript

JavaScript Introduction, JavaScript Output, JavaScript Variables, JavaScript Operators, JavaScript Arithmetic, JavaScript Data Types, JavaScript Assignment, JavaScript Functions, JavaScript Objects, JavaScript Scope, JavaScript Events, JavaScript Strings and String Methods, JavaScript Numbers and Number Methods, JavaScript Math, JavaScript Dates: Formats and Methods, JavaScript Booleans, JavaScript Comparisons, JavaScript Conditions, JavaScript Switch, JavaScript Loops, JavaScript Break, JavaScript Type, JavaScript Forms (API and Validation), JavaScript Objects, JavaScript Functions, JavaScript DOM, JavaScript Browser BOM, JavaScript Frameworks

Unit-5: Introduction to PHP

Introduction and basic syntax of PHP, Installing PHP, PHP Variables, PHP Data Types, PHP Strings, PHP Constants, PHP Operators, PHP Programming Loops, PHP Functions, PHP Arrays, PHP Forms and PHP Form Handling, PHP Form Validation



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Text Books:

1. Robin Nixon, *Learning PHP, MYSQL, JavaScript, CSS & HTML5 3ed: A Step-by-Step Guide to Creating Dynamic Websites*, O'Reilly
2. Jon Duckett, *HTML and CSS: Design and Build Websites*, Wiley.
3. Jon Duckett, *JavaScript and JQuery: Interactive Front-End Web Development*, Wiley.
4. Jennifer Niederst Robbins, *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics*, O'reilly.
5. Dt Editorial Services, *Html 5 Black Book - Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and JQuery*, DreamTech Press Publication.

List of Practicals:

1. Design a home page which displays information about your college department using headings, HTML entities and paragraphs.
2. Implement different types of list tags, hyperlinks, marquee tag and HTML formatting tags in the college department homepage.
3. Create a web page having two frames, Frame 1 containing links and another with contents of the link. When a link is clicked appropriate contents should be displayed on Frame 2. Also, insert an iframe in the same page.
4. Design your course timetable and display it in tabular format.
5. Design an admission form for any course in your college with text, password fields, drop-down list, check-boxes, and radio buttons, submit and reset button etc. with proper CSS formatting.
6. Create a website for online book stores with Home, Login, Catalogue, Registration page with links to all these pages in a menu on top of every page. Embed heading, paragraph, images, video, .iframe, form controls, table, and list in this website. Use both Internal and external CSS in this.
7. Write a JavaScript program to display the current day and time.
8. Write a JavaScript program to
 - a) Remove a character at the specified position of a given string and return the new string.
 - b) Change the case of a string. (I.e. upper case to lower case and vice-versa).
9. Write a JavaScript program to compute the sum of elements of a given array of integers.
10. Develop and demonstrate a HTML file that includes JavaScript script for taking full name in a text field and display first, middle, last name *in 3 different labels. Middle and last name may be optional, thus messages like "NA" should be displayed in corresponding labels. If input contains 2 words, then they should be considered as first and last names.
11. Design HTML form for keeping student record, apply JavaScript validation for restriction of mandatory fields, numeric field, email-address field, specific value in a field etc.
12. Write a JavaScript code that displays text "Bigger Text" with increasing font size in the interval of 10ms in red color, when the font size reaches 50 pt. it displays "Smaller Text" in green color. Then the font size should decrease to 5pt and then stop.
13. Write a PHP script that removes the whitespaces from a string.
14. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
15. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.

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 Director - B.Voc



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