KAVAYITRI BAHINABAI CHAUDHARI NORTH MAHARASHTRA UNIVERSITY, JALGAON

Semester-wise Code structure and Syllabus for

Faculty: Science and Technology

B. Sc (Computer Science) (Honors/Research) Programme

As per NEP2020 for Affiliated Colleges

w.e.f. June 2024

BACHELOR OF SCIENCE in Computer Science
[4-Year B.Sc. (Computer Science) as Per NEP-2020]

PROGRAMME OBJECTIVES (POs):

1) To develop problem solving abilities using a computer.;
2) To prepare necessary knowledge base for research and development in Computer Science.
3) To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
4) Communicate scientific information in a clear and concise manner both orally and in writing. PO5
5) To train students in professional skills related to Software Industry
6) To develop logical judgment and communication skill
7) Augment the recent developments in the field of IT and relevant fields of Research and Development.
8) To Create Scientific temper among the students so that to develop the research culture

PROGRAMME SPECIFIC OUTCOMES (PSOs):

At the end of the program the graduate will be able to :

PSO No.	PSO	Cognitive level
BCSPSO.1	Students will able to apply knowledge of computing, software designing and development that is relevant and appropriate to the problem domain.	2
BCSPSO.2	Students will be able to model concepts of software application and projects.	3
BCSPSO.3	Students will be able to apply current technical concepts and practices in the core development of solutions in the form of Information technology	3
BCSPSO.4	Aware them to publish their work in reputed journals	4
BCSPSO.5	Students will be able to critically evaluate the problem.	5
BCSPSO.6	To make them employable according to current demand of IT Industry and responsible citizen	5
BCSPSO.7	Development of in-house applications in terms of projects	6

Abbreviations:

- **T:** Theory Course
- **P:** Practical course
- **DSC:** Discipline Specific Core Course
- **DSE:** Discipline Specific Elective Course
- **MIN:** Minor subject
- **VSEC:** Vocational skill and Skill enhancement courses
- **VSC:** Vocational Skill Courses
- **SEC:** Skill Enhancement Courses
- **GE/OE:** Generic/open elective
- **CI:** Constitution of India
- **IKS:** Indian Knowledge System
- **CEP:** Community engagement and service
- **OJT**: On Job Training: Internship/ Apprenticeship
- **RP:** Research Project
- **RM:** Research methodology
- **ES:** Environment studies
- **ENG:** English
- **MIL:** Modern Indian language

- **Co-curricular Course (CC)**
    a) **CC-1: CC-120: Sports and Yoga**
    b) **CC-2: CC-130: Cyber Security**
    c) **CC-3: CC-220: Human Rights and Environment Law**
    d) **CC-4: CC-229: Communication Skills and Personality Development**
- **Value Education Courses (VEC)**
    a) **VEC1: ES-118: Environmental Science**
    b) **VEC2: CI-129: Constitution of India**
- **Indian Knowledge System (IKS):**
    a) **IK: 119: Ayurvedic Medicine in Ancient India**
- **Ability Enhancement Courses (AEC)**
    a) **AEC-1: EG: 101 – English -1**
    b) **AEC-2: EG: 102 – English -2**
    c) **AEC-3: MR: 201 – Marathi -1**
    d) **AEC-3: HN: 201 – Hindi -1**
    e) **AEC-3: MR: 202 – Marathi -2**
    f) **AEC-3: HN: 202 – Hindi -2**

Subject Short Name:		
Sr	**Name of Subject**	**Short Name**
1	Physics	PH
2	Mathematics	MT
3	Chemistry	CH
4	Botany	BO
5	Zoology	ZO
6	Electronics	EL
7	Computer Science	CS
8	Statistics	ST
9	Microbiology	MB
10	Biotechnology	BT
11	Information Technology	IT
12	Biochemistry	BC
13	Environmental Science	EV
14	Geography	GG
15	Geology	GE

Semester-wise Code structure for B. Sc (Honors/Research) Programme as per NEP2020, for Affiliated Colleges w.e.f. – June 2024

B. Sc. (Honors/Research) – First Year, SEMESTER – I, Level – 4.5

Course	Course Type	Course Code	Course Title	Credits	T	P	Total	Internal (CA) T	Internal (CA) P	External (UA) T	External (UA) P
DSC-1	DSC	CS-111	Essentials of Computer	2	2	--	2	20	--	30	--
DSC-2	DSC	CS-112	C Programming	2	2	--	2	20	--	30	--
DSC-3	DSC	CS-113	Lab on C Programming	2	--	4	4	--	20	--	30
MIN-1	MIN	CS-114	C Programming	2	2	--	2	20	--	30	--
MIN-2	MIN	CS-115	Lab on C Programming	2	--	4	4	--	20	--	30
OE-1	OE	CS-116	Word Processing Tools (Hands on)	2	2	--	2	20	--	30	--
SEC-1	SEC	CS-117	Software and Hardware Maintenance	2	2	--	2	20	--	30	--
VEC-1	VEC	EA-118	Environmental Awareness	2	2	--	2	20	--	30	--
IKS	IKS	IK-119	Ayurvedic Medicine in Ancient India	2	2	--	2	20	--	30	--
CC-1	CC	CC-120 (A/B)	Select any ONE of the following: A) Sports B) Yoga	2	2	--	2	50	--	---	--
AEC-1	AEC	EG-101	English -1	2	2	--	2	20	--	30	--

B. Sc. (Honors/Research) – First Year, SEMESTER – II, Level – 4.5

Course	Course Type	Course Code	Course Title	Credits	T	P	Total	Internal (CA) T	Internal (CA) P	External (UA) T	External (UA) P
DSC-4	DSC	CS-121	Introduction To Data Science	2	2	--	2	20	--	30	--
DSC-5	DSC	CS-122	Vedic Mathematics	2	2	--	2	20	--	30	--
DSC-6	DSC	CS-123	Lab on Data Science	2	--	4	4	--	20	--	30
MIN-3	MIN	CS-124	Introduction To Data Science	2	2	--	2	20	--	30	--
MIN-4	MIN	CS-125	Lab on Data Science	2	--	4	4	--	20	--	30
OE-2	OE	CS-126	Spreadsheet Tools (Hands on)	2	2	--	2	20	--	30	--
SEC-2	SEC	CS-127	Linux Fundamentals	2	2	--	2	20	--	30	--
SEC-3	SEC	CS-128	Lab on Linux Fundamental	2	--	4	4	--	20	--	30
VEC-2	VEC	CI-129	Constitution of India	2	2	--	2	20	--	30	--
CC-2	CC	CC-130 (A/B)	Select any ONE of the following: A) NSS B) NCC	2	2	--	2	50	--	---	--
AEC-2	AEC	EG-102	English -2	2	2	--	2	20	--	30	--

Cumulative Credits for First Year – 44

* Students need to complete one month on job training **(OJT)** or internship in any industry related to major subject.

Semester-wise Code structure for B. Sc (Honors/Research) Programme as per NEP2020, for Affiliated Colleges w.e.f. – June 2024

B. Sc. (Honors/Research) – Second Year, SEMESTER – III, Level – 5.0

Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/Week T	P	Total	Marks (Total 100) Internal (CA) T	P	External (UA) T	P
DSC-7	DSC	CS-211	Data Structure-I	2	2	--	2	20	--	30	--
DSC-8	DSC	CS-212	Object Oriented Programming using C++-I	2	2	--	2	20	--	30	--
DSC-9	DSC	CS-213	Lab on Data Structure-I	2	--	4	4	--	20	--	30
DSC-10	DSC	CS-214	Lab on OOP using C++-I	2	--	4	4	--	20	--	30
MIN-5	MIN	CS-215	Web Design	2	2	--	2	20	--	30	--
MIN-6	MIN	CS-216	Lab on Web Design	2	--	4	4	--	20	--	30
OE-3	OE	CS-217	Database utilities in Access	2	2	--	2	20	--	30	--
VSC-1	VSC	CS-218	Web Design	2	2	--	2	20	--	30	--
VSC-2	VSC	CS-219	Lab on Web Design	2	--	4	4	--	20	--	30
CC-3	CC	CC-220 (A/B)	Select any ONE of the following: A) Human Rights and Environment Law B) Cyber Security	2	2	--	2	50	--	---	--
AEC-3	AEC	MR-201	Marathi -1	2	2	--	2	20	--	30	--
		HN-201	Hindi -1	2	2	--	2	20	--	30	--

B. Sc. (Honors/Research) – Second Year, SEMESTER – IV, Level – 5.0

Course	Course Type	Course Code	Course Title	Credits	T	P	Total	Internal (CA) T	P	External (UA) T	P
DSC-11	DSC	CS-221	Data Structure-II	2	2	--	2	20	--	30	--
DSC-12	DSC	CS-222	Object Oriented Programming using C++-II	2	2	--	2	20	--	30	--
DSC-13	DSC	CS-223	Lab on Data Structure-II	2	--	4	4	--	20	--	30
DSC-14	DSC	CS-224	Lab on OOP using C++-II	2	--	4	4	--	20	--	30
MIN-7	MIN	CS-225	Introduction of Database Management system	2	2	--	2	20	--	30	--
MIN-8	MIN	CS-226	Lab on Introduction of Database Management system	2	--	4	4	--	20	--	30
OE-4	OE	CS-227	Data Analytic Tools	2	2	--	2	20	--	30	--
CEP	CEP	CS-228	Field Project								
CC-4	CC	CC-229 (A/B)	Select any ONE of the following: A) Communication Skills andPersonality Development B) Cultural	2	2	--	2	50	--	---	--
AEC-4	AEC	MR-202	Marathi -2	2	2	--	2	20	--	30	--
		HN-202	Hindi -2	2	2	--	2	20	--	30	--
Cumulative Credits For First Year – 44											

Semester-wise Code structure for B. Sc (Honors/Research) Programme as per NEP2020, for Affiliated Colleges w.e.f. – June 2024

B. Sc. (Honors/Research) – Third Year, SEMESTER – V, Level – 5.5

Course	Course Type	Course Code	Course Title	Credits	T	P	Total	Internal (CA) T	Internal (CA) P	External (UA) T	External (UA) P
DSC-15	DSC	CS-311	Software Engineering	2	2	--	2	20	--	30	--
DSC-16	DSC	CS-312	Database Management System	2	2	--	2	20	--	30	--
DSC-17	DSC	CS-313	Java Programming - I	2	2	--	2	20	--	30	--
DSC-18	DSC	CS-314	LAB on DBMS	2	--	4	4	--	20	--	30
DSC-19	DSC	CS-315	LAB on Java Programming - I	2	--	4	4	--	20	--	30
DSE-1	DSE	CS-316 (A)	Python Programming - I	2	2	--	2	20	--	30	--
		CS-316 (B)	Programming in PHP	2	2	--	2	20	--	30	--
		CS-316 (C)	Introduction to Big Data Analytics	2	2	--	2	20	--	30	--
DSE-2	DSE Select LAB for DSE-I	CS-317 (A)	Lab on Python Programming - I	2	--	4	4	--	20	--	30
		CS-317 (B)	Lab on Programming in PHP								
		CS-317 (C)	Lab on Big Data Analytics								
MIN-9	MIN	CS-318	Computer Aided Graphics	2	2	--	2	20	--	30	--
VSC-3	VSC	CS-319	Computer Network	2	2	--	2	20	--	30	--
FP	FP	CS-320	**Field Project**	4	--	8	8	--	40	--	60

B. Sc. (Honors/Research) – Third Year, SEMESTER – VI, Level – 5.5

Course	Course Type	Course Code	Course Title	Credits	T	P	Total	Internal (CA) T	Internal (CA) P	External (UA) T	External (UA) P
DSC-20	DSC	CS-321	System Programming and Operating System	2	2	--	2	20	--	30	--
DSC-21	DSC	CS-322	Theoretical Computer Science	2	2	--	2	20	--	30	--
DSC-22	DSC	CS-323	Java Programming - II	2	2	--	2	20	--	30	--
DSC-23	DSC	CS-324	LAB on System Programming and OS	2	--	4	4	--	20	--	30
DSC-24	DSC	CS-325	LAB on Java Programming - II	2	--	4	4	--	20	--	30
DSE-3	DSE	CS-326 (A)	Python Programming - II	2	2	--	2	20	--	30	--
		CS-326 (B)	Data Science	2	2	--	2	20	--	30	--
		CS-326 (C)	Machine Learning	2	2	--	2	20	--	30	--
DSE-4	DSE Select LAB for DSE-3	CS-327 (A)	Lab on Python Programming - II	2	--	4	4	--	20	--	30
		CS-327 (B)	Lab on Data Science								
		CS-327 (C)	Lab on Machine Learning								
MIN-10	MIN	CS-328	Software Tools for Industry Approach	2	2	--	2	20	--	30	--
VSC-4	VSC	CS-329	Software Project Management	2	2	--	2	20	--	30	--
*OJT/ Int	OJT/Int	CS-330	**On Job Training/Internship**	4	--	8	8	--	40	--	60

* Students need to complete one month on job training **(OJT)** or internship in any industry related to major subject.

Semester-wise Code structure for B. Sc (Honors/Research) Programme as per NEP2020, for Affiliated Colleges w.e.f. – June 2024

B. Sc. (Honors/Research) – 4th Year (Honors), SEMESTER – VII, Level – 6.0

Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/Week			Marks (Total 100)			
					T	P	Total	Internal (CA)		External (UA)	
								T	P	T	P
DSC-25	DSC	CS-411	Artificial Intelligence	4	4	--	4	40	--	60	--
DSC-26	DSC	CS-412	Design and Analysis of Algorithms	2	2	--	2	20	--	30	--
DSC-27	DSC	CS-413	Data Mining	4	4	--	4	40	--	60	--
DSC-28	DSC	CS-414	LAB on DAA	2	--	4	4	--	20	--	30
DSC-29	DSC	CS-415	LAB on AI and Data Mining	2	--	4	4	--	20	--	30
DSE-5	DSE	CS-416 (A)	Cloud Computing	4	4	--	4	40	--	60	--
		CS-416 (B)	Web Analytics	4	4	--	4	40	--	60	--
		CS-416 (C)	Digital Image Processing	4	4	--	4	40	--	60	--
RM	RM	CS-417	**Research Methodology**	4	4	--	4	40	--	60	--

B. Sc. (Honors/Research) – 4th Year (Honors), SEMESTER – VIII, Level – 6.0

Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/Week			Marks (Total 100)			
DSC-30	DSC	CS-421	Compiler Construction	4	4	--	4	40	--	60	--
DSC-31	DSC	CS-422	Current Computing Trends (CCT) in Java	2	2	--	2	20	--	30	--
DSC-32	DSC	CS-423	Advance OS	4	4	--	4	40	--	60	--
DSC-33	DSC	CS-424	LAB on CCT in Java	2	--	4	4	--	20	--	30
DSC-34	DSC	CS-425	LAB on Advance OS	2	--	4	4	--	20	--	30
DSE-6	DSE	CS-426(A)	Network Programming	4	4	--	4	40	--	60	--
		CS-426(B)	Optimization Techniques	4	4	--	4	40	--	60	--
		CS-426(C)	Natural Language Processing	4	4	--	4	40	--	60	--
*OJT/ Int	OJT/Int	CS-427	**On Job Training/Internship**	4	--	8	8	--	40	--	60

* Students need to complete one month on job training **(OJT)** or internship in any industry related to major subject.

Semester-wise Code structure for B. Sc (Honors/Research) Programme as per NEP2020, for Affiliated Colleges w.e.f. – June 2024											
B. Sc. (Honors/Research) – 4th Year (Research), SEMESTER – VII, Level – 6.0											
Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/ Week			Marks (Total 100)			
					T	P	Total	Internal (CA)		External (UA)	
								T	P	T	P
DSC-25	DSC	CS-411	Introduction to Database Tool (DbVisualizer)	4	4	--	4	40	--	60	--
DSC-26	DSC	CS-412	Angular JS	2	2	--	2	20	--	30	--
DSC-28	DSC	CS-414	LAB on Introduction to Database Tool (DbVisualizer)	2	--	4	4	--	20	--	30
DSC-29	DSC	CS-415	Lab on Angular JS	2	--	4	4	--	20	--	30
DSE-5	DSE	CS-416 (A)	Natural Language Processing	4	4	--	4	40	--	60	--
		CS-416 (B)	Digital Image Processing	4	4	--	4	40	--	60	--
		CS-416 (C)	Ethical Hacking and Penetration Testing	4	4	--	4	40	--	60	--
RM	RM	CS-417	**Research Methodology**	4	4	--	4	40	--	60	--
RP	RP	CS-418	**Research Project**	4	--	8	8	--	40	--	60
B. Sc. (Honors/Research) – 4th Year (Research), SEMESTER – VIII, Level – 6.0											
DSC-30	DSC	CS-421	Data Visualization	4	4	--	4	40	--	60	--
DSC-31	DSC	CS-422	Advanced Trends in Cloud Computing	2	2	--	2	20	--	30	--
DSC-33	DSC	CS-424	LAB on Data Visualization	2	--	4	4	--	20	--	30
DSC-34	DSC	CS-425	LAB on Advanced Trends in Cloud Computing	2	--	4	4	--	20	--	30
DSE-6	DSE	CS-426(A)	Internet of Things (IoT)	4	4	--	4	40	--	60	--
		CS-426(B)	Linux Server Administration	4	4	--	4	40	--	60	--
		CS-426(C)	Network Programming	4	4	--	4	40	--	60	--
RP	RP	CS-428	**On Job Training/Internship**	8	--	16	16	--	80	--	120
* Students need to complete one month on job training **(OJT)** or internship in any industry related to major subject.											

Course Code: CS-111

Course Title: Essentials of Computer

Course Code: CS-111	**Course Category: Core Course (DSC)**
Course Title: Essentials of Computer	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- To learn about basics of computer
- To learn designing an algorithm.
- To study about networks and its type
- To learn about OS and its different types.

Course Outcomes:

CO No.	CO	Cognitive level
BCS111C.1	To do basic operations regarding OS	2
BCS111C.2	To identify network type and analyze & comply basic issues in networking.	3
BCS111C.3	To design an algorithm and draw the flowchart.	6

Course Content:

Unit-1. Introduction to Computer Components   (08 L, 12 M)

1.1 Definition of computer

1.2 Block Diagram of Computer, Types of computer, Neumann machine

1.3 Input Devices and Output Devices

1.4 Memory: RAM, ROM, EPROM, PROM, SSD

1.5 Definition: Data, Information, Algorithm, Flowchart, Program, Hardware, and

1.6 Software: System Software, Application, Software, Firmware, Interpreter, compiler

1.7 Programming Languages: High level, Middle Level, Low Level

Unit-2 Basics of Algorithms and Flowcharts   (06 L, 09 M)

2.1 What is Algorithm? , Steps for creation of Algorithm.

2.2 Properties of Algorithm and Examples

2.3 What is Flowchart?, Symbols for drawing Flowcharts, Examples

2.4 Advantages of algorithm and flowcharts.

Unit -3. Concepts of network   (08 L, 12 M)

3.1 What is Computer Network?

3.2 Types of Networks (with Features and Application): LAN, WAN, MAN Wired Network, Wireless Network

3.3 Introduction and application of Internet

3.4 Network Topology

3.5 Study of Web Browsers and Search Engines

Unit -4. Operating System   **(08 L, 12 M)**

4.1 What is booting, POST, Bootstrap, Boot Drive.

4.2 Definition of operating system, functions of operating system

4.3 Introduction of operating systems: DOS, Windows, Linux, Android

4.4 Applications of Operating System,

4.5 Comparison Of various Operating Systems

References:

1. V. Rajaraman, "Fundamentals of Computers", PHI publication, ISBN: 8120340116, 9788120340114

2. Fundamentals of Data Structures in C by Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed.

3. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni, Sanguthever

4. Abraham Silberschatz, Peter B. Galvin, Greg Gagne," Operating System concepts", ISBN:1119017475, 9781119017479

5. Andrew S. Tanenbaum, David J. Wetheral, "Computer Network", ISBN 0133072622, 9780133072624

Course Code: CS-112

Course Title: C Programming

Course Code: CS-112	Course Category: Core Course (DSC)
Course Title: C Programming	Type: Theory
Total Contact Hours: 30 (2/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks

Course Objectives:

- **Understand basic Structure of the C-Programming, declaration and usage of variables**
- **Understand the concepts of various operators and conditional statements.**
- **Understand array to store multiple pieces of homogeneous data.**
- **Understand the concepts of functions and pointers.**

- **Be able to work with operators and conditional statements.**

CO No.	CO	Cognitive level
BCS112C.1	Apply the C-language syntax rules to write C program	3
BCS112C.2	Analyze given problem to convert in programing logic.	4
BCS112C.3	Develop C programs to solve mathematical and decision-making problems.	6

Course Content:

Unit 1: Fundamentals and Element of 'C' Program   **(4 L, 8M)**

Introduction & structure of C Program, Variables and Identifiers, Declaration of variables, keywords, Data types and Qualifiers, Constants and types of constants, Comments, Input Output Statements (Standard and formatted), pre-processor directives.

Unit 2:Operators and Conditional Statements   **(8L, 0M)**

Types of Operators –Arithmetic, Relational, Logical, Assignment, Compound assignment operator (short hand assignment), Bitwise, Increment-Decrement, Conditional Operator, Special Operator – Comma, sizeof operator, Operator Precedence and Associativity, Type Conversion – implicit and explicit, If Statement, if-else Statement, nested if-else Statement, Switch Statement, Break, continue and goto statements, Looping Concepts - While, do-while, for loop Nested loops Concept.

Unit 3:Arrays and Strings   **(8L, 12M)**

Array: declaration and Initialization, Types of array (One Dimensional and Multidimensional), String Function: strcpy(), strlen(), strcmp(), strcat(), strrev().

Unit 4:Functions and Pointers   **(10L, 15M)**

Declaration and Prototypes, Function calling (Call by value, call by reference), Function with return and Function with argument, Recursion.

Pointers, accessing value through a pointer, Operations on Pointers: Pointers and Arrays, Array of Pointer, Dynamic memory allocation and releasing dynamically allocated memory, **structure and union:** Introduction, Declaration and access.

Reference Books:

1. Denis Ritchie. "C" Programming – Prentice Hall Software Series- ISBN. 10 9 8 7

2. Yashwant P. Kanetkar - ANSI C ,BPB publication. ISBN: 9788183333245

3. Byron Gottfried – Programming with C –Tata McGRAW-Hill ISBN-10: 0070145903

4. Yashwant P. Kanetkar -Understanding pointers in "C" -BPB publication. ISBN-13: 978-8176563581

5. E.Balguruswami -Programming in ANSI- C- Tata McGRAW-Hill- ISBN-10: 933921966X

6. Mike McGrath - C programming in easy step – Wiley publication ISBN-10: 1840785446

Course Code: CS-113

Course Title: Lab on C Programming

Course Code: CS-113	Course Category: Core Course (DSC)
Course Title: Practical based on C Programming	Type: Practical
Total Contact Hours: 60 (4/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks

Course Objectives:
- To study various data types, arrays and functions in C
- To understand input-output and, control and iterative statements in C

Course Outcomes:

CO No.	CO	Cognitive level
BCS113C.1	Apply appropriate data types and control structures for problem solving using C	4
BCS113C.2	Implement the real world problems by devising algorithm and implement using C	6
BCS113C.3	Illustrate and explain the programming principles of C language by drawing flowchart for given problem.	5

List of Experiment:

1. Demonstration of use of data types, simple operators (expressions)
2. Demonstration of decision making statements (if and if-else, nested control statements)
3. Demonstration of decision making statements (switch case)
4. Demonstration of use of while loops, for loops, do-while loops, nested loops
5. Demonstration of exit, goto, continue, break.
6. Demonstrations of Structure and Union.
7. Demonstration of writing C programs in modular way (use of user defined functions)
8. Demonstration of call by value, call by reference and recursive functions
9. Demonstration of use of arrays (1-D array, 2-D arrays) and functions
10. Demonstration of Standard Library Function.

Course Code: CS-114

Course Code: CS-114	Course Category: Minor Course (MIN)
Course Title: C Programming	Type: Theory
Total Contact Hours: 30 (2/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks

Course Objectives:
- **Understand basic Structure of the C-Programming, declaration and usage of variables**
- **Understand the concepts of various operators and conditional statements.**
- **Understand array to store multiple pieces of homogeneous data.**
- **Understand the concepts of functions and pointers.**

- **Be able to work with operators and conditional statements.**

CO No.	CO	Cognitive level
BCS114C.1	Apply the C-language syntax rules to write C program	3
BCS114C.2	Analyze given problem to convert in programing logic.	4
BCS114C.3	Develop C programs to solve mathematical and decision making problems.	6

Course Content:

Unit 1: Fundamentals and Element of 'C' Program   (4L, 8M)

Introduction & structure of C Program, Variables and Identifiers, Declaration of variables, keywords, Data types and Qualifiers, Constants and types of constants, Comments, Input Output Statements (Standard and formatted), pre-processor directives.

Unit 2: Operators and Conditional Statements   (8L, 10M)

Types of Operators –Arithmetic, Relational, Logical, Assignment, Compound assignment operator (short hand assignment), Bitwise, Increment-Decrement, Conditional Operator, Special Operator – Comma, sizeof operator, Operator Precedence and Associativity, Type Conversion – implicit and explicit, If Statement, if-else Statement, nested if-else Statement, Switch Statement, Break, continue and goto statements, Looping Concepts - While, do-while, for loop Nested loops Concept.

Unit 3: Arrays and Strings   (8L, 12M)

Array: declaration and Initialization, Types of array (One Dimensional and Multidimensional), String Function: strcpy(), strlen(), strcmp(), strcat(), strrev().

Unit 4: Functions and Pointers **(10L, 15 M)**

Declaration and Prototypes, Function calling (Call by value, call by reference), Function with return and Function with argument, Recursion.

Pointers, accessing value through a pointer, Operations on Pointers: Pointers and Arrays, Array of Pointer, Dynamic memory allocation and releasing dynamically allocated memory, **structure and union:** Introduction, Declaration and access.

Reference Books:

1. Denis Ritchie. "C" Programming – Prentice Hall Software Series- ISBN. 10 9 8 7

2. Yashwant P. Kanetkar - ANSI C ,BPB publication. ISBN: 9788183333245

3. Byron Gottfried – Programming with C –Tata McGRAW-Hill ISBN-10: 0070145903

4. Yashwant P. Kanetkar -Understanding pointers in "C" -BPB publication. ISBN-13: 978-8176563581

5. E.Balguruswami -Programming in ANSI- C- Tata McGRAW-Hill- ISBN-10: 933921966X

6. Mike McGrath - C programming in easy step – Wiley publication ISBN-10: 1840785446

Course Code: CS-115

Course Title: Lab on C Programming

Course Code: CS-115	**Course Category:Minor Course (MIN)**
Course Title: Practical based on C Programming	**Type: Practical**
Total Contact Hours: 60 (4/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- To study various data types, arrays and functions in C
- To understand input-output and, control and iterative statements in C

Course Outcomes:

CO No.	CO	Cognitive level
BCS115C.1	Apply appropriate data types and control structures for problem solving using C	4
BCS115C.2	Implement the real world problems by devising algorithm and implement using C	6
BCS115C.3	Illustrate and explain the programming principles of C language by drawing flowchart for given problem.	5

On completion of the course, students will be able to–
- Formulate an algorithm and draw flowchart for the given problem
- Implement the given algorithm in C
- Write programs using appropriate data types and control structures in C

List of Experiment:

1. Demonstration of use of data types, simple operators (expressions)
2. Demonstration of decision making statements (if and if-else, nested control statements)
3. Demonstration of decision making statements (switch case)
4. Demonstration of use of while loops, for loops, do-while loops, nested loops
5. Demonstration of exit, goto, continue, break.
6. Demonstrations of Structure and Union.
7. Demonstration of writing C programs in modular way (use of user defined functions)
8. Demonstration of call by value, call by reference and recursive functions
9. Demonstration of use of arrays (1-D array, 2-D arrays) and functions
10. Demonstration of Standard Library Function.

course Code: CS-116

Course Title: Word Processing Tools (Hands on)

Course Code: CS-116	Course Category: Open Elective Course (OE)
Course Title: Word Processing Tools (Hands on)	Type: Theory
Total Contact Hours: 30 (2/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks

Course Objectives:
- This course introduces word processing concepts and applications.
- Topics include preparation or a variety of documents and mastery of specialized software functions.
- Upon completion, students should be able to work effectively in a computerized word processing environment.

Course Outcomes: This course will enable the students to

CO No.	CO	Cognitive level
BCS116C.1	Identify and navigate different components of the MS Word interface, including ribbons, menus, and toolbars.	3
BCS116C.2	Use advanced features of macros, styles, graphics, document protection, table of contents, and indexes	3
BCS116C.3	Create and format professional-looking text documents using MS Word, including tasks such as setting margins, aligning text, applying font styles and sizes, and inserting images and tables.	6

Course Content:

Unit 1: Introduction to Word Processing   (06 L, 12 M)
1.1 Development of the Word Processor
1.2 Design considerations for word processed documents
1.3 Open Office suite's word processing application/Writer
1.4 Opening and Closing Writer, Creating, opening and closing documents
1.5 Working with multiple documents
1.6 Saving documents, Save an existing file under another name, Save different Versions.

Unit 2: Locating the Components of the Writer Window   (04 L, 06 M)
2.1 Writer toolbars and ruler
2.2 Adjusting the application settings
2.3 Adding content to Writer Documents
2.4 Working with text
2.5 Editing Content

Unit 3: Formatting Documents and Tables   (08 L, 12 M)

3.1 Text Formatting, Paragraph Formatting, Text alignment

3.2 Tabs and its types, Placing text at the tab position

3.3 Paragraph spacing

3.4 Working with lists, Paragraph borders and shading

3.5 Creating and Applying Styles

3.6 Adding data to a table, Deleting a table

3.7 Add and delete columns and rows, Modifying columns and rows

3.8 Images, Inserting images, Modifying images, Resize an image and charts

Unit 4: Mail Merge and Google Docs   (12 L, 15 M)

4.1   Preparing the documents, creating the main document

4.2   Creating the data source, Document formatting

4.3   Create new documents from scratch, as well as from templates.

4.4   Open existing documents from Google Docs, as well as other word processing programs.

4.5   Navigate both the desktop and mobile versions of Google Docs.

4.6   Format text, paragraphs, and pages.

4.7   Insert, format, and edit images and graphics.

4.8   Share and collaborate on documents with other users.

4.9   Publish documents to the web.

4.10 Print documents. Install add- ons to give Google Docs even more function and features.

Reference Books:

1. Microsoft Word 2013 with CD by Nita Rutkosky and Audrey Rutkosky Roggenkamp, Paradigm Publishing, 2011, ISBN 978-0-76385-199-6 (text and CD).

2. Mastering MS Office, Bittu Kumar, V&S Publishers, 2017

Course Code: CS-117

Course Title: Software and Hardware Installation

Course Code: CS-117	**Course Category: Skill Enhancement Course**
Course Title: Software and Hardware Installation	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- To make aware about Operating System Basics & Installation.
- To demonstrate various Software Installation and Device Installation.
- To introduce student with diagnostic Tools & PC Maintenance.
- To give Basic Network Introduction & Installation.

Course Outcomes:

CO No.	CO	Cognitive level
BCS117C.1	Demonstrate knowledge of Operating System Basics & Installation.	2
BCS117C.2	Understanding about various Software Installation and Device Installation process. .	2
BCS117C.3	Apply Knowledge about Basic Network & its Installation	3
BCS117C.4	Analyze hardware issues by using diagnostic Tools & able to do PC Maintenance	4

Course Content:

Unit 1: Operating System Basics & Installation   (08 L, 12 M)
1.1 Introduction to OS
1.2 Types of Operating systems
1.3 System files FAT and NTFS
1.4 Dos 6.22, Windows 7 and RedHat Linux and Multi Boot Operating System.

Unit 2: Various types of Software Installation and Device Installation

                                              (08 L, 12 M)

2.1 MS-Office 2010, Photoshop 7 and CS5
2.2 Tally 7.0 and ERP, Acrobat Reader X, Java, Visual Studio, C & C++,
2.3 Multimedia software's, and Internet Browsers like- IE9, Google Chrome, Mozilla Firefox
2.4 Graphics Card, Sound Card
2.5 LAN Card, Wireless LAN Card, SCSI Card
2.6 External Drive, Flash Cards, Web Camera, CCTV Camera

2.7 Mobile Devices, Firewire Cards

2.8 Modem, Plotter, Wireless LAN, Access Point.

Unit 3:Diagnostic Tools & PC Maintenance (06L, 10 M)

3.1 Introduction, Virus and its types

3.2 Effect of Virus for Computer System

3.3 Scanning and Antivirus remover tools

3.4 Antivirus Utilities for Diagnostic, Safety and Preventive Maintenance Tools

3.5 Data Recovery, Troubleshooting

3.6 PC Hardware:- O/S Troubleshooting issues in computer System.

(Related Diagnostic Tools should be covered)

Unit-4: Basic Network Introduction & Installation (06L, 12 M)

4.1 Introduction about Network

4.2 Installing Network Operating System Server and Windows 2008 Server

4.3 Cable Crimping

4.4 Network Sharing and user Permission

4.5 Internet Connection, E-Mail, Cloud Networking

4.6 Google Drive, SkyDrive, Dropbox, etc.

Reference Books:

1. Windows XP Professional edition complete BPB Publication
2. Office XP complete BPB publication
3. Microsoft Windows Server 2008 Administration by STEVE SEGUIS,
4. McGraw Hill Publication, ISBN 10: 0071493263 ISBN 13: 9780071493260.
5. Upgrading and Repairing PC by Scott Muller, ISBN-13: 978-0789756107,ISBN-10: 9780789756107
6. https://www.makeuseof.com/tag/13-windows-diagnostics-tools-check-pcs-health/

Course Code: CS-121 **Course Title: Introduction to Data Science**	

Course Code: CS-121	**Course Category: Core Course (DSC)**
Course Title: Introduction to Data Science	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:

By the end of the course, students should be able to:

- Define data science and explain its significance in various fields.
- Utilize data manipulation techniques to preprocess and clean data.
- Apply exploratory data analysis (EDA) methods to gain insights into datasets.
- Understand fundamental statistical concepts used in data science.
- Implement basic data visualization techniques to effectively communicate findings.
- Apply machine learning algorithms to solve prediction and classification tasks.
- Explain the importance of data ethics and privacy in data science projects.
- Work collaboratively on data science projects and communicate results effectively.

Course Outcomes:

CO No.	CO	Cognitive level
BCS121C.1	Identify and describe the methods and techniques commonly used in data science.	3
BCS121C.2	Model the problem with the help of methods and techniques for obtaining, organizing, exploring, and analyzing data.	3
BCS121C.3	Perform data analysis and use inferential statistics, machine learning, and statistical computing to solve problem.	6

Course Content:

Unit 1:The Data Science Road Map   **(08 L, 12 M)**

1.1   Introduction
1.2   Frame the Problem
1.3   Understand the Data: Basic Questions, Data Wrangling, And Exploratory Analysis.
1.4   Extract Features
1.5   Model
1.6   Present Results
1.7   Deploy Code
1.8   Iterating.

Unit 2:Programming Languages   **(06 L, 12 M)**

2.1 Why Use a Programming Language?

2.2A Survey of Programming Languages for Data Science:
- Python
- R
- MATLAB® and Octave
- SAS®
- Scala®

Unit 3:Data Munging   **(08 L, 12 M)**
3.1 Problems with Data Content
3.2 Formatting Issues
3.3 Example Formatting Script
3.4 Regular Expressions

Unit 4:Visualizations and Simple Metrics   **(08 L, 14 M)**
4.1 Python's Visualization Tools
4.2 Pie Charts
4.3 Bar Charts
4.4 Histograms
4.5 Means, Standard Deviations, Medians, and Quantiles
4.6 Boxplots
4.7 Scatterplots

Reference Books:

1. F. Cady, "The Data Science Handbook". John Wiley & Sons, Incorporated, 2017. [Online]. Available: https://books.google.co.in/books?id=VjkbnQAACAAJ.
2. "Data Science for Beginners" by John D. Kelleher
3. "Smarter Decisions: The Intersection of IoT and Data Science", Jojo Moolayil, PACKT, 2016.
4. "Doing Data Science", Cathy O'Neil and Rachel Schutt, O'Reilly, 2015.

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Course Code: CS-122

Course Title: **Vedic Mathematics**

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Course Code: CS-122	**Course Category: Core Course (DSC)**
Course Title: Vedic Mathematics	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- Gain an understanding of the historical and cultural context in which Vedic mathematics developed.
- Learn and apply fundamental Vedic mathematical sutras for addition, subtraction, multiplication, and division.
- Develop the ability to perform mental calculations quickly and accurately using Vedic methods.
- Use Vedic mathematics to solve geometry problems.

Course Outcomes:

CO No.	CO	Cognitive level
BCS122C.1	Apply Vedic sutras effectively to perform mental calculations, leading to improved speed and accuracy in arithmetic operations.	3
BCS122C.2	Utilize Vedic methods to simplify geometry and trigonometry problems, enhancing problem-solving skills in these areas.	3
BCS122C.3	Demonstrate ethical mathematical practices, including proper attribution of sources and responsible problem-solving	2

Course Content:

Unit 1: Introduction to Vedic Mathematics   **(08 L, 12 M)**
1.1 Historical background and significance of Vedic mathematics.
1.2 Overview of Vedic mathematical techniques and sutras.
1.3 Benefits of learning Vedic mathematics.
1.4 Introduction to mental calculation strategies.

Unit 2: Basic Operations   **(08 L, 12 M)**
2.1 Addition and subtraction using Vedic sutras.
2.2 Sutra: "NikhilamNavatashcaramamDashatah" (All from 9 and the last from 10).
2.3 Multiplication techniques.

2.4 Sutra: "Urdhva-Tiryagbhyam" (Vertically and crosswise).

2.5 Division techniques.

2.6 Sutra: "ParavartyaYojayet" (Transpose and apply).

2.7 Practical exercises and problems involving these operations.

Unit 3: Advanced Multiplication and Division   **(08 L, 12 M)**

3.1 Advanced multiplication of numbers with specific patterns.

3.2 Sutra: "EkadhikenaPurvena" (By one more than the previous one).

3.3 Squaring numbers.

3.4 Sutra: "Anurupyena" (Proportionately).

3.5 Finding square roots.

3.6 Sutra: "ShunyamSaamyasamuccaye" (The sum of the same in balance).

3.7 Cube roots and cube calculations.

3.8 Sutra: "VargaYojayet" (By the completion or non-completion in the square).

Unit 4: Algebraic Techniques   **(06 L, 09 M)**

4.1 Solving algebraic equations using Vedic methods.

4.2 Simplifying and factorizing algebraic expressions.

4.3 Applying Vedic mathematics to polynomial and quadratic equations.

4.4 Practical exercises and problem-solving in algebra.

4.5 Using Vedic techniques to solve geometry problems.

4.6 Trigonometric calculations made easier with Vedic methods.

Reference Books:

1. Bharati Krisna Tirthaji, "Vedic Mathematics: Sixteen Simple Mathematical Formulae From The Vedas",

2. Dhaval Bathia "Vedic Mathematics Made Easy"

3. Kenneth Williams "Vedic Mathematics for All Ages: A Beginner's Guide"

<table>
<tr><td colspan="2" align="center">Course Code: CS-123

Course Title: Lab on Data Science</td></tr>
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Course Code: CS-123	**Course Category: Core Course (DSC)**
Course Title: Lab on Introduction to Data Science	**Type: Practical**
Total Contact Hours: 60 (4/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- To learn features in data science
- To study data manipulation techniques
- To understand fundamental statistical concepts used in data science.

Course Outcomes: On completion of the course, student will be able to–

CO No.	CO	Cognitive level
BCS123C.1	Understand programming abilities to tackle data.	2
BCS123C.2	Demonstrate proficiency with statistical analysis of data.	4
BCS123C.3	Apply skills to manage data using data science methods.	3
BCS123C.4	Utilize data science concepts and methods to resolve problems in real-world contexts.	6

List of Experiment:

Note: All experiments should be performed using C programming language and Excel.

1. Create and display data and matrix manipulation.
2. Create and manipulate list and an array.
3. Create a data frame and matrix-like operations on a data frame.
4. Merging two Data Frames and applying functions to Data frames
5. Visualization Effects and Linear Regression

   (Here equation is y=mx+c, find m and c and display scatter plot coordinates)
6. Plotting with layers and Histogram & Density Charts.
7. Implement a program to calculate Means and Standard Deviations.
8. Implement a program to calculate Medians, and Quantiles.

Course Code: CS-124

Course Title: Introduction to Data Science

Course Code: CS-124	**Course Category: Minor Course (MIN)**
Course Title: Introduction to Data Science	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:

By the end of the course, students should be able to:

- Define data science and explain its significance in various fields.
- Utilize data manipulation techniques to preprocess and clean data.
- Apply exploratory data analysis (EDA) methods to gain insights into datasets.
- Understand fundamental statistical concepts used in data science.
- Implement basic data visualization techniques to effectively communicate findings.
- Apply machine learning algorithms to solve prediction and classification tasks.
- Explain the importance of data ethics and privacy in data science projects.
- Work collaboratively on data science projects and communicate results effectively.

Course Outcomes:

CO No.	CO	Cognitive level
BCS124C.1	Identify and describe the methods and techniques commonly used in data science.	3
BCS124C.2	Model the problem with the help of methods and techniques for obtaining, organizing, exploring, and analyzing data.	3
BCS124C.3	Perform data analysis and use inferential statistics, machine learning, and statistical computing to solve problem.	6

Course Content:

Unit 1: The Data Science Road Map   **(08 L, 12 M)**
1.1   Introduction
1.2   Frame the Problem
1.3   Understand the Data: Basic Questions, Data Wrangling, And Exploratory Analysis.
1.4   Extract Features
1.5   Model
1.6   Present Results
1.7   Deploy Code
1.8   Iterating.

Unit 2: Programming Languages   **(06 L, 12 M)**

2.1 Why Use a Programming Language?

2.2A Survey of Programming Languages for Data Science:
- Python
- R
- MATLAB® and Octave
- SAS®
- Scala®

Unit 3:Data Munging   (08 L, 12 M)

3.1 Problems with Data Content

3.2 Formatting Issues

3.3 Example Formatting Script

3.4 Regular Expressions

Unit 4:Visualizations and Simple Metrics   (08 L, 14 M)

4.1 Python's Visualization Tools

4.2 Pie Charts

4.3 Bar Charts

4.4 Histograms

4.5 Means, Standard Deviations, Medians, and Quantiles

4.6 Boxplots

4.7 Scatterplots

Reference Books:

5. F. Cady, "The Data Science Handbook". John Wiley & Sons, Incorporated, 2017. [Online]. Available: https://books.google.co.in/books?id=VjkbnQAACAAJ.

6. "Data Science for Beginners" by John D. Kelleher

7. "Smarter Decisions: The Intersection of IoT and Data Science", JojoMoolayil, PACKT, 2016.

8. "Doing Data Science", Cathy O'Neil and Rachel Schutt, O'Reilly, 2015.

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<tr><td colspan="2" align="center">Course Code: CS-125

Course Title: Lab on Data Science</td></tr>
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Course Code: **CS-125**	Course Category: Minor Course (MIN)
Course Title: Lab on Introduction to Data Science	Type: Practical
Total Contact Hours: 60 (4/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks

Course Objectives:
- To learn features in data science
- To study data manipulation techniques
- To understand fundamental statistical concepts used in data science.

Course Outcomes: On completion of the course, student will be able to–

CO No.	CO	Cognitive level
BCS125C.1	Understand programming abilities to tackle data.	2
BCS125C.2	Demonstrate proficiency with statistical analysis of data.	4
BCS125C.3	Apply skills to manage data using data science methods.	3
BCS125C.4	Utilize data science concepts and methods to resolve problems in real-world contexts.	6

List of Experiment:

Note: All experiments should be performed using C programming language/Excel.

1. Create and display data and matrix manipulation.

2. Create and manipulate list and an array.

3. Create a data frame and matrix-like operations on a data frame.

4. Merging two Data Frames and applying functions to Data frames

5. Visualization Effects and Linear Regression

   (Here equation is y=mx+c, find m and c and display scatter plot coordinates)

6. Plotting with layers and Histogram & Density Charts.

7. Implement a program to calculate Means and Standard Deviations.

8. Implement a program to calculate Medians, and Quantiles.

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<tr><td colspan="2" align="center">**Course Code: CS-126**

Course Title: Spreadsheet Tools (Hands on)</td></tr>
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Course Code: CS-126	**Course Category: Open Elective Course (OE)**
Course Title: Spreadsheet Tools (Hands on)	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20 Marks	**University Assessment (UA): 30 Marks**

Course Objectives:
- Construct, modify, and print a professionally designed and formatted spreadsheet.
- Create and manipulate various types of charts and enhance charts with drawing tools.
- Create and use basic formulas and functions.
- Create and use complex and advanced formulas and functions from each category of functions provided by Excel.

Course Outcomes: After completion of the course, students will be able to

CO No.	CO	Cognitive level
BCS126C.1	Make meaningful representation of data using formatted spreadsheet	4
BCS126C.2	Draw analysis using various types of charts and enhance charts with drawing tools	4
BCS126C.3	Create and use basic formulas and functions.	6
BCS126C.4	Create and use complex and advanced formulas and functions from each category of functions provided by Excel.	6

Course Content:

Unit 1:The Excel environment and working with data   **(08 L, 12 M)**
1.1 Navigating a worksheet
1.2 Spreadsheet terminology
1.3 Entering and editing text and values
1.4 Entering and editing formulas
1.5 Saving and updating workbooks
1.6 Moving and copying data
1.7 Moving and copying formulas
1.8 Inserting and deleting ranges, rows, and columns
1.9 Cell comments

Unit 2: Using functions   **(08 L, 12 M)**
2.1 Entering functions
2.2 AutoSum

2.3 Other common functions

2.4 Create an outline and consolidate data

2.5 Create subtotals in a list

2.6 Use multiple subtotal functions – SUBTOTAL, SUMIF

2.7 Create custom views to save different sets of worksheet display and print settings

Unit 3: Range names, Filter data and Charts (08 L, 12 M)

3.1 Define and apply cell and range names

3.2 Use names in Formulas

3.3 Filter data based on complex criteria

3.4 Use conditional filters

3.5 Copy filtered results to another range

3.6 Chart basics

3.7 Pie Chart

3.8 Bar Chart

Unit 4: Selected Functions and Pivot Tables (06 L, 09 M)

4.1 Using IF and SUMIF functions to calculate a value based on specified criteria

4.2 Use ROUND function to round off numbers

4.3 Use VLOOKUP to find values in worksheet data

4.4 Use HLOOKUP to find values in worksheet data

4.5 Prepare data in a table format and name thetable

4.6 Create a PivotTable for analyzing

Reference Books:

1. "Microsoft Excel 365 Bible", 1st Edition by Michael Alexander, Dick Kusleika, ISBN-10-1119835100, Publisher-Wiley

2. "Excel 2019 All-in-One For Dummies", 1st Edition by Greg Harvey, ISBN-10-111951794X, Publisher-For Dummies

3. "Excel Dashboards and Reports", 2nd Edition by John Walkenbach , Michael Alexander, ISBN-10-9781118490426

Course Code: CS-127

Course Title: Linux Fundamentals

Course Code: CS-127	**Course Category: Core Course (SEC)**
Course Title: Linux Fundamentals	**Type: Theory**
Total Contact Hours: 30 (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20	**University Assessment (UA): 30 Marks**

Marks	

Course Objectives:
- To familiarize students with Linux operating system and its features
- To understand the Linux System Architecture and shells
- To learn working with Files
- To learn basic Linux commands
- To understand the basic principles of programming and writing shell scripts
- To familiarize students with Managing User Accounts and Groups
- To familiarize students with working in X Windows and GNOME

Course Outcomes:

CO No.	CO	Cognitive level
BCS127C.1	Understand Linux operating system and its features	2
BCS127C.2	Apply basic Linux commands to work with File system	3
BCS127C.3	Analyze the Linux System Architecture and classification of shells	4
BCS127C.4	Write shell scripts to apply principles of programming to work with OS.	6
BCS127C.5	Create and Managing User Accounts and Groups, Familiarize with X Windows and GNOME	6

Course Content:

Unit 1: History and Development of Linux   **(08 L, 12 M)**
1.1 A Brief History of Linux
1.2 Features of Linux
1.3 Applications of Linux
1.4 Components of Linux System
1.5 Acquiring and Using Linux- Linux Software, Linux as Free Software
1.6 Examining Linux Distributions
1.7 System Access-Logging In, Logout, Shutdown and Using Remote Linux System
1.8 Understand the Linux System Architecture
1.9 Classification of Linux Shell-Bourn Shell (sh), Shell (csh), Bourn Again Shell (bash), Korn Shell (ksh), Other Shell

Unit 2: Working with Files and using Linux Commands   **(08 L, 12 M)**
2.1 Creating and Viewing File- Using The vi Editor Using Other Editor (ex-emac, etc)
2.2 File Operations- Copying and Deleting Files, Moving and Renaming Files
2.3 Creating Files and Symbolic Links, Redirection.
2.4 What is Linux Command? How to Execute a Linux Command?
2.5 Linux Commands - su, pwd, cd, echo, cal, clear, man, xman, cat, more, less, ls, find, grep, tar, gzip, kill, wildcards * and?

Unit 3: Writing Simple Shell scripts   **(06 L, 09 M)**

3.1 How to write and execute Shell Script

3.2 Operators in Linux

3.3 Control Structures- if, if-else, elif, fi, case statement

3.4 Looping-while, until, for loop

3.5 Shell Scripts

Unit 4: Create and Managing Users, Working In X Windows and GNOME

(08 L, 12 M)

4.1 Introduction

4.2 Purpose of Different User Account and Group

4.3 Creating and Managing Users and Groups

4.4 Introduction to X-windows and GNOME

4.5 Comparison of Microsoft Windows and X-windows

4.6 X-servers, Window Manager and Desktop Environment

4.7 The GNOME Panel, GNOME Main Menu

4.8 X-Windows Utilities

Reference Books:

1. Mc callister, SuseLinus-10,Pearson Education,2006.

2. Ball, Using Linux, PHI, 1998.

3. Das, Unix: Concepts And Applications (4thEd), TMH, 2006.

4. Foster Johnson, Welch, Anderson, Beginning Shell Scripting, Wiley India (Wrox),2006.

5. Neil Mathew, Richard Stones, Beginning Linux Programming (3rdEd), Wiley India (Wrox), 2006.

6. Peterson, Linux: Complete Reference(5thEd), Peterson, TMH.

Course Code: CS-128

Course Title: Lab on Linux Fundamentals

Course Code: CS-128	Course Category: Core Course (DSC)
Course Title: Lab on Linux Fundamentals	Type: Practical
Total Contact Hours: 30 (2/week)	Course Credits: 02
College Assessment (CA) Marks: 20 Marks	University Assessment (UA): 30 Marks
Course Objectives:	

- Provide knowledge about how to use Linux operating system and its features.
- To provide hands on for working with Files
- How to work with basic Linux commands
- To understand the basic principles of programming and writing shell scripts
- To make able to students with Managing User Accounts and Groups
- To familiarize students with working in X Windows and GNOME

Course Outcomes:

CO No.	CO	Cognitive level
BCS128C.1	Understand Linux operating system and able to use its features	3
BCS128C.2	Analyze the Linux System Architecture and classification of shells	4
BCS128C.3	Write shell scripts to apply principles of programming to work with OS.	6
BCS128C.4	Create and Managing User Accounts and Groups, X Windows and GNOME	6

Course Content:

1. Demonstration of System Access-Logging In, Logout, Shutdown and Using Remote Linux System.
2. Creating and Viewing File(cat), Using The vi Editor
3. File Operations- Copying (cp) and Deleting (rm) Files, Moving (mv) and Renaming (ren) Files, Creating Files and Symbolic Links (ln), Redirection (|, >, >>).
4. Demonstration of Linux Commands: su, pwd, cd, echo, cal, clear, man, xman, more, less, ls, wildcards * and?
5. Shell script for addition of two number/ Number is Positive or Negative/ Number is ODD or EVEN
6. Shell Script for demonstration of if else, etc
7. Shell Script for demonstration of while, for loop
8. Shell Script to demonstrate use of case statement
9. Practical for Creating and Managing Users, Creating and Managing Groups
10. Demonstration of Working in X Windows: Gedit, Gcalc, Xclock, Choosing and Changing Desktops & properties etc.