

Sardar Patel University, Mandi (H.P.)-175001

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Recognized Under Section 2(f)-UGC Act 1956]

Department of Computer Science



Scheme & Syllabus

of

**Bachelor of Science (B.Sc.) (Computer
Science) /**

**Bachelor of Arts (B.A.) (Computer
Applications) / B.Sc. (Physical Science with
Computer Science)**

[Three Year Multidisciplinary Programme]

Based on NEP 2020

Effective from 2026-27 onwards

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Programme: B.Sc. in Physical Sciences [PEOs, PSOs and POs]

Program Educational Objectives (PEOs)

The PEOs will enable students to

PEO-1: Develop a strong foundation in Physical Sciences through the integrated study of Computer Science, Physics, and Mathematics, enabling a comprehensive understanding of computational, mathematical, and physical systems.

PEO-2: Equip students with analytical, computational, experimental, and research competencies to investigate scientific problems and undertake independent research in specialized areas of Physical Sciences.

PEO-3: Foster critical thinking, innovation, leadership, effective communication, teamwork, and ethical values for successful participation in multidisciplinary academic, industrial, and research environments.

PEO-4: Prepare graduates for higher education, research, entrepreneurship, and diverse career opportunities in information technology, software development, scientific computing, artificial intelligence, data science, education, and government organizations.

PEO-5: Promote lifelong learning, technological innovation, environmental stewardship, and social responsibility to contribute towards sustainable development and scientific advancement.

Program Specific Outcomes (PSOs)

The B.Sc.(Computer Science) with Physical Sciences programme is designed to

PSO-1: Apply the fundamental principles of Computer Science, Physics, and Mathematics to analyze, model, and solve computational and scientific problems.

PSO-2: Demonstrate proficiency in programming, mathematical modelling, scientific experimentation, simulation techniques, and computational problem-solving using contemporary software tools.

PSO-3: Utilize computational, statistical, and analytical methods for scientific data processing, interpretation, visualization, and informed decision-making.

PSO-4: Integrate interdisciplinary knowledge and emerging technologies to address challenges in scientific computing, artificial intelligence, automation, data analytics, and sustainable technological development.

PSO-5: Apply professional ethics, effective communication, collaborative skills, and innovative thinking in academic, industrial, and societal contexts.

Programme Outcomes (POs)

After successfully completing the programme, the students will be able to:

PO1: Computing Knowledge

Apply knowledge of Computer Science, Mathematics, and supporting scientific principles to solve complex computing problems.

PO2: Computational Thinking and Problem Analysis

Identify, formulate, analyze, and solve computational problems using logical reasoning, algorithmic thinking, mathematical modelling, and scientific approaches.

PO3: Software Design and Development

Design, implement, test, deploy, and maintain efficient software systems using appropriate programming languages, development frameworks, and software engineering practices.

PO4: Modern Computing Tools

Utilize contemporary programming languages, integrated development environments (IDEs), databases, cloud platforms, version control systems, virtualization tools, and open-source technologies for software development.

PO5: Artificial Intelligence and Data Analytics

Apply concepts of artificial intelligence, machine learning, data science, data analytics, and visualization techniques to solve real-world computational problems.

PO6: Systems, Networks and Cybersecurity

Demonstrate knowledge of operating systems, computer networks, cybersecurity principles, cloud computing, and distributed systems to build secure and reliable computing environments.

PO7: Scientific Investigation and Innovation

Apply scientific methods, computational modelling, simulation, experimentation, and analytical techniques to investigate problems and develop innovative computing solutions.

PO8: Ethics, Cyber Ethics and Professional Responsibility

Apply ethical principles, cybersecurity practices, intellectual property rights, digital responsibility, and professional standards in computing and information technology.

PO9: Communication, Leadership and Teamwork

Communicate effectively, lead multidisciplinary teams, manage projects, and collaborate professionally in diverse organizational environments.

PO10: Lifelong Learning and Technological Adaptability

Engage in continuous learning, professional development, and adaptation to emerging technologies, industry trends, and global technological advancements.

PO11: Interdisciplinary Integration

Integrate concepts from Computer Science, Mathematics, Physics, and allied disciplines to develop sustainable, innovative, and technology-enabled solutions for societal and industrial challenges.

PO12: Employability, Entrepreneurship and Global Competence

Demonstrate technical competence, entrepreneurial mindset, innovation, and global professional skills required for higher education, employment, research support, startups, and leadership roles in the computing profession.

Break-Down of Credits-Semester wise

Course Type/ Semester	DSC	DSE	MDC	SEC	AEC	VAC	INP/APT/PRT/COM or Vocation Course	DIS	Total
I	12	-	3	3	2	-	-	-	20
II	12	-	3	3	-	2	4	-	24
Exit option with UG Certificate after securing 44 credits along with entry option to second year or third semester									
III	8 (MJ)+4 (MN)	-	3	3	2	2	-	-	22
IV	8 (MJ)+4 (MN)	4	-	-	2	2	-	-	20
Exit option with UG Diploma after securing 86 credits along with entry option to third year or fifth semester									
V	8 (MJ)+4 (MN)	8	-	-	2	-	-	-	22
VI	8 (MJ)+4 (MN)	8	-	-	-	-	-	-	20
Award of 3Year Bachelor's Degree after completion of 128 credits									

Abbreviations: **DSC**-Discipline Specific Core, **DSE**- Discipline Specific Elective, **MDC**-Multidisciplinary Course, **SEC**-Skill Enhancement Course, **AEC**-Ability Enhancement Course, **VAC**-Value Added Course, **MJ**-Major, **MN**-Minor, **INP/APT/PRT/COM**-Internship / Apprenticeship/ Project/ Community Outreach.

Important Notes

- In the first semester, students will be offered three different subjects within the same stream: A, B, and C
- The student will be required to give his/her Major and Minor at the end of the second semester. Such choices, including DSCs made at the end of the second semester, shall remain in effect until the VI semester.
- The DSCs of another discipline for the first two semesters of students who opt for Major programmes will be treated as Minors.
- MDCs must be selected from a broad discipline/pool of MDCs other than Major and Minor disciplines/subjects
- AEC/VAC/SEC-3 should be chosen from a pool of courses. Every discipline shall provide these courses, some of which will be offered discipline-specific, while the rest can be open to students of all other disciplines. However, the two SECs (SEC-1 & SEC-2) must be chosen from the discipline-specific (Core and Minor).
- Internship / Apprenticeship/ Project/ Community Outreach will be determined at the end of the first semester to enable students to carry out some INP/APT/PRT/COM activities during winter vacation.
- To pursue an Honours & Honours with research in the 4th year, students will have to successfully complete 3-year UG Degree and choose only one discipline in both semesters, in which s/he have studied 6 DSCs and 5 DSEs in the first three years.
- A student who secures 75% or more marks in aggregate till semester 6 (up to a 3-year degree) shall be eligible for a 4-year degree Honours with Research, provided SPU has approved the college to offer it.
- The Dissertation and Project will start in the VII semester. However, the evaluation and assessment will be conducted in both the VII and VIII semesters.
- As permitted under the UGC Guidelines for Multiple Entry and Exit in Academic Programmes offered in Higher Education Institutions, students will be allowed to enter/re-enter in the odd semesters and after even semesters, provided they fulfill the minimum requirements for entry and exit
- A student shall be eligible to appear in the end-semester examination only if he/she has a minimum of 75% attendance. The terms and rules governing condoning can be found in the Examination Section of the Ordinance.

Semester wise Scheme

Semester-I

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC-101 T		DSC	3	0	0	3	3	25	50	-	-	75
2	BCOMP-DSC-101 P		DSC	0	0	1	1	2	-	-	5	20	25
3	BPHYS-DSC-101T		DSC	3	0	0	3	3	25	50	-	-	75
4	BPHYS-DSC-101P		DSC	0	0	1	1	2	-	-	5	20	25
5	BMATH-DSC-101T		DSC	4	0	0	4	4	25	75	-	-	100
6	BXXXX*-MDC-101*		MDC	3	0	0	3	3	25	50	-	-	75
7	BCOMP-SEC-101		SEC	3	0	0	3	3	25	50	-	-	75
8	BXXX-AEC-101		AEC	2	0	0	2	2	15	35	-	-	50
Total							20	23					
Cumulative Credits							20						

Abbreviations: L-Lecture, T-Tutorial, P-Practical, C-Credits, CH-Contact Hours, IA-Internal Assessment, ESE- End Semester Examination

Note:

- XXXX*- Short form of the department whose MDC is offered in the curriculum

Semester-II

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC-201 T		DSC	3	0	0	3	3	25	50	-	-	75
2	BCOMP-DSC-201 P		DSC	0	0	1	1	2	-	-	5	20	25
3	BPHYS-DSC-201T		DSC	3	0	0	3	3	25	50	-	-	75
4	BPHYS-DSC-201P		DSC	0	0	1	1	2	-	-	5	20	25
5	BMATH-DSC-201T		DSC	4	0	0	4	4	25	75	-	-	100
6	BXXXX-MDC-201*		MDC	3	-	-	3	3	25	50	-	-	75
7	BCOMP-SEC-201		SEC	3	-	-	3	3	25	50	-	-	75
8	BXXXX.-VAC-201		AEC	2	-	-	2	2	15	35	-	-	50
9	BCOMP-INP-201		INP	4	-	-	4	12	100	-	-	-	100
Total							24	35					
Cumulative Credits							44						

Note:

- Exit option with UG Certificate after securing 44 credits(*with 4 credits of I/A/P/C/ or work-based vocational course offered during winter/summer term), along with entry option to second year or third semester

Semester-III

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC(MJ)-301 T		DSC	3	0	0	3	3	25	50	-	-	75
2	BCOMP-DSC(MJ)-301 P		DSC	0	0	1	1	2	-	-	5	20	25
3	BPHYS-DSC(MJ)-301T		DSC	3	0	0	3	3	25	50	-	-	75
4	BPHYS-DSC(MJ)-301P		DSC	0	0	1	1	2	-	-	5	20	25
5	BMATHS-DSC(MN) 301T		DSC	4	0	0	4	4	25	75	-	-	100
6	BXXXX-MDC-301		MDC	3	-	-	3	3	25	50	-	-	75
7	BCOMP-SEC-301		SEC	3	-	-	3	3	25	50	-	-	75
8	BXXXX-AEC-301		AEC	2	-	-	2	2	15	35	-	-	50
9	BXXXX-VAC-301		VAC	2	-	-	2	2	15	35	-	-	50
Total							22	35					
Cumulative Credits							66						

Semester-IV

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC(MJ)-401 T		DSC	3	-	-	3	3	25	50	-	-	75
2	BCOMP-DSC(MJ)-401 P		DSC	-	-	1	1	2	-	-	5	20	25
3	BPHYS-DSC(MJ)-401T		DSC	3	-	-	3	3	25	50	-	-	75
4	BPHYS-DSC(MJ)-401P		DSC	-	-	1	1	2	-	-	5	20	25
5	BMATHS-DSC(MN) 401T		DSC	4	-	-	4	4	25	75	-	-	100
6	BCOMP-DSE-401		DSE	4	-	-	4	4	25	75	-	-	100
7	BXXXX.-AEC-401		AEC	2	-	-	2	2	15	35	-	-	50
8	BXXXX.-VAC-401		VAC	2	-	-	2	2	15	35	-	-	50
Total							20						
Cumulative Credits							86						

Note:

- Exit option with UG Diploma after securing 86credits along with entry option to third year or fifth semester

Semester-V

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC(MJ)-501 T		DSC	3	-	-	3	3	25	50	-	-	75
2	BCOMP-DSC(MJ)-501 P		DSC	-	-	1	1	2	-	-	5	20	25
3	BPHYS-DSC(MJ)-501T		DSC	3	-	-	3	3	25	50	-	-	75
4	BPHYS-DSC(MJ)-501P		DSC	-	-	1	1	2	-	-	5	20	25
5	BMATHS-DSC(MN) -501T		DSC	4	-	-	4	4	25	75	-	-	100
6	BCOMP-DSE-501		DSE	4	-	-	4	4	25	75	-	-	100
7	BCOMP-DSE-502		DSE	4	-	-	4	4	25	75	-	-	100
8	BXXXX-AEC-501		AEC	2	-	-	2	2	15	35	-	-	50
Total							22						
Cumulative Credits							108						

Semester-VI

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BCOMP-DSC(MJ)-601 T		DSC	3	-	-	3	3	25	75	-	-	100
2	BCOMP-DSC(MJ)-601 P		DSC	-	-	1	1	2	-	-	5	20	25
3	BPHYS-DSC(MJ)-601T		DSC	3	-	-	3	3	25	75	-	-	100
4	BPHYS-DSC(MJ)-601P		DSC	-	-	1	1	2	-	-	5	20	25
5	BMATHS-DSC(MN)-601T		DSC	4	-	-	4	4	25	75	-	-	100
6	BCOMP-DSE-601		DSE	4	-	-	4	4	25	75	-	-	100
7	BCOMP-DSE-602		DSE	4	-	-	4	4	25	75	-	-	100
Total							20						
Cumulative Credits							128						

Note:

- Award of 3Year Bachelor's Degree after completion of 128 credits

Syllabus of Bachelor of Science (B.Sc.) (Computer Science) with Physical Sciences Programme

Fundamentals of Computers and Office Productivity Tools

BCOMP-DSC-101 T

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-DSC-101 T	Fundamentals of Computers and Office Productivity Tools	3	0	0	3	45	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, digital literacy, and information technology concepts covered up to the +2 level.						
Course Coordinator		Dr.						

i. Course Objectives:

1. To provide a fundamental understanding of computer systems, operating systems, digital technologies, and information management concepts.
2. To develop practical skills in the use of office productivity tools, AI-assisted applications, and digital collaboration platforms for creating, managing, analyzing, and presenting information effectively in academic and professional environment

ii. Course Outcomes: On completion of this course, the students are expected to

CO1	Student will understand the fundamentals of computer systems, memory, storage devices, operating systems, cloud computing, cybersecurity, and basic programming concepts.
CO2	Utilize AI productivity tools, collaboration platforms, and word processing software to create, edit, format, and manage professional documents efficiently.
CO3	Apply spreadsheet software for data organization, analysis, visualization, and reporting using formulas, functions, charts, and pivot tables.
CO4	Design and deliver effective presentations using presentation software by integrating multimedia, visual elements, collaboration features, and modern presentation design principles.

iii. Syllabus:

Section	Contents	Contact Hours
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1	Introduction: Computers Characteristics, Evolution, Types, Block Diagram of a Computer, Memory & Storage ,Input & Output Devices, Software & Operating Systems ,Application Software, Overview of Windows & Linux.Basic Programming Concepts : Introduction to Machine Language, Assembly Language, High-Level Languages. Cloud Computing Fundamentals :SaaS, PaaS, IaaS, Public/Private Cloud.Cyber Security: Awareness, Password Management and Digital Safety.	15 Hours
2	AI Productivity Tools :ChatGPT, Copilot, Gemini. Collaboration Tools: Microsoft Teams, Slack, Zoom, Google Workspace Word Processing Software (Microsoft Word / Google Docs / LibreOffice Writer): Introduction to Word Processing and Its Features; Creating, Saving, and Opening Documents; Formatting Text: Font, Paragraph, Styles, Page Layout; Working with Tables, Columns, and Lists; Insert Images, Shapes, Charts, and Hyperlinks; Header, Footer, Page Numbering, Watermark; Spell Check, Grammar Check, and Thesaurus; Mail Merge and Automated Letter Writing; Printing Documents and Exporting to PDF	15 Hours
3	Spreadsheet Software (Microsoft Excel / Google Sheets / LibreOffice Calc): Introduction to Spreadsheets and Their Uses; Creating, Saving, and Formatting Worksheets; Working with Rows, Columns, and Cells; Data Entry, Sorting, and Filtering; Formulas and Functions (SUM, AVERAGE, IF, VLOOKUP, HLOOKUP); Creating and Formatting Charts and Graphs; Conditional Formatting and Data Validation; Pivot Tables and Data Analysis Basics; Importing and Exporting Data. Presentation Graphics Software (Microsoft PowerPoint / Google Slides / LibreOffice Impress): Introduction to Presentation Software; Creating and Managing Slides; Formatting Text, Themes, and Backgrounds; Inserting Images, Shapes, Tables, and Charts; Using Animations and Slide Transitions.Adding Multimedia: Audio and Video; Custom Slide Shows and Slide Master View; Printing Handouts and Exporting Presentations; Best Practices for Effective Presentations.	15 Hours

iv. Suggested readings:

Text book:

1. Pradeep K. Sinha, Priti Sinha, “Computer Fundamentals”. BPB Publications.
2. Peter Weverka, “Microsoft Office 2021 All-in-One for Dummies”, Wiley, 2023.

Reference book:

1. Rajaraman, V., “Fundamental of Computers”. Prentice Hall India, New Delhi.
2. Joan Lambert, Curtis Frye, “Microsoft Office Step by Step (Office 2021 and

Microsoft 365)", Pearson, 2023.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks
2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%:1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)
3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.

2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
A	Section/Block I	2	Any 1	12	12
B	Section/Block II	2	Any 1	12	12
C	Section/Block III	2	Any 1	12	12

D	All Sections/Blocks (I, II & III)	10 Short- Answer Questions/MCQ	Any 7	2	14
Total	—	16 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%

Fundamentals of Computers and Office Productivity Tools – Practical

BCOMP-DSC-101 P

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-DSC-101 P	Fundamentals of Computers and Office Productivity Tools - Practical	0	0	0	1	20	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, digital literacy, and information technology concepts covered up to the +2 level.						
Course Coordinator		Dr.						

i. Course Objectives: The basic objective of this course is to develop practical skills in word processing, spreadsheets, presentations, and digital productivity tools for academic and professional applications.

ii. Course Outcomes: On completion of this course, the students are expected to

CO1	Develop practical skills in using word processing, spreadsheet, and presentation software for creating, editing, formatting, and managing professional digital documents.
CO2	Demonstrate competency in performing office automation tasks by applying appropriate productivity tools, computational techniques, and cloud-based collaboration platforms efficiently and securely.
CO3	Develop analytical and problem-solving skills through the application of spreadsheet functions, data analysis techniques, visualization tools, and AI-assisted productivity applications.
CO4	Understand the purpose, features, and effective use of modern office productivity software and emerging digital technologies for professional communication, documentation, and information management.

iii. Syllabus:

S. No.	Aim of the Experiment
1	Create and format a professional document using a word processor by applying text formatting, page layout, styles, headers, footers, and page numbering.
2	Design a document containing tables, lists, images, SmartArt, charts, hyperlinks, references, and citations, and review it using Track Changes and document proofing tools.
3	Create personalized letters, labels, or certificates using Mail Merge and collaborate on documents using Microsoft 365 or Google Workspace with appropriate document security features.
4	Create and manage spreadsheets by entering, formatting, validating, and organizing data using spreadsheet applications.
5	Perform data analysis using spreadsheet formulas, logical, statistical, text, date, and lookup functions to solve real-world problems.

6	Analyze datasets by applying sorting, filtering, conditional formatting, Pivot Tables, Pivot Charts, and data visualization techniques.
7	Import, export, automate, and present spreadsheet data using charts, dashboards, macros, and AI-assisted spreadsheet tools.
8	Create a professional multimedia presentation by applying themes, layouts, tables, charts, SmartArt, images, audio, video, and infographics.
9	Develop an interactive presentation using animations, slide transitions, hyperlinks, action buttons, Slide Master, Presenter View, and presentation delivery tools.
10	Create an AI-assisted presentation, collaborate through cloud-based platforms, and publish the presentation in multiple formats while ensuring accessibility, copyright compliance, and presentation ethics.

iv. Suggested Readings:

Text Book:

1. Peter Weverka, "Microsoft Office 2021 All-in-One for Dummies", Wiley, 2023.

Reference Book:

1. Joan Lambert, Curtis Frye, "Microsoft Office Step by Step (Office 2021 and Microsoft 365)", Pearson, 2023.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	5	20
Total Marks	25	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	File record	2
2	Performance	3

vii. Instructions for End Semester Exam:

S. No.	Type of Assessment	Marks
1	Performance	10 Marks
2	Viva-Voce	5 Marks
3	Practical File/Record	5 Marks
4	Total	20 Marks

Python Programming Lab BCOMP-SEC-101

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-SEC-101	Python Programming Lab	3	0	0	3	45	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, logical reasoning, and elementary mathematical concepts covered up to the +2 level.						
Course Coordinator		Dr.						

i. Course Objectives:

- To introduce the fundamental concepts of programming and develop computational thinking using Python.
- To enable students to design, develop, test, and debug simple Python programs for solving computational and real-world problems.

ii. Course Outcomes: On completion of this course, the students are expected to

CO	Course Outcomes
CO1	Explain the fundamentals of programming and develop Python programs using variables, data types, operators, and expressions.
CO2	Apply decision-making statements, looping constructs, and functions to solve computational problems.
CO3	Develop Python programs using strings, lists, tuples, dictionaries, sets, and basic file handling techniques.
CO4	Apply debugging, exception handling, and modular programming techniques to develop efficient and error-free Python applications.

iii. Syllabus:

Section	Contents	Contact Hours
1	Lab 1: Introduction to Python Programming • Installation and configuration of Python (IDLE/VS Code) • Writing and executing Python programs • Python syntax, keywords, identifiers, variables, and comments • Exercise: Write a program to display personal information and perform simple arithmetic operations.	15 Hours

	Lab 2: Data Types, Operators, and Input/Output • Numeric, string, and boolean data types • Type conversion • Arithmetic, relational, logical, and assignment operators • Input and output statements • Exercise: Develop programs to perform arithmetic calculations and unit conversions. Lab 3: Decision Making • if, if-else, nested if, elif statements • Logical operators • Exercise: Develop programs to determine grades, find the largest number, and check leap years. Lab 4: Looping Statements • for loop • while loop • break, continue, and pass statements • Exercise: Generate multiplication tables, factorial, Fibonacci series, and number patterns. Lab 5: Functions • Built-in functions • User-defined functions • Function arguments and return values • Variable scope • Exercise: Develop programs using functions to solve mathematical problems. Lab 6: Strings • String creation, indexing, slicing • String methods • Exercise: Perform palindrome checking, string searching, and text manipulation.	
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2	Lab 7: Lists • List creation and manipulation • List methods • Nested lists • Exercise: Develop programs for searching, sorting, and processing lists. Lab 8: Tuples, Sets, and Dictionaries • Tuple operations • Set operations • Dictionary creation and manipulation • Exercise: Develop a student record management program using dictionaries. Lab 9: Modules • Importing built-in modules • Creating user-defined modules • Using the math and random modules • Exercise: Develop modular Python applications. Lab 10: File Handling • Reading and writing text files • File modes • Exercise: Develop applications for storing and retrieving data from files. Lab 11: Exception Handling • try, except, else, and finally blocks • Raising exceptions • Exercise: Develop robust Python programs using exception handling. Lab 12: Pattern Generation and Problem Solving • Number and star patterns • Mathematical applications • Menu-driven programs	15 Hours
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	Exercise: Develop menu-driven applications using functions and loops.	
3	Lab 13: Working with Date and Time - Date and time functions - Formatting date and time - Exercise: Develop programs using the datetime module. Lab 14: Basic File Processing Applications - Reading structured data from files - Writing formatted output to files - Exercise: Develop a simple text-based record management application. Lab 15: Debugging and Code Testing - Identifying syntax, runtime, and logical errors - Using debugging techniques - Exercise: Test and debug Python programs. Lab 16: Program Documentation and Coding Standards - Writing comments and documentation - Naming conventions and code readability - Exercise: Improve and document existing Python programs. Lab 17: Mini Project Development - Develop a Python application integrating programming concepts such as functions, data structures, file handling, and exception handling. Lab 18: Project Demonstration and Documentation - Testing, debugging, documentation, and presentation of the developed Python application.	15 Hours

iv. Suggested readings:

Text Books:

1. [Python for Everybody: Exploring Data Using Python 3 – Charles R. Severance](#) .
2. [Think Python: How to Think Like a Computer Scientist \(2nd Edition\) – Allen B. Downey](#)

Reference Books:

1. [A Byte of Python – Swaroop C. H.](#)
2. [The Python Tutorial – Python Software Foundation](#)
3. [Automate the Boring Stuff with Python \(2nd Edition\) – Al Sweigart](#)
4. [Python for Everybody Course Resources](#) (Lecture Notes, Exercises, and Programming Assignments).

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks
2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%:1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)
3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.

2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
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A	Section/Block I	2	Any 1	10	10
B	Section/Block II	2	Any 1	10	10
C	Section/Block III	2	Any 1	10	10
D	Sections/Blocks (I, II & III)	5 Short-Answer Questions	All compulsory	2	10
D	All Sections/Blocks (I, II & III)	10 MCQ	All compulsory	1	10
Total	—	21 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%

Computer Fundamentals

BCOMP-MDC-101

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-MDC-101	Computer Fundamentals	3	0	0	3	45	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, including knowledge of hardware components, software, operating systems, and basic digital literacy acquired at the +2 level.						
Course Coordinator		Dr.						

i. Course Objectives:

1. This course will give a thorough understanding of principle and practice of systematics.
2. To help students acquire an in depth knowledge on the diversity and relationships in animal world.

ii. Course Outcomes: On completion of this course, the students are expected to

CO1	Understand the fundamental concepts of computer systems, including hardware components, processor architecture, and their functionalities.
CO2	Gain knowledge of different types of memory, storage devices, input, and output peripherals used in modern computing.
CO3	Explore various types of software, operating systems, file systems, and their role in managing computer resources.
CO4	Develop a foundational understanding of programming languages and their applications in software development.

iii. Syllabus:

Section	Contents	Contact Hours
1	Introduction to Computers and Components: Characteristics and Evolution of Computers, Generations of Computers; Types of Computers: Microcomputers, Minicomputers, Mainframe Computers, Supercomputers; Basic Components of a Computer System: Input Unit, Output Unit, ALU, Control Unit, CPU; Instruction Set, Registers, Processor Speed, Types of Processors (Intel, AMD, ARM, RISC, CISC).	15 Hours

2	Memory, Storage, and Peripherals: Memory: RAM (DRAM, SRAM), ROM, EPROM, EEPROM, Cache Memory, Virtual Memory; Secondary Storage: HDD, SSD, Optical Storage (CD, DVD, Blu-ray), USB Flash Drives, SD Cards; Input Devices: Keyboard, Mouse, Touch Screens, Joystick, Stylus, Scanners (OCR, OMR, MICR, Bar Code Reader), Biometric Devices, Digital Cameras; Output Devices: Monitors (LCD, LED, OLED), Printers (Inkjet, Laser, 3D), Plotters, Projectors.	15 Hours
3	Software and Operating Systems: Software Types: System Software (Operating Systems, Utility Programs), Application Software (Word Processors, Spreadsheets, DBMS); Operating Systems: Windows, Linux, macOS, Android, iOS, Basics of Cloud-Based OS and Virtual Machines; File Systems: FAT32, NTFS, ext4, APFS; Introduction to Programming Languages: Low-Level (Machine Language, Assembly), High-Level (C, Java, Python, JavaScript, SQL), Basics of Fourth-Generation Languages (4GL)	15 Hours

iv. Suggested readings:

Text book:

1. Pradeep K. Sinha, Priti Sinha, "Computer Fundamentals". BPB Publications.

Reference book:

1. Rajaraman, V., "Fundamental of Computers". Prentice Hall India, New Delhi.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks

2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%: 1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)
3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.

2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
A	Section/Block I	2	Any 1	12	12
B	Section/Block II	2	Any 1	12	12
C	Section/Block III	2	Any 1	12	12
D	All Sections/Blocks (I, II & III)	10 Short-Answer Questions	Any 7	2	14
Total	—	16 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%

Internet and Web Technologies
BCOMP-DSC-201 T

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-DSC-201 T	Internet and Web Technologies	3	0	0	3	45	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, digital literacy, and information technology concepts covered up to the +2 level.						
Course Coordinator		Dr.						

i. Course Objectives:

- To introduce the fundamental concepts, technologies, and standards of the Internet and World Wide Web, including client-side and server-side web development.
- To develop the knowledge and practical skills required to design, develop, and deploy interactive, responsive, and dynamic web applications using HTML, CSS, and PHP.

ii. Course Outcomes: On completion of this course, the students are expected to

CO1	Explain Internet technologies, web architecture, protocols, cloud deployment, web hosting, and web security concepts.
CO2	Develop static and interactive web pages using HTML, CSS, JavaScript, and DOM manipulation techniques.
CO3	Create server-side web applications using PHP by implementing variables, functions, form handling, validation.

iii. Syllabus:

Section	Contents	Contact Hours
1	Introduction to the Internet and its applications, evolution of the World Wide Web (WWW), difference between WWW and the Internet. Intranet vs Internet. Internet protocols: HTTP, HTTPS, FTP, SMTP, IMAP, and POP3. Types of web pages: static, dynamic, and active. Introduction to web servers, URL structure, web browsers, search engines, DNS, proxy servers, and client-server architecture. Cloud Deployment and Web Hosting Basics . Introduction to Web Security and SSL (Secure Sockets Layer) Certificates	15 Hours
2	Structure of HTML documents, HTML tags and attributes, semantic elements, and formatting text (font, color, size). Creating and using HTML lists, tables, forms, images, and inserting links, comments, and horizontal rules. Introduction to CSS: external, internal, and inline styles, CSS rules, class selector, div & span tags. Styling properties: font, list, color, text	15 Hours

	alignment, and background images. Introduction to JavaScript and DOM (Document Object Model) Manipulation.	
3	Introduction to PHP, identifiers, variables, data types, scope of variables, operators, control structures (conditional statements and loops), functions, arrays, super globals (\$_GET, \$_POST, \$_SESSION,\$_COOKIE), handling user input, and form validation in PHP.JSON (JavaScript Object Notation) Handling in PHP	15 Hours

iv. Suggested readings:

Text Books:

1. Raj Kamal, Internet and Web Technologies, Tata McGraw-Hill.
2. Ramesh Bangia, Multimedia and Web Technology, Firewall Media.
3. Jon Duckett, *JavaScript and jQuery: Interactive Front-End Web Development*, Wiley.

Reference Books:

1. Naveen Kumari, Internet Technologies, Eagle Prakashan, 2015.
2. Uttam K. Roy, Web Technologies, Oxford University Press.
3. Steven Holzner, The Complete Reference PHP, Tata McGraw-Hill.
4. A.S. Godbole & A. Kahate, Web Technologies, 3rd Edition, Tata McGraw-Hill, 2017.
5. R. Greenlaw & E. Hepp, Fundamentals of Internet and WWW, 2nd Edition, Tata McGraw-Hill, 2007.
6. B. Patel & L.B. Barik, Internet & Web Technology, Acme Learning Publisher.
7. Jackson, Web Technologies, Pearson Education, 2008.
8. Wendy Willard, HTML Beginner's Guide, Tata McGraw-Hill.
9. Ivan Bayross, Web Technologies Part II, BPB Publications.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks

2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%: 1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)
3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.

2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
A	Section/Block I	2	Any 1	12	12
B	Section/Block II	2	Any 1	12	12
C	Section/Block III	2	Any 1	12	12
D	All Sections/Blocks (I, II & III)	10 Short-Answer Questions	Any 7	2	14
Total	—	16 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%

Internet and Web Technologies- Practical BCOMP-DSC-201 P

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-DSC-201 P	Internet and Web Technologies- Practical	0	0	0	1	20	Core
Prerequisite		Students should have a basic understanding of computer fundamentals, Internet concepts, digital literacy, and elementary programming concepts covered up to the +2 level.						
Course Coordinator		Dr.						

ii. **Course Objectives:** The basic objective of this course is to develop practical skills in Internet technologies, web designing, and server-side programming for designing, developing, and deploying dynamic web applications.

iii. **Course Outcomes:** On completion of this course, the students are expected to

CO1	Develop interactive and responsive web pages using HTML for structure and CSS for styling and layout design.
CO2	Implement dynamic web applications using PHP with variables, functions, control structures, and form handling techniques.
CO3	Integrate PHP with MySQL databases to perform CRUD operations while ensuring data security and efficiency.
CO4	Apply advanced PHP concepts such as file handling, session management, OOP, and security measures to build scalable web applications.

iii. **Syllabus:**

S. No.	Aim of the Experiment
1	Design a basic HTML webpage using text formatting, headings, paragraphs, lists, hyperlinks, images, tables, and comments.
2	Develop interactive HTML forms incorporating various form controls, input validation, and table-based layouts.
3	Design and style web pages using CSS selectors, fonts, colors, backgrounds, the box model, positioning techniques, and responsive layouts.
4	Develop a responsive multi-page website using HTML5, CSS3, navigation menus, media queries, and reusable page layouts.
5	Create a dynamic personal portfolio website integrating HTML, CSS, multimedia content, hyperlinks, and responsive web design principles.
6	Install and configure a PHP development environment, create PHP scripts, and implement variables, data types, operators, and basic input/output operations.
7	Develop PHP programs using decision-making statements, looping constructs, user-defined functions, and arrays to solve computational problems.
8	Design PHP applications for form handling using GET , POST , SESSION , and COOKIE variables with secure user input processing.

9	Develop dynamic web applications by implementing server-side form validation, JSON encoding/decoding, and error handling techniques in PHP.
10	Design and develop a complete responsive web application (e.g., User Registration System, Student Information System, or Personal Portfolio) using HTML5, CSS3, and PHP , incorporating form validation and dynamic content generation.

iv. Suggested Readings:

Text Books:

1. Raj Kamal, Internet and Web Technologies, Tata McGraw-Hill.
2. Ramesh Bangia, Multimedia and Web Technology, Firewall Media.

Reference Books:

1. Naveen Kumari, Internet Technologies, Eagle Prakashan, 2015.
2. Uttam K. Roy, Web Technologies, Oxford University Press.
3. Steven Holzner, The Complete Reference PHP, Tata McGraw-Hill.
4. A.S. Godbole & A. Kahate, Web Technologies, 3rd Edition, Tata McGraw-Hill, 2017.
5. R. Greenlaw & E. Hepp, Fundamentals of Internet and WWW, 2nd Edition, Tata McGraw-Hill, 2007.
6. B. Patel & L.B. Barik, Internet & Web Technology, Acme Learning Publisher.
7. Jackson, Web Technologies, Pearson Education, 2008.
8. Wendy Willard, HTML Beginner's Guide, Tata McGraw-Hill.
9. Ivan Bayross, Web Technologies Part II, BPB Publications.
10. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML, and PHP, 4th Edition, BPB Publications, 2013.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	5	20
Total Marks	25	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	File record	2
2	Performance	3

vii. Instructions for End Semester Exam:

S. No.	Type of Assessment	Marks
1	Performance	10 Marks
2	Viva-Voce	5 Marks
3	Practical File/Record	5 Marks
4	Total	20 Marks

Object-Oriented Programming Using Python BCOMP-SEC-201

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-SEC-201	Object-Oriented Programming Using Python	3	0	0	3	45	Core
Prerequisite		Students should have successfully completed the Python Programming course and possess a basic understanding of programming concepts, control structures, functions, and data structures.						
Course Coordinator		Dr.						

i. Course Objectives:

The basic objective of this course is to develop practical skills in object-oriented programming using Python for designing, developing, testing, and implementing modular and interactive software applications.

ii. Course Outcomes: On completion of this course, the students are expected to

CO	Course Outcomes
CO1	Apply object-oriented programming concepts including classes, objects, inheritance, encapsulation, and polymorphism to develop Python applications.
CO2	Develop modular Python programs using packages, exception handling, file processing, and regular expressions.
CO3	Design graphical user interface (GUI) applications and database-driven applications using Tkinter and SQLite.
CO4	Integrate object-oriented programming principles, GUI development, database connectivity, and file handling to develop complete Python-based software applications.

iii. Syllabus:

Section	Contents	Contact Hours
1	Lab 1: Introduction to Object-Oriented Programming - Classes and Objects - Creating objects and accessing members - Exercise: Create a Student class. Lab 2: Constructors and Methods - Constructors - Instance variables and methods	15 Hours

	- Exercise: Develop programs using constructors. Lab 3: Encapsulation and Inheritance - Data encapsulation - Single and multilevel inheritance - Exercise: Develop programs using inheritance. Lab 4: Polymorphism - Method overriding - Introduction to operator overloading - Exercise: Implement polymorphism in Python. Lab 5: Modules and Packages - Creating and importing modules - User-defined packages - Exercise: Develop modular Python programs. Lab 6: Exception Handling - try, except, else and finally - User-defined exceptions - Exercise: Develop exception handling programs.	
2	Lab 7: File Handling - Reading and writing text files - File operations - Exercise: Develop a student record management application. Lab 8: Regular Expressions - Pattern matching - Input validation - Exercise: Validate email addresses and mobile numbers. Lab 9: GUI Programming using Tkinter - Labels, buttons, text boxes - Event handling	15 Hours

	- Exercise: Design a simple calculator. Lab 10: Database Connectivity - SQLite database - Basic CRUD operations - Exercise: Develop a student database application. Lab 11: JSON Processing - Reading and writing JSON files - Exercise: Store and retrieve application data. Lab 12: Integrated Application - Integrating GUI, files, and database - Exercise: Develop a simple desktop application.	
3	Lab 13: Debugging and Testing - Program testing and debugging techniques - Exercise: Debug Python applications. Lab 14: Code Documentation - Comments, documentation, and coding standards - Exercise: Document existing Python programs. Lab 15: Mini Project Planning - Problem identification and system design - Exercise: Prepare project design and workflow. Lab 16: Mini Project Development - Develop a Python application using OOP concepts. Lab 17: Project Testing and Enhancement - Testing, debugging, and refinement of the project. Lab 18: Project Demonstration and Documentation - Project presentation and report submission.	15 Hours

iv. Suggested readings:

Text Books

1. Charles R. Severance, **Python for Everybody: Exploring Data Using Python 3**
<https://www.py4e.com/book>
2. Allen B. Downey, **Think Python: How to Think Like a Computer Scientist (2nd Edition)**
<https://greenteapress.com/wp/think-python-2e/>

Reference Books

1. **The Python Tutorial**, Python Software Foundation (*Official Documentation*)
<https://docs.python.org/3/tutorial/>
2. Swaroop C. H., **A Byte of Python**
<https://python.swaroopch.com/>
3. Doug Hellmann, **Python Module of the Week (PyMOTW)**
<https://pymotw.com/3/>
4. Al Sweigart, **Invent with Python**
<https://inventwithpython.com/>
5. **Real Python Tutorials**
<https://realpython.com/>

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks
2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%:1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)

3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.
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2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
A	Section/Block I	2	Any 1	10	10
B	Section/Block II	2	Any 1	10	10
C	Section/Block III	2	Any 1	10	10
D	Sections/Blocks (I, II & III)	5 Short-Answer Questions	All compulsory	2	10
D	All Sections/Blocks (I, II & III)	10 MCQ	All compulsory	1	10
Total	—	21 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%

Introduction to Emerging Trends in Information Technology

BCOMP-MDC-201

S. No.	Course Code	Course Title	L	T	P	C	CH	Course Type
1	BCOMP-MDC-201	Introduction to Emerging Trends in Information Technology	3	0	0	3	45	Core
Prerequisite		Students should have successfully completed the Fundamentals of Computers course and possess a basic understanding of computer systems, programming fundamentals, and digital technologies.						
Course Coordinator		Dr.						

i. Course Objectives:

- To introduce students to emerging trends, technologies, and innovations shaping the field of Information Technology.
- To develop an understanding of modern computing paradigms, digital transformation, and the applications of emerging technologies in solving real-world problems across various domains.

ii. Course Outcomes: On completion of this course, the students are expected to

CO1	Understand and analyze the latest IT trends and their applications.
CO2	Evaluate the impact of emerging technologies on industries.
CO3	Identify potential risks and ethical concerns in IT advancements.
CO4	Stay updated with evolving IT innovations for future career opportunities.

iii. Syllabus:

Section	Contents	Contact Hours
1	Introduction to Emerging IT Trends: Definition and Importance of Emerging Technologies; Evolution of IT Trends Over the Years; Impact of Emerging Technologies on Business and Society. Artificial Intelligence & Machine Learning: AI vs. Machine Learning vs. Deep Learning; Applications of AI in Different Industries (Healthcare, Finance, Education); Ethics & Challenges in AI Development.	15 Hours

2	Cloud Computing & Edge Computing: Basics of Cloud Computing (IaaS, PaaS, SaaS); Edge Computing vs. Cloud Computing; Benefits and Future of Cloud & Edge Technologies. Internet of Things (IoT) & Smart Technologies: Introduction to IoT and its Architecture; Real-World Applications of IoT (Smart Homes, Smart Cities, Healthcare); Security & Privacy Concerns in IoT.	15 Hours
3	Cybersecurity & Data Privacy: Emerging Cyber Threats & Cybersecurity Challenges; Role of AI in Cybersecurity; Global Data Privacy Laws (GDPR, CCPA, India's Data Protection Act). Future Trends in IT: Quantum Computing: Concepts & Potential Applications; Digital Twin Technology & Metaverse; Green Computing & Sustainable IT Practices.	15 Hours

iv. Suggested readings:

Text & Reference Book:

1. Subhashree Bhattacharjee, "Artificial Intelligence for students", Shroff publishers and Distributors Pvt. Ltd., 2016.
2. Stuart Russell, Peter Norvig, "Artificial intelligence a modern approach (4th edition), Pearson, 2021.
3. Avantika Yadav, "Cyber security", Narosa Publishing House Pvt. Ltd., 2017.
4. Rajkumar buyya, James Broberg, Andrzej Goscinski, "Cloud computing principles and paradigms", Wiley, 2011.
5. Dr. Kamlesh Lakhwani, Dr. Hemant Kumar Gianey, Joseph Kofi Wireko, Kamalkant Hiran, "Internet of Things (IoT) principles paradigms and applications of IoT", BPB Publications, 2020.

v. Evaluation Pattern:

Components	Internal Assessment	Semester End Examination
Marks	25	50
Total Marks	75	

vi. Components of Internal Evaluation:

S. No.	Type of Assessment	Marks
1	Assignments & Presentations	10 marks

2	Class Test/House Test	10 Marks
3	Attendance (The marks would be given in the following manner: (75%-79.9%:1 Mark : 1; 80%-84.9%: 2; 85%-89.9%: 3; 90%-94.9%: 4 and 95%-100%: 5).	5 marks

vii. Instructions for the Paper Setter:

1. Pattern of Mid Semester Examination

S. No.	Particulars	Details
1	Maximum Marks	10 Marks
2	Number of Sections	2 (Section A & Section B)
3	Section A	Consists of four short-answer questions. All questions are compulsory. Each question carries 1 mark.

2. Pattern of End Semester Examination

Part	Section/Block	Questions Set	Questions to be Attempted	Marks per Question	Marks to be Attempted
A	Section/Block I	2	Any 1	12	12
B	Section/Block II	2	Any 1	12	12
C	Section/Block III	2	Any 1	12	12
D	All Sections/Blocks (I, II & III)	10 Short-Answer Questions	Any 7	2	14
Total	—	16 Questions	—	—	50 Marks

viii. Pass marks

S. No.	Requirement	Minimum Percentage
1	Pass in each individual component (CCE, ESE)	35%
2	Pass in aggregate of the subject	40%