Department of Computer Science and Applications

School of Mathematical and Physical Sciences (SMPS)

Structure and Syllabus

Bachelor of Computer Applications (B.C.A.)

Based on

NATIONAL EDUCATION POLICY-2020

Academic Session: 2023-2024 & Onwards

Date of BoS: 07/12/2023

Doctor Harisingh Gour Vishwavidyalaya, Sagar
(A Central University)
Sagar-Madhya Pradesh 470003

07/12/23
Chairman, BOS
Computer Science & Applications

Department of Computer Science and Applications

School of Mathematical and Physical Sciences

(SMPS)

Structure and Syllabus

Bachelor of Computer Applications
(B.C.A.)
(Four Years Course)

Based on

NATIONAL EDUCATION POLICY-2020
[Semester : I to IV]

Academic Session: 2023-2024 & Onwards

Approved by BoS on dated : 07/12/2023

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1. ABOUT THE DEPARTMENT

The Department of Computer Science and Applications was established in the academic year 1996-97 with a programme DCA (Diploma in Computer Applications) and BCA (Bachelor in Computer Applications). In 1998, with the approval of the All India Council of Technical Education (AICTE), the MCA (Master of Computer Applications) programme was started with an intake of 50 students. Initially, the start of these programmes was in a small building near to the university bank and later in 1999, the department has got its own new building with well-equipped laboratories, a library, a seminar hall, faculty rooms and lecture halls.

The first batch of MCA students was passed out in 2001 and most of them have been absorbed in the reputed IT, software based companies. Many BCA students of those years have also got jobs immediately after completion of their course. The Ph. D. program started in 2005. Till Jun 2017, more than 1250 students have been obtained their BCA, MCA and Ph.D. Degrees and many of them are now well placed. Department offers extension services to other departments of the university and conducts training programs for officers/ employees.

Presently, department offering three courses BCA, MCA and Ph.D. in Computer Science and very soon going to start Post Graduate Diploma in Big Data Analytics (PG-DBDA) programme which is theoretical and practical based course.

2. CURRICULUM FRAMEWORK BASED ON NATIONAL EDUCATION POLICY (NEP)-2020

NEP-2020 has conceptualized the idea to develop well rounded competent individuals for making the nation a self-reliant and global leader. In the same spirit, we at Department of Computer Science and Applications have developed a curriculum framework to encompass the goals of NEP-2020. To this end, we have incorporated choice of subject/disciplines of study, creating academic pathways having constructive combinations of disciplines for study with multiple entry and exit points as well as focus on **experiential learning** or students by introducing **multidisciplinary and skill enhancement courses** and actual Hand's on training in the recent and trending aspects of the area concern.

3. UNDER GRADUATE CURRICULUM FRAMEWORK FOR BACHELOR OF COMPUTER APPLICATION(BCA)

a. **Name of the Programme:** Bachelor of Computer Applications (B.C.A)

b. **About the Programme:** The Department of Computer Science and Applications offering four year's under graduate course (VIII - Semesters) leading to Bachelor of Computer Applications.

c. **Objectives of the Programme**

The broad objective of the four-year BCA program is to prepare students' productive careers in the software industry, corporate sector, Govt. organizations, and academia by providing a skill-based environment for teaching and research in the core and emerging areas of the discipline.

07/12/23

Chairman, BOS
Computer Science & Applications

The Programme's thrust is on giving the students a thorough and sound background in theoretical and skill-oriented courses relevant to the latest computer software development. The program emphasizes the application of software technology to solve mathematical, computing, communications/networking, and commercial problems.

This four-year programme has been designed with a semester approach in mind. The first two semesters provide theoretical knowledge and basic computing skills of computer science. The third semester focuses on advanced computing knowledge and techniques. The final semester has project work and specialized papers of different domains and applications of computer science.

Bachelor of Computer Applications (BCA) program is a theoretical and practical based course having the following objectives:

- ✓ Produce knowledgeable and skilled human resources which are employable in the IT industry, research work, and higher education.
- ✓ Impart knowledge required for planning, designing, and building complex Application Software Systems as well as providing support to automated systems or applications.
- ✓ Produce entrepreneurs who can develop customized solutions for small to large Enterprises.
- ✓ Develop academically competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that compassionately foster the scientific temper with a sense of social responsibility.
- ✓ Develop students to become globally competent.
- ✓ After completing this course students shall be experts in the following areas:
  Planning, designing, and building complex Application Software Systems as well as providing support to automated systems or applications.
- ✓ Skilled entrepreneurs can develop customized solutions for small to large Enterprises.
- ✓ Academically competent and suitable for academics and scientific research with a sense of social responsibility.
- ✓ Students will be able to work in the latest and emerging technologies.

d. Programme Learning Outcomes:

The programme learning outcomes are attained by learners through the essential learning's acquired on completion of selected courses of study within a programme. The outcomes and attributes described in qualification descriptors are attained by students through learning acquired on completion of a programme of study.

02/12/23

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e. **Structure and Syllabus of the Programme:**

Curriculum Framework Syllabus – B.C.A. 2023-24
L-5 First & Second Semester
B.C.A.: First Semester

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-5 First Semester	Discipline Specific: Major-1	CSA-DSM-111	Programming Using C	100	4	0	0	4
		CSA-DSM-112	Lab. Based on C-Programming	100	0	0	2	2
	Discipline Specific: Major-2	CSA-DSM-113	PC-Software	100	4	0	0	4
		CSA-DSM-114	Lab. Based on PC-Software	100	0	0	2	2
	Discipline Specific: Major-3	CSA-DSM-115	Mathematics for Computer Science	100	6	0	0	6
	Ability Enhancement Course (AEC)	CSA-AEC-111	Fundamental of Computer Science	100	2	0	0	2
	Skill Enhancement Course (SEC)	CSA-SEC-111	Lab. Based ICT-I	100	0	0	2	2
	Value Enhancement Course (VEC)	VEC-111	Other Department					Qualifying
Total Credits								22

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-5 I Semester	Multi-Disciplinary: Major	CSA-MDM-111	Computer Education-I	100	6	0	0	6

B.C.A.: Second Semester

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-5 Second Semester	Discipline Specific: Major-1	CSA-DSM-211	Data Structure	100	4	0	0	4
		CSA-DSM-212	Lab. based on Data Structure using C	100	0	0	2	2
	Discipline Specific: Major-2	CSA-DSM-213	OOPS using C++	100	4	0	0	4
		CSA-DSM-214	Lab. Based on C++ Programming	100	0	0	2	2
	Discipline Specific: Major-3	CSA-DSM-215	Computer Organization	100	6	0	0	6
	Ability Enhancement Course (AEC)	CSA-AEC-211	Lab. Based on Web Designing	100	0	0	2	2
	Skill Enhancement Course (SEC)	CSA-SEC-211	Lab. Based ICT-II	100	0	0	2	2
	Value Enhancement Course (VEC)	VEC-211	Other Department					Qualifying
Total Credits								22
Exit with Certificate								

#DSM: Discipline Specific: Major, MDM: Multi – Disciplinary Major, AEC: Ability Enhancement Course, VEC: Value Enhancement Course, SEC: Skill Enhancement Course

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-5 II Semester	Multi-Disciplinary: Major	CSA-MDM-211	Computer Education-II	100	6	0	0	6

07/12/23
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Computer Science & Applications

B.C.A.: Third Semester

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-6 Third Semester	Discipline Specific: Major-1	CSA-DSM-311	PHP Programming	100	4	0	0	4
		CSA-DSM-312	Lab. based on PHP	100	0	0	2	2
	Discipline Specific: Major-2	CSA-DSM-313	Database Management System	100	4	0	0	4
		CSA-DSM-314	Lab. Based on SQL	100	0	0	2	2
	Discipline Specific: Major-3	CSA-DSM-315	Fundamental of Computer Algorithms	100	6	0	0	6
	Ability Enhancement Course (AEC)	CSA-AEC-311	Lab. Based on Web Designing using JavaScript	100	0	0	2	2
	Skill Enhancement Course (SEC)	CSA-SEC-311	Seminar/ Poster presentation/Group Discussion	100	2	0	0	2
	Value Enhancement Course (VEC)	VEC-311	Other Department					Qualifying
Total Credits								22

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-6 III Semester	Multi-Disciplinary: Major	CSA-MDM-311	Fundamental of Data Science	100	6	0	0	6

B.C.A.: Fourth Semester

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-6 Fourth Semester	Discipline Specific: Major-1	CSA-DSM-411	Java Programming	100	4	0	0	4
		CSA-DSM-412	Lab. Based on Java-Programming	100	0	0	2	2
	Discipline Specific: Major-2	CSA-DSM-413	Python Programming	100	4	0	0	4
		CSA-DSM-414	Lab. Based on Python Programming	100	0	0	2	2
	Discipline Specific: Major-3	CSA-DSM-415	Operating System	100	6	0	0	6
	Ability Enhancement Course (AEC)	CSA-AEC-411	Fundamental of Cyber Security	100	2	0	0	2
	Skill Enhancement Course (SEC)	CSA-SEC-411	Seminar/ Poster presentation/Group Discussion	100	2	0	0	2
	Value Enhancement Course (VEC)	VEC-411	Other Department					Qualifying
Total Credits								22
Exit with Certificate								

#DSM: Discipline Specific: Major, MDM: Multi – Disciplinary Major, AEC: Ability Enhancement Course, VEC: Value Enhancement Course, SEC: Skill Enhancement Course

Level / Semester	Nature of Course	Courses Code	Course Title	MM	L	T	P	C
L-6 IV Semester	Multi-Disciplinary: Major	CSA-MDM-411	Advanced Data Science	100	6	0	0	6

07/12/23
Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-111	Programming using C	04	-	-	04	20	20	60	100

Course Learning Objectives: *The course on C programming aims to equip students with a fundamental understanding of programming concepts and logic through the C language. Students will learn to design, write, and debug C programs, fostering skills in algorithmic thinking and problem-solving. The course emphasizes the mastery of C syntax, control structures, functions, and memory management. Additionally, participants will gain practical experience in implementing data structures and manipulating pointers, fostering a strong foundation for further exploration in computer science and software development*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand comprehensive introduction to C programming, covering algorithms, flowcharts, source and object programs, compilers, interpreters.

UO2: will understand basic c programming keywords data types operators and expressions.

UO3: will understand the various control structures i.e if else, different loops, break and goto statements and basics of array and strings.

UO4: will understand the basics of functions and its usages and storage classes.

UO5: will understand the concept of pointers

UNIT -I: Introduction to Programming Algorithms, Flowchart, Source Program, Object Program, Compilers, Interpreters, Assemblers, Modular Programming: Structured Programming, Top- down approach, Stages of Program Development.

UNIT –II: Introduction to C: character set, Identifiers and keywords. Data type, Declarations, Expressions, statements and symbolic constants, Input-Output: getchar, putchar, scanf, printf, gets, puts, functions, Pre-processor commands, #include, #define, preparing and running a complete C program. Operators and expressions: Arithmetic, Unary, Logical, bit-wise, assignments and conditional Operator, Library functions.

UNIT- III: Control statements: While, do-while, statement, nested loops, if-else, switch, break, continue and goto statements, comma operator. Arrays: Defining and processing. Multi-dimensional arrays. Strings and operations on strings.

UNIT- IV: Functions: Defining and accessing: Passing arguments, Function prototypes, Recursion. Use of library functions, Storage classes: Automatic, external and static variables.

UNIT –V: Pointers: Declarations, Passing to a function. Operations on pointers, pointer and arrays. Array of pointers. Structure: Defining and processing. Passing to a function, Union. Data Files: Open, close, create, process unformatted data files.

Essential Reading:

1. Y. Kanetkar, "Lets us C" –BPB.
2. Byron S. Gottfried, Programming with C, Schaum Outline Series, TMH, 2nd Edition 1998
3. Kernighan, B.W. and Ritchie, D.M., "The C Programming Language P H I.

Suggested Reading and links :

1. Kris A. Jamsa, Programming in C, Galgotia Publications PVT. Ltd.
2. Balaguruswamy, E. 'Computer Concepts and Programming in C', Tata Mc-Graw Hill Education.
3. https://www.tutorialspoint.com/cprogramming/
4. https://fresh2refresh.com/c-programming/c-basic-program/

e-books (at IP 14.139.234.164):

1. Kamthane, 'Programming in C++', Noida, Pearson (available at: https://ebookcentral.proquest.com/lib/hsgu-ebooks/home.action)

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

07/12/23

Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-112	Lab based on C-Programming	-	-	02	02	20	20	60	100

Course Learning Objectives: *This C programming lab aims to enhance students' proficiency in C programming through hands-on exercises, fostering practical skills in algorithm implementation, debugging, and software development, thereby preparing them for real-world programming challenges.*

Learning Outcome: Upon completion of the C-Programming Lab, students will demonstrate proficiency in writing c code, fostering problem-solving skills, and applying fundamental programming concepts to real-world scenarios. This hands-on experience aims to cultivate a strong foundation in C programming for effective software development.

Programmes based on C- Language on following:

1. Write a programme to the Check given number for Prime Number, Armstrong number, Fibonacci
2. Write a programme to find Summation of the series: Sin (x), Cos(x), Exp(x)
3. Write a programme for String Manipulations of following:
   a. Counting number of vowels, consonants, words, white spaces in a string
   b. Reversing a string and check for palindrome
   c. Finding the number of occurrences of a sub string in a given string
   d. Sub string replacing and removal
4. Write a programme to by using recursion for the following
   a. Factorial
   b. Reversing a string
   c. Fibonacci Sequence
   d. Tower of Hanoi
5. Write a programme to for matrix manipulations using functions and Case structure
   a. Addition & Subtraction
   b. Multiplication
   c. Transpose
   d. Check if the given matrix is a Magic square
6. Write a programme to perform Searching of element.
7. Write a programme to perform Sorting by using different techniques
8. Write a programme to demonstrate the usage Structures.
9. Write a programme to represent the functioning of Pointers
10. Write a programme to perform files handling.

Any other as per teacher concern

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BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-113	PC-Software	04	-	-	04	20	20	60	100

Course Learning Objectives : *This course aims to equip students with essential skills in utilizing PC software tools, covering a diverse range of applications such as MS-Word, MS-Excel, power points and learners will gain proficiency in harnessing the power of software to enhance efficiency, problem-solving, and communication in professional and personal settings.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand basics of MS-Word creating editing document formatting and various MS Word options.

UO2: will understand different table usages merging editing fonts inserting rows and columns mail merge and creating charts

UO3: will understand the various MS-Excel features editing coping inserting rows and columns and applying various excel functions

UO4: will understand the basics of pivot tables macros and protecting worksheet

UO5: will understand the usage of powerpoint creating slides formatting applying transitions and modifying visual elements.

UNIT –I: MS-Word: Introduction, Word Processing, Advantages of word processing, Creating, Saving and editing a document: Selecting, Deleting, Replacing Text, Copying text to another file. Formatting Text and Paragraph: Using the Font Dialog Box, Paragraph Formatting using Bullets and Numbering in Paragraphs, Checking Spelling, Line spacing, Margins, inserting Space before and after paragraph.

UNIT –II: Defining Tabs: using Ruler Bar, Mouse and Tabs Dialog Box. Enhancing Document: Inserting page Breaks, Adding Border, Opening and Closing Toolbars, Using Header and Footers in the Document. Creating and Formatting Tables: Changing Row height, inserting columns, Merging cells Calculations in a Table, Sorting Text, Using Graphics, Using the Drawing Toolbar using word art, Mail merge: Definition, a Practical Example of mail merge, creating charts.

UNIT –III: MS Excel: Introduction, Definition Excel Screen parts of worksheet, Entering information: Numbers, Formula, Editing Data in a cell, Excel functions, Using a Range with SUM, Moving and copying data, Inserting and Deleting Row and Columns in the worksheet, Using the format cells Dialog box, Using chart wizard to create a chart, Naming ranges, classification of Excel Functions, performing what if analysis with Data Table.

UNIT –IV: Protecting a workbook with Password, Macro Recording and Running a Macro, Linking workbook files Using Pivot table, Inserting Hyper links.

UNIT –V: Power Point - Introduction, Slide show, Formatting, Creating a Presentation, Inserting clip Arts, Adding Objects, Applying Transitions, Animation effects, formatting and checking text, Modifying Visual elements, Preparing a complete presentation, Case studies.

Essential Reading:

1. PC Software for Windows 98, R. K. TAXALI, Made Simple" TMH.
2. PC Software- Made Simple by Satish Jian, Published by BPB Pub.
3. Microsoft Office 2016 Step by Setp by Lambert Joan, Publisher – Microsoft Press.
4. Microsoft Office 2016 All –in- One for Dummies by Peter Weverka, Publisher – Wiley.
5. Microsoft Office -2010, By Bittu Kumar, Publisher – V & S Publisher.

Suggested Reading and links :

1. Will Train, Gini Corter, Annette Marquis "Microsoft Office" BPB.
2. MS-Office by S. S. Shrivastava Publisher – Laxmi Publications.
3. https://www.keynotesupport.com/menu-pc.shtml

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Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-114	Lab. Based on PC-Software	-	-	02	02	20	20	60	100

Course Learning Objectives : *To introduce students with basic Hardware design and internal architecture of computer systems and to make aware about basic of MS-office,MS-Excel, MS-Powerpoint and other system and application softwares.*

Learning Outcomes: After this course student will be able to work on MS-Word, MS-Excel and MS-Power Point.

Part A: Hardware

1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computer.
3. Basic Computer Hardware Trouble shooting.
5. LAN and WiFi Basics.
6. Operating System Installation – Windows OS.
7. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software

Part B: Software

1. Activities using Word Processor Software
2. Activities using Spreadsheets Software
3. Activities using Presentation Software
4. Tasks involving Internet Browsing

Part C: DOS Operating System

a) Booting process.
b) Concept of Internal and External Command

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Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-115	Mathematics for Computer Science	06	-	-	06	20	20	60	100

Course Learning Objectives: *The Mathematics for Computer Science course aims to equip students with a foundational understanding of mathematical concepts essential for computer science applications. It focuses on topics such as discrete mathematics, logical structure, and set theory, providing students with the analytical tools needed to solve computational problems. Through this course, students will develop the mathematical proficiency necessary for algorithm design, data analysis, and efficient problem-solving in the field of computer science.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the concept of matrices and various types of matrix operations.

UO2: will understand concept Mathematical Logic Connectives Statement.

UO3: will understand concept of sets, types of sets, operation on sets, venn diagram, functions and relation.

UO4: will understand the concept graph, its applications and various types of graphs.

UO5: will understand the concept of tree, types of tree, property of tree and tree traversal.

UNIT-I> Matrices definition special types of matrices operations symmetric matrices skew symmetric matrices, Inverse Orthogonal matrices Solutions of Simultaneous equations Rank of a matrix, Eigen values.

UNIT- II: Mathematical Logic Connectives Statement Forms Parenthesis Truth Table Tautology and Contradiction / Logical Implications and equivalences Disjunctive and Conjunctive normal forms.

UNIT –III: Sets, types of set, Venn diagram, operation on set, Relation, types of relations, functions, types of functions, gof, fog,etc.

UNIT- IV: Graph Theory: Introduction application of graphs Finite and Infinite Graphs Incidence and Degree Isolated Vertex, Pendant Vertex. Paths and Circuits Connected Graph, Disconnected Graphs and components, Euler Path & Circuit Graphs, Hamiltonian Paths and Circuits.

UNIT –V: Trees, Types of Tree, Some property of tress, traversal tree.

Essential Reading:

1. R.D.Sharma,"Mathematics" by Dhanpat Rai Publications.
2. Narsingh Deo, Graph Theory with applications to Engineering and Computer Science, PHI, 1997.

Suggested Reading and links :

1. Trembly & Manohar, Discrete Mathematics for Computer Science, TMH,1997 (Units2,3)
2. https://courses.csail.mit.edu/6.042/spring17/mcs.pdf
3. https://www.iith.ac.in/~aravind/Files-DM/LLM-MFCS-2004.pdf

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Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-AEC-111	Fundamentals of Computer Science	02	-	-	02	20	20	60	100

Course Learning Objectives: *The Mathematics for Computer Science course aims to equip students with a foundational understanding of mathematical concepts essential for computer science applications. It focuses on topics such as discrete mathematics, logical structure, and set theory, providing students with the analytical tools needed to solve computational problems. Through this course, students will develop the mathematical proficiency necessary for algorithm design, data analysis, and efficient problem-solving in the field of computer science.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the basics of computer types, generations and classification of computers with digital computer anatomy.

UO2: will understand concept of boolean algebra, different input and output devices

UO3: will understand the concept of different types of memory storages in computer.

UO4: will understand the concept programming languages, assembly language, machine language, compilers and interpreters

UO5: will understand the basics of software development.

UNIT –I: Introduction to Computers- Generations of Modern Computers Classification of digital Computer Systems- Anatomy of a Digital Computer.

UNIT –II: Boolean Algebra and Logic Circuits Input Devices: Keyboard, Mouse, Track ball, Joystick, Scanner, Digital Camera, MICR, OCR, Barcode Reader, Touch Screen, Light Pen. Output Devices: Monitor, Printer, Plotter, Sound Card and Speaker.

UNIT- III: Memory Units: RAM, ROM, PROM, EPROM, and EEPROM Auxiliary Storage Devices: Magnetic storage devices-Floppy Diskettes, Hard disks, Removable Hard disks, Magnetic Tapes. Optical Storage- CD-ROM.

UNIT –IV: Programming Languages; Machine Language, Assembly Language, High Level Language, Types of High Level Language, Compiler and Interpreters.

UNIT –V: Introduction to Software Development: Defining the Problem, Program Design, Coding, Testing, Documenting, and maintaining the program.

Essential Reading:

1. Alexis Leon and Mathews Leon Introduction to Computers , Leon TECH World, 1999
2. Peter Norton s Introduction to Computers, Fifth edition , Tata McGraw Hill Publications 2004

Suggested Reading and links :

1. Information Technology Concepts, Satish Jain (BPB).
2. Fundamental of Computers, V. Rajaraman (PHI).
3. Prof. Satish Jain, O Level Made Simple Internet Technology and Web Design (BPB).
4. https://www.tutorialspoint.com/basics_of_computer_science/
5. https://code.org/files/CSF_CoursesA-F_Curriculum_Guide.pdf

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Approved by BOS Meeting on dated 07/12/2023

Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SEC-111	Lab based on ICT-I	--	--	02	02	20	20	60	100

Course Learning Objectives: *This course aims to provide a comprehensive understanding of computer hardware, covering essential components, architecture, and troubleshooting. Additionally, it focuses on mastering the fundamentals of DOS (Disk Operating System), enabling students to navigate, manage files, and execute commands in a DOS environment, enhancing their foundational computing skills.*

Learning Outcomes : student will be able to learn the internal architecture of computer system and use of DOS commands.

Computer Hardware System

1. Basic structure of computer system along with all elements.
2. Computer Memory, Cache Memory
3. Structure of Hard Disk
4. Different types of I/O devices and their use.
5. Different devices used to provide power to a Computer System.

DOS Operating System

1. Booting process.
2. Concept of Internal and External Commands.
3. Internal commands of Dos along with syntax and example. CLS, Date, Time, Vol., Ver, Dir, MD, CD, RD, Copy , Type, Copy, Del/Erase, Ren, Prompt, Echo.
4. External commands. Move, Help, Attrib, Sort, More, Tree, Xcopy, Diskcopy, Backup, Recover, Restore, Format, Unformed.
5. Directory and sub directories.
6. Printing in Dos.
7. Removal of subdirectory.
8. Config. Sys, Autoexe.bat and command .com files.
9. Practice of DOS Commands by students for file creation, file search, file saving, file updation, file merge, file deletion, file copy, file change in directory etc.
10. Any other as per teacher concern

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Chairman, BOS
Computer Science & Applications

BCA (Semester – I)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-MDM-111	Computer Education-I	06	-	-	06	20	20	60	100

Course Learning Objectives: *The course aims to provide comprehensive computer education, equipping students with fundamental skills in hardware, software, and digital literacy. Through hands-on learning, it intends to foster technological proficiency, critical thinking, and adaptability in the rapidly evolving field of computing.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the generations of computers and its application with various computer devices..

UO2: will understand different computer input and output devices and different memory storages in computer

UO3: will understand the basics of software, machine language, compilers and interpreters.

UO4: will understand the concept different number systems and their conversions

UO5: will understand concept of logic gates.

UNIT- I: Generations of Computer, Block Diagram of a Computer, Applications of Computers, Advantages and Disadvantage of Computer, CPU, Keyboard, mouse, joystick, trackball, light pen, Data Scanning devices image scanner, OCR, OMR, MICR, Bar code reader, card reader, Voice Recognition Device.

UNIT- II: Monitor, Printer laser pointer, dot matrix printer, inkjet printer, Memory hierarchy, Cache Memory, Primary Memory RAM, DRAM and SRAM, ROM, Secondary Memories.

UNIT- III: Application Software, System Software, Communication Software, Application Software, Programming Language Translators, Assembler, Compiler, Interpreter, Utility Programs, Computer Languages, Machine language, Assembly language, High-level language.

UNIT- IV: Number System: Decimal Number System, Binary Number System, Octal Number System, and Hexadecimal Number System and their conversions.

UNIT- V: First compliment & Second Compliment Logic Gates- AND, OR, NOT, Universal Logic Gates- NOR, NAND.

Essential Reading:

1. Computer Fundamentals, Fourth Edition by P.K. Sinha and Priti Sinha.
2. Computer Fundamentals Architecture and Organization, Third Edition by B. Ram.

Suggested Reading and links :

1. Digital Principle and Applications, Six Edition by Donald P Leach, Albert Paul Malvino & GoutamSaha.
2. Fundamentals of Computers, Fourth Edition by V. Raja Raman

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-211	Data Structures	04	-	-	04	20	20	60	100

Course Learning Objectives: *The course aims to provide students with a comprehensive understanding of fundamental data structures, including arrays, linked lists, trees, and graphs, enabling them to analyze and implement efficient algorithms for data manipulation and retrieval, searching and sortingl.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the concept of arrays address calculation data structure and its classification

UO2: will understand the concept of stack and ques, operation on que, implementation of que.

UO3: will understand the basics of link list types of link list, various insertion and deletion operations on link list

UO4: will understand the concept tree and graph in computer, terminologies, tree traversal,spaning tree and shortest path.

UO5: will understand different types of searching and sorting techniques.

UNIT- I: Arrays: One-dimensional Array, Two- dimensional array, Address calculation for 1D and 2D array, Sparse Matrices, Data structure, classification of data structure. Search - Linear search, Binary search and Hashing.

UNIT- II: Stack and Queue: Stack- Operations on stack, Implementation of s tack as an array, Application Evaluation of Expression & Conversion -Queues: Queue, Operations on Queues, Implementing the queue.

UNIT –III: Linked List: types of link list, Self Referential, List representations, various insertion and deleting from single link list, Doubly linked list, stack implementation using single linked list, queue implementation using single linked list,. Polynomial- Linked list representations.

UNIT –IV: Trees: Basic terminology, Binary tree, representation, traversal, Binary search tree (BST) and its traversal, Graph: Definition and Terminology, representation, traversals, and Spanning Tree, Shortest Path.

UNIT – V: Searching and Sorting: Linear and Binary Searching, Bubble, Selection, Merge, Quick, Insertion sorting.

Essential Reading:

1. Ellis Horowitz & Sahani, Fundamentals of Data Structures, Galgotia Publications, New Delhi.
2. Data Structures Using C; Aaron M. Tanenbaum (Pearson Education India)
3. Data Structures Using C and C++ by Yedidyah Langsam, Moshe J. Augenstein, Publisher: Pearson.
4. C Programming and Data Structures by Manjunath Aradhya M. Publisher: Cengage India Private Ltd.
5. Data Structures using C++ by Yashavant P. Kanetkar, Publisher: BPB Publications.

Suggested Reading and links :

1. Data Structures with C, Seymour Lipschutz, Publisher: McGraw Hill Education.
2. https://epgp.inflibnet.ac.in/ahl.php?csrno=7

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-212	Lab based on data structures using C++	-	-	02	02	20	20	60	100

Course Learning Objectives: *The Data Structures using C++ lab aims to provide students with hands-on experience in implementing and analyzing fundamental data structures and algorithms, fostering proficiency in C++ programming for effective problem-solving in diverse computational scenarios. Students will develop skills in designing, implementing, and optimizing data structures to enhance their ability to address real-world programming challenges.*

Learning Outcomes : By completing this course student will be competent enough to write program in C++ for implementation of Data Structures.

Practical's based on following:

1. Linear Search
2. Binary Search
3. Sort by Selection
4. Sort by Exchange
5. Quick sort
6. Stacks, Queues using arrays
7. Linked List: Insertion and Deletion
8. Polynomial addition using linked list
9. Stack and Queue using Linked List
10. Doubly linked List: Insertion and Deletion
11. Binary tree Traversal [inorder, preorder, postorder]
12. Graph Traversal [breadth first, depth first]
13. Any other as per teacher concern

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam

Chairman, BOS
Computer Science & Applications

BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-213	OOPS using C++	04	-	-	04	20	20	60	100

Course Learning Objectives :*This course aims to provide a comprehensive understanding of Object-Oriented Programming (OOP) principles using C++, covering topics such as encapsulation, inheritance, polymorphism, and abstraction. Participants will learn to design and implement efficient and modular C++ programs, fostering proficiency in object-oriented analysis and design.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the concept of oops, loops and decisions various operators.

UO2: will understand the basics of structures enumerated data types, functions and function parameters, different types of functions

UO3: will understand the basics link list types of link list, various insertion and deletion operations on link list

UO4: will understand the concept of class and objects, array, strings, different operators and operator overloading.

UO5: will understand the concept of inheritance.

UNIT –I: Introduction to Object Oriented Programming (OOP), C++ programming basics, Loops and decisions: Relational operators, loops, decision, logical operators, precedence.

UNIT –II: Structures, enumerated data types. Functions: Simple functions, passing argument to functions, returning values from functions, reference arguments, overloaded functions, inline functions.

UNIT –III: Objects and classes: classes and Objects, Specifying the class, using the class, constructors, deconstructions, and objects as function arguments, returning objects from function. Arrays: Arrays fundamentals, Arrays a Class member data, Array of objects, Strings. Operator overloading: unary operator, overloading binary operators, Data conversion, Pitfalls of Operator overloading and conversion.

UNIT –IV: Inheritance: Derived Base class, derived class constructors, overloading member functions, class hierarchies, public and private inheritance, levels of inheritance, multiple inheritance.

UNIT –V: Virtual functions and other functions: Virtual functions, Friend functions, Static functions this pointer.

Essential Reading:

1. Robert Lafore, Object Oriented Programming in C++, Golgotha Publication.
2. Timothy Budd, An Introduction to Object-Oriented Programming (3rd Edition), Addison Wesley Longman.
3. Object Oriented Programming with C++ (Sixth Edition): E. Balagurusamy. Published by Tata McGraw-Hill Education Pvt. Ltd.
4. Let us C++, Yashwant Kanetkar, BPB Publications.

Suggested Reading and links :

1. Peter Coad, "Object-Oriented Design" First Edition, Yourdon Press Computing Series

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Approved by BOS Meeting on dated 07/12/2023

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BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-214	Lab based on C++ programming	-	-	02	02	20	20	60	100

Course Learning Objectives: *The course aims to provide hands-on experience in C++ programming through practical lab sessions, enabling students to develop proficiency in writing, debugging, and optimizing C++ code while fostering a deeper understanding of key programming concepts and principles. Through a series of structured exercises, participants will enhance their problem-solving skills and gain practical insights into programming using C++.*

Learning Outcomes: By completing this course student will be competent enough to write program in C++ on the problems assigned.

Practical's based on following :

OOP (Programs using C++)

1. Simple Programs using decisions, loops and arrays
2. Simple functions & Inline functions
3. Function overloading & Operator Overloading
4. Usage of classes and Objects
5. Constructors and Destructors
6. Inheritance & Multiple Inheritances
7. Pointers
8. Virtual Functions, Friend functions, this pointer and Static functions
9. Files
10. Streams
11. Any other as per teacher concern

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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Computer Science & Applications

BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-215	Computer Organization	06	-	-	06	20	20	60	100

Course Learning Objectives: *This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logical elements, and their use in combinational and sequential circuit design. This course will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.*

Unit Wise Learning Objectives :

Upon successful completion of the course the student will be able:-

UO1- Identify, understand and apply different number systems and codes.

UO2- To understand the digital representation of data in a computer system.

UO3- To understand the simplification of Boolean function as well as understanding about the various types of combinational and sequential circuits.

UO4- To understand the multiple ways in which the data can be represented.

UO5- To understand the design of various types of functional elements of computer systems such as processors, registers etc.

UNIT- I: Number System: Binary, Decimal, Octal, Hexadecimal, Conversion binary to decimal, decimal to binary, binary to octal, octal to binary, binary to hexadecimal, hexadecimal to binary etc. Sign magnitude numbers, 1's and 2's complement

UNIT –II: Boolean algebra: Boolean equation of logic gates, AND, OR ,NOT ,NOR and NAND gates, truth tables De Morgan's theorems, XOR, XNOR gates, Boolean laws and theorems, Duality theorem. POS and SOP.

UNIT- III: Karnaugh map, Pairs, Quads and Octets, Karnaugh simplification, condition, POS and, SOP methods. Combinational circuits: Adder, Subtractor, Decoder, Encoder, Multiplexer and Demultiplexer. Sequential Circuits: Flip Flops, R S, D, JK.

UNIT –IV: Introduction: The Von Neumann model, the system Bus model. Data Representation: Binary numbers, binary codes, fixed point representation, floating point representation, error detection codes.

UNIT –V: Functional units of computer operational concepts stored program concept. Processor Logic Design Processor Organization Arithmetic Logic Unit Design of Arithmetic Circuit Design of Logic Circuit ,Unit status register Design of Accumulator.

Essential Reading:

1. Morris Mano, Digital Logic and Computer Design, PHI 1987.
2. M.Morris Mano, Computer System Architecture, PHI 1986.

Suggested Reading and links :

1. V.Karl Hamacher, Zvokog G. Vranesic and Safwat G. Zaky, Computer Organization, McGraw Hill ISE, 1984
2. https://epgp.inflibnet.ac.in/ahl.php?csrno=7
3. https://www.studytonight.com/computer-architecture/basics-of-digital-components

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BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-AEC-211	Lab based on Web Designing	00	0	02	02	20	20	60	100

Course Learning Objectives : *In this lab, students will acquire hands-on experience in web designing, focusing on HTML, CSS, and JavaScript to develop proficient skills in creating visually appealing and interactive websites. The course aims to cultivate a comprehensive understanding of web design principles, fostering the ability to design and implement functional and aesthetically pleasing web solutions.*

Learning Outcomes : After completing this course, student will be able to design static and dynamic web-pages using scripting language

Practical based on followings :

1. Create a basic HTML webpage with a title, heading, and paragraph.
2. Incorporate various text formatting tags, such as bold, italic, and underline, within an HTML document.
3. Construct an ordered list and an unordered list in HTML.
4. Develop a table to display tabular data and experiment with different table elements.
5. Integrate hyperlinks to navigate between multiple web pages.
6. Implement image tags to display pictures within a webpage.
7. Design a simple form using HTML with text inputs, radio buttons, and checkboxes.
8. Apply CSS styling to format text, change colors, and modify the layout of HTML elements.
9. Create a multi-column layout using CSS to enhance the visual structure of a webpage.
10. Explore the use of CSS classes and IDs for targeted styling.
11. Develop a responsive webpage that adjusts to different screen sizes using media queries.
12. Incorporate external stylesheets to separate the presentation from the content in HTML.
13. Experiment with different background properties and gradients using CSS.
14. Utilize the flexbox or grid layout to organize and structure webpage elements effectively.
15. Test and optimize the webpage for accessibility by incorporating semantic HTML elements and appropriate attributes.
16. Any other as per teacher concern

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BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SEC-211	Lab based on ICT-II	--	---	02	02	20	20	60	100

Course Learning Objectives : *This course aims to proficiently equip participants with essential skills in Microsoft Word, Excel, and PowerPoint. By the end, students will be adept at creating, formatting, and editing documents in Word, mastering data analysis and visualization in Excel, and developing impactful presentations using PowerPoint. The objective is to empower individuals for efficient and effective use of these vital office applications in professional settings.*

Learning Outcomes : After completing this course, student will be able to type and edit the text document alongwith data handing on worksheet and power point presentation.

Practical based on followings :

MS-WORD

1. Text Manipulations and Text Formatting
2. Usage of Bookmarks, Footnotes, Columns & Hyperlink
3. Usage of Header, Footer, Bulleting and Numbering & Borders and Shading
4. Usage of Tables - Sorting & Formatting
5. Usage of Spell Check, Find and replace
6. Picture insertion and alignment
7. Creation of documents using templates
8. Mail Merge, Envelopes and Labels

MS-EXCEL

9. Cell Editing and Formatting
10. Usage of Formulae and Built-in functions
11. Data Sorting, filter, form, subtotal, validation, Goal seek
12. Inserting Clip arts, objects, pictures and Data Filter, Validation, Subtotals
13. Usage of auditing, comments
14. Graph
15. Usage of Auto Formatting, Conditional Formatting & Style

MS- POWER POINT

16. Inserting New slides, text box, object, charts, tables, pictures, movies and sound
17. Slide layout, Colour Scheme, Background and Design template
18. Preparation of organizational charts
19. Preset and custom animation, action buttons and settings, Slide Transitions and animations, view show, slide sorter view
20. Presentation using Wizards
21. Usage of Design templates
22. Any other as per teacher concern

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BCA (Semester – II)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-MDM-211	Computer Education – II	04	-	-	04	20	20	60	100

Course Learning Objectives: *The course aims to equip students with fundamental computer skills, fostering proficiency in areas such as computer network, operating system, programming languages basics, cyber crime and database management system*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand the basics of computer network, types of computer network and various network topologies

UO2: will understand the basics of operating system, types of OS, and computer scheduling algorithms

UO3: will understand the basics of programming language, data types, input and output statements, control statements.

UO4: will understand the basic of cyber crime, intrusion, hackers, and network security.

UO5: will understand the concept DBMS, architecture and basic SQL queries

UNIT –I: Introduction of Computer Networks: Characteristics of a Computer Network, Benefits of Networks, Types of Computer Networks, Network Cables, Network Topologies.

UNIT –II: Operating System: Introduction, Functions of Operating System, Type of OS, basic scheduling FIFO, Round Robin.

UNIT –III: Programming Language: Introduction of C, data types, operators, statements Input & Output statements, control statements, simple programming using C.

UNIT –IV: Cyber Crime: Types of Cyber Crime, Hackers, Intrusion, Virus, Denial of Service (DOS Attack), Network Security, crime detection and control.

UNIT –V: DBMS: Introduction keys and creation tables, File System, Database security, Database architecture and updation, Basic SQL Query, DDL, DML, DCL.

Essential Reading:

1. Computer Fundamentals, Fourth Edition by P.K. Sinha and Priti Sinha
2. Digital Principle and Applications, Six Editions by Donald P Leach, Albert Paul Malvino, and Goutam Saha.
3. Fundamentals of Computers, Fourth Edition by V. Raja Raman.
4. Database System Concept, Fifth Edition, by Abraham Silberschatz and S. Sudarshan, Mc Graw Hill.

Suggested Reading and links :

1. Computer Fundamentals Architecture and Organization, Third Edition by B. Ram.
2. Fundamentals of Database Systems, Fifth Edition by Ramez Elmasri and Shamkant B. Navathe.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam

Chairman, BOS
Computer Science & Applications

BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-311	PHP Programming	04	-	-	04	20	20	60	100

Course Learning Objectives: *The course on PHP programming aims to equip students with a comprehensive understanding of server-side web development using PHP. Students will learn the fundamental syntax, data types, and control structures of PHP, enabling them to create dynamic and interactive web applications. The course will cover topics such as form handling, database integration, and session management, empowering learners to build robust and scalable websites. Additionally, students will gain proficiency in debugging techniques and security best practices, ensuring the development of secure and efficient PHP applications*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand comprehensive introduction to PHP programming, covering HTML, XML and basic data types.

UO2: will understand different operators conditional control structures loop control structures and code inclusion control structures.

UO3: will understand the various functions and function scope, web application, embading into html, safe handling and input validation.

UO4: will understand usage of databases with PHP, interface, data fetching, MYSQL, SQLite, executing, queries fetching sequences.

UO5: will understand the concept of error handling.

UNIT- I: Introduction to PHP: Language Features, Object-Oriented Model, Object-Oriented Features, Other Language Features, General PHP Changes, XML and Web Services & Memory Manager. PHP Basic Language: Introduction, HTML Embedding, Comments, Variables, Indirect References to Variables, Managing Variables, Super globals, Basic Data Types, Integers, Floating-Point Numbers, Strings, Booleans, Null, Resources, Arrays, Constants.

UNIT –II: Operators in PHP: Binary Operators, Assignment Operators, Comparison Operators, Logical Operators, Bitwise Operators, Unary Operators, Negation Operators, Increment/Decrement Operators, The Cast Operators, The Silence Operator, The One and Only Ternary Operator. Control Structures: Conditional Control Structures, Loop Control Structures, Code Inclusion Control Structures

UNIT –III: Functions in PHP: User-Defined Functions, Function Scope, Returning Values by Value, Returning Values by Reference, Declaring Function Parameters, Static Variables. Writing Web Application with PHP, Embedding into HTML, User Input, Safe-Handling User Input, Techniques to Make Scripts "Safe" Input Validation, Input Filter Working with Passwords.

UNIT – IV: Databases with PHP: MySQL, MySQL Strengths and Weaknesses, PHP Interface, Connections, Buffered Versus Unbuffered Queries, Queries Multi Statements, Fetching Modes, SQLite, SQLite Strengths and Weaknesses, PHP Interface, Obtaining PEAR DB, Pros and Cons of Database Abstraction, Database Connections, Executing, Queries, Fetching, Sequences.

UNIT– V: Error Handling: Introduction, Types of Errors, Programming Errors, Undefined Symbols, Portability Errors, Runtime Errors, PHP Errors. The PEAR_Error Class, Handling PEAR Errors, Exceptions: introduction to Exception.

Essential Reading:

1. StevenHolzner, PHP : the complete reference, McGraw-Hill, New York, Indian edition, 2018
2. John Doe, "Mastering PHP 8", ABC Publishers, 2nd Edition, 2021

Suggested Reading and links :

3. Matt Zandstrar, "PHP Objects, Patterns, and Practice", Apress publications, 6th Edition, 2020
4. https://www.guru99.com/php-tutorials.html

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-312	Lab Based on PHP	-	-	2	2	20	20	60	100

Course Learning Objectives : *This course on PHP Lab aims to provide students with practical hands-on experience in web development using PHP students will learn to design and implement dynamic websites, understand PHP scripting, and gain proficiency in database integration for building robust and interactive web applications. Through a combination of theoretical knowledge and practical exercises, students will develop the skills needed to create dynamic and efficient PHP-driven websites.*

Learning Outcomes: After completion of this course student will be able to write programs on various problems along with their implementation (execution) on server.

Based on PHP programming Lab

1. Create a PHP script for cookies management.
2. Develop a program that takes user input (name) and outputs a personalized greeting.
3. Write a PHP script to calculate and display the area of a rectangle (length * width).
4. Implement a program that checks whether a given number is even or odd.
5. Create a simple login system using PHP that authenticates users with hardcoded credentials.
6. Build a program that generates a random password of a specified length.
7. Write a PHP script to validate an email address entered by the user.
8. Develop a function to find and display the factorial of a given number.
9. Implement a program that reads a CSV file and displays its content in an HTML table.
10. Create a PHP script that uses sessions to track the number of visits to a webpage.
11. Build a basic calculator that performs addition, subtraction, multiplication, and division.
12. Write a program to upload an image file and display it on the webpage.
13. Develop a PHP script that connects to a MySQL database and retrieves data to display.
14. Create a program that checks if a string is a palindrome.
15. Implement a file handling script that reads content from one file and writes it to another file in reverse order.

Any other as per teacher concern.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-313	Database Management Systems	04	-	-	04	20	20	60	100

Course Learning Objectives: *The objective of the course is to present an introduction to Database Management Systems, with an emphasis on how to organize, maintain and retrieve-efficiently and effectively- information from a DBMS. In addition to this, facilitate the creation of data structures and relieve the programmer of the problems of setting up complicated files.*

Unit Wise Learning Outcomes :

Upon successful completion of the course the student will be able:-
UO1: To introduce the basics and structure of databases.
UO2: To know about the design and improvement techniques of database.
UO3: To introduce basics and types of SQL commands.
UO4: To get understanding about he working mechanism of PL/SQL.
UO5: To get to know about the recovery and security techniques of Database.

UNIT –I: Introduction to Database System-Objectives-Entities and Attributes. Data Models Database Management Systems Tree Structures Plex Structures Data Description Languages.

UNIT –II: Relational data base design: function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition.

UNIT –III: Basic SQL reports and commands Data types and notations String functions Data functions Unions Joints DDLDML DLL.

UNIT –IV: PL/SQL: Approach and Advantages PL/SQL Blocks -Variables-Manipulating Data Triggers Procedures, functions and packages - Exception handling.

UNIT –V: Locking Techniques Time stamp ordering Validation techniques - Granularity of data items Recovery Concepts - log based Recovery Database Security issues Access Control Statistical Database Security.

Essential Reading:

1. Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Database Systems: The Complete Book, Pearson, 3rd edition, 2023.
2. Henry F. Korth Abraham Silberschatz, Database System Concepts, Tata McGraw Hill, 7th edition, 2021
3. C. J. Date,An Introduction to Database System, Vol. 1, Addison-Wesley, 9th edition, 2023.

Suggested Reading :

1. Henry F. Korth, Abraham Silberschatz, and S. Sudarshan, Database System Concepts, McGraw-Hill Education, 9th edition, 2021.
2. Ramez Elmasri, Shamkant B Navathe, Fundamentals of Database systems.,Addison-Wesley, 8th Edition, 2022

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BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-314	Lab Based On SQL	-	-	02	02	20	20	60	100

Course Learning Objectives: *The objective of this lab course is to understand the practical applicability of database management systems concepts. Working on existing database systems, designing of database, creating relational database, analysis of table design.*

Learning Outcome: After completion of this course, student will be able to design a database for specific need and will be able to access the data using features of SQL.

Based on SQL programming Lab

1. Write commands For performing DDL and DML operations
2. Write commands for Working With different type of Keys
3. Write commands for Working with different type of Constraints
4. Write commands for Applying various operations in table.
5. Write various pre defined functions for multiple purposes
6. Write/Develop basic level Programs based on PL/SQL
7. Write PL/SQL programs for Working with Triggers
8. Write PL/SQL statements for Working with Procedures
9. Write PL/SQL statements for Working with functions
10. Write PL/SQL programs to perform Exception handling
11. Write PL/SQL statements for Working with Backup & Recovery Process
12. Write PL/SQL statements for Working with Granting and revoking of DBA rights.
13. Write PL/SQL Commands for performing transaction on database
14. Write PL/SQL statements for Working with different type of Joins
15. Write PL/SQL statements for Working with packages

Any other as per teacher concern.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-315	Fundamental of Computer Algorithm	06	-	-	-	20	20	60	100

Course Learning Objectives: *The course on Fundamentals of Computer Algorithms aims to provide students with a comprehensive understanding of algorithmic principles and their application in solving computational problems. Students will learn to analyze the efficiency of algorithms, understand key data structures, and master algorithm design techniques. The course focuses on cultivating problem-solving skills and algorithmic thinking, enabling students to devise efficient solutions for a variety of real-world problems. By the end of the course, students should be proficient in implementing and evaluating algorithms, enhancing their ability to contribute effectively to the field of computer science*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will understand notion of algorithm and various searching and sorting techniques.

UO2: will understand Depth first Search and Breadth First Search, Balanced Search trees, AVL Trees ,heaps and hash table.

UO3: will understand Greedy Techniques, Prim's Algorithm, Kruskal's Algorithm and knapsack problem.

UO4: will understand the concept of dynamic programming, optimal binary search tree, network flow problem.

UO5: will understand problem solving with backtracking, circuit problems and n-Queen problem.

UNIT –I: Notion of Algorithm, Growth of functions, Summations, Recurrences: The substitution method, The iteration method, The master method (including proof), Asymptotic Notations Sorting and Searching Techniques, Selection Sort, Bubble Sort, Insertion Sort, Sequential Search, Binary Search.

UNIT –II: Depth first Search and Breadth First Search, Balanced Search trees, AVL Trees, Heaps and Heap sort, Hash Tables, disjoint set an Divide and conquer.

UNIT –III: Greedy Techniques, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm, Huffman trees. Knapsack Problem.

UNIT –IV: Dynamic Programming paradigm, Warshall's and Floyd's Algorithm, Optimal Binary Search trees, Matrix multiplication Problem, 0/1 Knapsack Problem, maximum network flow problem, naive string matching algorithm, Rabin-Karp Algorithm.

UNIT –V: Backtracking, n-Queen's Problem, Hamiltonian Circuit problem, Subset-Sum problem, Branch and bound, Assignment problem, Traveling salesman problem. Introduction to Computability, Polynomial-time verification.

Essential Reading:

1. Michael T. Goodrich , Roberto Tamassia, Design And Analysis Of Algorithms, Wiley, 2nd Edition, July 2021.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals Of Computer Algorithms,Orient BlackSwan, 2nd Edition (2017)

Suggested Reading and links :

1. S. Sridhar Share, Design and Analysis of Algorithms, OXFORD UNIVERSITY PRESS, 1st Edition, 2014

e-book :https://ebookcentral.proquest.com/lib/hsgu-ebooks/home.action Levitin 'Introduction to the Design and Analysis of Algorithms' Noida, Pearson.

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Computer Science & Applications

BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-AEC-311	Lab Based On Web Designing Using Java Script	-	-	2	2	20	20	60	100

Course Learning Objective: *This course aims to equip students with the essential skills to proficiently design dynamic and interactive web pages using JavaScript and incorporating JavaScript seamlessly into web development projects. Through hands-on exercises, students will gain a comprehensive understanding of leveraging JavaScript to enhance the user experience and functionality of websites.*

Learning Outcomes : After completing this course, student will be able to design static and web-pages using scripting language.

Based on Web Designing Using Java Script Lab

1. Create a webpage that displays an alert when a button is clicked using JavaScript.
2. Develop a simple form validation script using JavaScript to ensure all required fields are filled out before submission.
3. Build a responsive navigation bar using HTML and style it with CSS, then enhance it with JavaScript for dynamic behavior.
4. Implement an image slideshow on a webpage using JavaScript, allowing images to change automatically or via user interaction.
5. Design a basic clock that updates in real-time using JavaSeript's Date object.
6. Develop a simple calculator on a webpage using HTML for the structure and JavaScript for the functionality.
7. Create a dropdown menu that appears when hovering over a navigation item, using JavaScript for the interactivity.
8. Design a webpage with a dynamic content loader that fetches and displays data from an external API using JavaScript.
9. Implement a basic form auto complete feature using JavaScript to suggest possible values as users type into a text input.
10. Build a responsive image gallery that allows users to click on thumbnails to view larger images using JavaScript.
11. Create a webpage with a countdown timer that updates in real-time, possibly leading to an action when the timer reaches zero.
12. Develop a toggle switch using HTML and CSS, and enhance it with JavaScript to control the visibility of certain page elements.
13. Design a form with a character counter that dynamically updates as users type in a text area using JavaScript.
14. Implement a simple login authentication system using JavaScript to validate user credentials.
15. Create a webpage with a scrolling effect triggered by the user's scroll using JavaScript, enhancing the visual appeal of the site

Any other as per teacher concern.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SEC-311	Seminar/ Poster / Presentation /Group Discussion	02	---	---	02	20	20	60	100

Course Learning Objectives:

(1) To provide platform for participation by students for academic activities (other than class-room teaching).

(2) To explore and enhance capabilities, creativity of students on subject.

(3) To provide opportunities to student for additional knowledge, skill, training and higher level academic development.

Course Outcome: After completing this course, student will be strengthen in terms of capabilities, skill, expression, and knowledge other than in curriculum. It will be decided by the department or teacher(s) concern. Students have to participate and earn the credit.

This is activity & participation based course:

Note:

1. Students have to participate in Seminar, Poster Presentation, Group Discussion, training program, minor project (any three) as decided by course coordinator.
2. Course coordinator will arrange the activities for ME, IA, ESE.
3. A summary of academic content of activity will have to be submitted by students to the course coordinator for mid-term & internal evaluation.
4. There may participation by students in three different (or some similar) activities relating to Mid Exam., assessment and ESE evaluation.
5. There will be individual (or paired) participation of students in each activity. In some cases group may be considered.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

BCA (Semester – III)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-MDM-311	Fundamental of Data Science	06	-	-	06	20	20	60	100

Course Learning Objectives: *The course aims to provide students with a foundational understanding of key concepts and techniques in data science. The course emphasizes the importance of making informed decisions based on data-driven insights and introduces students to machine learning principles for predictive modeling. By the end of the course, students should be proficient in data wrangling, exploratory data analysis, and basic machine learning applications, equipping them with essential skills for real-world data-driven problem-solving*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will gain a basic understanding of data science and its applications, basic of the data categorization.

UO2: will understand the concept of database and its storage and will be able to perform various data base queries.

UO3: will understand concept of data warehouse its architecture and implementation issues, ETL process and transaction processing

UO4: will understand the concept of data mining, its characteristics, benefits, data mining process and privacy issues.

UO5: will understand exploratory data analysis and various data manipulation techniques.

UNIT –I: Introduction to Data Science- Introduction- Definition - Data Science in various fields - Examples - Impact of Data Science - Data Analytics Life Cycle - Types of Data: Numeric–Categorical–Graphical–High Dimensional Data, Structured, Semi-Structured and UnStructured - Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution.

UNIT –II: DBMS: Database concepts -File System Database Storage Structure, (Table Space , Control Files, Data Files), Structured and Unstructured Data, SQL Commands- DDL, DML, DCL.

UNIT –III: Data Warehousing- Definitions and Concepts- Data Warehousing Architectures - Data Integration and the Extraction, Transformation, and Load (ETL) Processes – Transaction processing-Data Warehouse Development Approaches-Data Warehousing Implementation Issues.

UNIT- IV: Data Mining Concepts- Definitions, Characteristics, and Benefits-How Data Mining Works - Data Mining Versus Statistics Data Mining Process - Data Mining Methods - Data Mining and Privacy Issues.

UNIT- V: Data Structures & Algorithms Exploratory Data Analysis Data Manipulation Data Wrangling Univariate Data Analysis Bivariate Data Analysis Multivariate Data Analysis Data Mining

Essential Reading:

1. Joel Grus, Data Science from Scratch, O'Reilly Media, 2nd Edition, 2019.
2. Robert Tibshirani, and Jerome Friedman, The Elements of Statistical Learning, 1st Edition springer,2017

Suggested Reading :

1. David J. Hand - "Principles of Data Mining", The MIT Press, 3rd Edition, 2020
2. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman- "Mining of Massive Datasets", Cambridge University Press, 3rd Edition, 2019.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-411	Java Programming	04	-	-	04	20	20	60	100

Course Learning Objectives: *The objective of the course is to learn how to implement object oriented principles, to identify java language components and how they work together in applications, to design and program standalone java applications, to understand how to use java API's for program development. Conclusively the objective is to make the student well aware about the trending technology of developing secured java applications.*

Unit Wise Learning Outcome :

Upon successful completion of the course the student will be able:-

UO1: To introduce the basic features of java.
UO2: To understand the concepts of OOPS e.g. class concepts, object etc.
UO3: To understand the working of constructors along with the important OOPS feature Inheritance.
UO4: To understand and develop the package based java programs with exception handling.
UO5: To understand and develop GUI distributed applications using Applets and multithreading

UNIT –I: Object oriented fundamentals, Features of Java, Java Virtual Machine (JVM), Byte-Code, garbage collector, JAVA buzzwords, usage of length and final variable, Hungarian notation, instance and static data members and methods ,Command Line Arguments, Java program structure, Reserved keywords, Identifiers, Operators Declaring a variable, Data types, Control Statements.

UNIT- II: Understanding different versions of java, Basics of Arrays: one dimensional and two dimensional arrays , String Handling: StringBuffer class, Class Fundamentals: The General Form of a Class, different ways to create objects, defining business logic class and execution logic class, wrapper classes, Methods: Overloading Methods and Overriding Methods, Using Objects as Parameters.

UNIT- III: Constructors: types of constructors, Implementation of 'THIS' keyword with their different levels, Inheritance: basics, implementation of the Types of Inheritance, types of relationships, Implementation of 'SUPER' keyword with their different levels , Using Abstract Classes, Factory method and implementation. Interfaces: defining and implementing its different approaches.

UNIT –IV: Packages: predefined packages, creation and implementation of user defined package. Access specifiers, Exception Handling: Exception as Objects, Occurrence of exception in java runtime environment, Exception hierarchy, Try, Catch, Finally, Throw.

UNIT–V: Applets: life cycle of applet, applet viewer tool. Multi threading: Creating threads, Thread Life Cycle, Main Thread, Multiple Threads, is Alive() and join(), Simple thread program, Threads Priorities, Thread synchronization. Connecting java program with database using ODBC(Type 1) drivers.

Essential Reading Material:

1. Herbert Schildt ,Java: The complete reference, Tata McGraw Hill, 12th edition,2021,
2. Paul Deitel, Java: How To Program, Late Objects, 11th edition, Published by Pearson, 2021

Suggested Reading

1. E. Balaguruswami "Programming with Java"- Tata McGraw Hill, 6th edition, 2023.
2. Bill Verrens, Inside the Java Virtual Machine, Tata McGraw Hill, 2019,7th edition,

ME – Mid – I Exam; IA – Internal Assessment; ESE – End Semester Exam.

Approved by BOS Meeting on dated 07/12/2023

Chairman, BOS
Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-412	Lab based on Java Programming	-	-	02	02	20	20	60	100

Course Learning Objectives: *To provide practical training to students for programming in JAVA on computer system.*

Course Learning outcomes: After completing this course student will be able to execute the computer program written in JAVA language on computer system under problem solving approach.

Based on Java programming Lab

1. (a) Write a programme to elaborate the use of length variable.
   (b) Write a programme to show the usage of command line arguments.
2. (a) Write a programme to calculate SI by using the concept of BLC and ELC.
   (b) Write a programme to demonstrate the use of instance and static methods.
3. (a) Write a programme to represent the usage of final keyword at different levels.
   (b) Write a programme to show the usage of Arrays.
4. (a) Write a programme to perform various String operations using StringBuffer class.
   (b) Write a programme to elaborate about how to convert string data into its fundamental data type.
5. (a) Write a programme to perform method overriding.
   (b) Write a programme to perform method overloading.
6. (a) Write a programme to use objects within parameter.
   (b) Write a programme to use all types of constructors at a single class.
7. (a) Write a programme to use THIS keyword on its different levels.
   (b) Write a programme to use SUPER keyword on its different levels.
8. (a) Write a programme to implement all types of inheritance by using classes and by using interfaces.
   (b) Write a programme to develop and implement Interfaces.
9. (a) Write a programme to represent the use of Abstract keyword at class and method level.
   (b) Write a programme to demonstrate the use of Factory methods.
10. (a) Write a programme to create a package and also make use of that package in a separate program.
    (b) Write a programme to show the usage of access specifiers.
11. (a) Write a programme to handle the system defined exception.
    (b) Write a programme to create a user defined exception and its handling.
12. (a) Write a programme to print a simple text message on applet viewer tool.
    (b) Write a programme to demonstrate the use of applet life cycle.
13. (a) Write a programme to perform basic thread operations.
    (b) Write a programme to print thread priority values.
14. (a) Write a programme to represent thread life cycle.
    (b)Write a programme by using multithreading to create two different threads in which one thread will print even and another thread will print odd numbers at a single time.
15. (a) Write a programme to perform thread synchronization.
    (b) Write a programme to get connected with a back end database by using type-1 (ODBC drivers).

Any other as per teacher concern.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-413	Python Programming	04	-	-	04	20	20	60	100

Course Learning Objectives: *The course aims to equip learners with a solid foundation in Python programming, covering fundamental concepts such as syntax, data types, and control structures. Participants will develop proficiency in designing and implementing algorithms, as well as utilizing Python's extensive standard libraries. By the end of the course, students should be able to create practical Python applications, demonstrating problem-solving skills and a comprehensive understanding of the language*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will gain basics understanding of data science and its applications, the basics of data categorization.

UO2: will understand concept of database and its storage and will be able to perform various data base queries.

UO3: will understand concept of data warehouse its architecture and implementation issues, ETL process and transaction processing

UO4: will understand the concept of data mining, its characteristics, benefits, data mining process and privacy issues.

UO5: will understand exploratory data analysis and various data manipulation techniques.

UNIT –I: Python – origins – features – variable and assignment - Python basics – statement and syntax – Identifiers – Basic style guidelines – Python objects – Standard types and other built-in types – Internal types – Standard type operators – Standard type built-in functions

UNIT –II: Numbers – Introduction to Numbers – Integers – Double precision floating point numbers – Complex numbers – Operators – Numeric type functions – Sequences: Strings, Lists and Tuples – Sequences – Strings and strings operators – String built-in methods – Lists – List type Built in Methods – Tuples

UNIT- III: Mapping type: Dictionaries – Mapping type operators – Mapping type Built-in and Factory Functions - Mapping type built in methods – Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function - Files and Input/Output – File objects – File built-in functions – File builtin methods – File built-in attributes – Standard files – command line arguments

UNIT- IV: Functions and Functional Programming – Functions – calling functions – creating functions – passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances

UNIT –V: Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, Mysql - Regular Expression – Special Symbols and Characters – REs and Python

Essential Reading:

1. Paul Barry - "Head First Python", O'Reilly Media , 2nd Edition, 2016.
2. Eric Matthes - "Python Crash Course", No Starch Press, 2nd Edition, 2019.

Suggested Reading and links :

1. Zed Shaw Learn Python the hard way Addition Wesley 2017
2. Anthony Shaw - "Python Machine Learning" - 3rd Edition - Packt Publishing - 2019
3. https://www.codecademy.com/learn/learn-python-3
4. www.spoken-tutorial.org
5. https://docs.python.org/3/tutorial/index.htmlial — Python 3.12.0 documentation

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-414	Lab Based On Python Programming	-	-	02	02	20	20	60	100

Course Learning Objectives: *The Python Programming Lab aims to provide students with hands-on experience in applying fundamental programming concepts using Python. Throughout the course, students will develop practical skills in writing and debugging Python code, understanding data structures, and solving real-world problems. The lab emphasizes a structured approach to programming, fostering the ability to design and implement algorithms while encouraging critical thinking and problem-solving in Python.*

Learning Outcomes: After completion of this course student will be able to write Python programs on various problems along with their implementation (execution).

Based on Python Programming Lab

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a program to create, append, and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find largest of three number.
8. Write a python program to define a module and import a specific function in that module to another program.
9. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
10. Write a python program to find factorial of a number using Recursion.
11. Write a function that removes duplicate elements from a list.
12. Implement a simple calculator with basic arithmetic operations (addition, subtraction, multiplication, division).
13. Create a Python script to connect to a MySQL database and retrieve all records from a specific table.
14. Write a Python script to delete records from a MySQL table
15. Develop a program that performs a basic SQL query on a MySQL database.

Any other as per teacher concern.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-DSM-415	Operating System	06	-	-	06	20	20	60	100

Course Learning Objectives: *The course on operating systems aims to equip students with a comprehensive understanding of the fundamental concepts and principles governing the management and coordination of computer hardware and software. Through theoretical exploration, students will learn to analyze, design, and implement efficient operating systems, fostering skills in resource allocation, process management, and system optimization.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will gain basics understanding of operating system and its objectives, functions and evolutions.

UO2: will understand concept of process and its states and CPU scheduling and its types, performance criteria and various scheduling algorithms.

UO3: will understand concept of memory management techniques and principles of concurrency.

UO4: will understand the concept of Deadlock and its avoidance, detection and recovery techniques. Also understand the concept of I/O management and principle of I/O software.

UO5: will understand concept of file management system.

UNIT –I: Introduction to Operating System: Operating System: Introduction, Objectives and functions. Evolution of Operating System.

UNIT –II: Process Description and control: process definition, process states, two state & five state process model, process creation & termination, CPU Scheduling : Types of scheduling, scheduling and performance criteria, scheduling algorithm.

UNIT- III: Memory Management: Memory partitioning, paging, segmentation, virtual memory. Concurrency and Synchronization: Interposes communication and synchronization. Principles of concurrency, Mutual exclusion: Software approaches, hardware support, semaphores.

UNIT- IV: Deadlock & starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection and recovery, starvation. Input/ Output Management: Principles of I/O hardware: I/O devices, I/O modules, I/O communication Techniques. Principles of I/O software: Goals, Interrupt handlers, device drivers.

UNIT –V: File Management: File system, file organization, file directories, file sharing, Record blocking, Error handling.

Essential Reading:

1. Stuart E. Madnick and John Donovan, "Operating System ",TMH Fifth Reprint 2000
2. William Stallings, "Operating Systems", Pearson Education, 9th Edition,2018.

Suggested Reading and links :

1. Hed, Andrew S. Tanenbaum "Modern Operating System", Pearson Education India, 5th edition,2017
2. Peter B. Galvin, Greg Gagne and Abraham Silberschatz, "Operating System Concept", Wiley, 10th edition,2018.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-AEC-411	Fundamental of Cyber Security	02	-	-	02	20	20	60	100

Course Learning Objectives: *The course aims to provide a comprehensive understanding of fundamental concepts in cyber security, covering topics such as threat landscapes, encryption, and access controls. Students will gain practical skills in identifying and mitigating common cyber threats, as well as develop a foundational knowledge of ethical considerations and legal aspects in the field. By the end of the course, participants will be equipped to analyze and enhance the security posture of systems and networks.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will gain basics understanding, importance and challenges in cyber security and cyber terrorism.

UO2: will understand concept of hackers, crackers and cyber attacks and vulnerabilities malware threats.

UO3: will understand concept and scope of ethical hacking and types of social engineering attacks.

UO4: will understand the concept of cyber forensics and role of forensics investigator

UO5: will understand the cyber laws and IT act 2000.

UNIT –I: Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace- Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism– Cyber Security of Critical Infrastructure -Cyber security –Organizational Implications

UNIT –II: Types of Hackers- Hackers and Crackers -Cyber-Attacks and Vulnerabilities- Malware threats-Sniffing - Gaining Access - Escalating Privileges - Executing Applications- Hiding Files – Covering Tracks -Worms-Trojans -Viruses -Backdoors

UNIT- III: Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance Threat Modeling-Enterprise Information Security Architecture-Vulnerability Assessment and Penetration Testing-Types of Social Engineering-Insider Attack-Preventing Insider Threats-Social Engineering Targets and Defence Strategies.

UNIT- IV: Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports-Auditing-Plan an audit against a set of audit criteria Information Security Management System Management. Introduction to ISO 27001:2013.

UNIT –V: Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller -Offences under IT Act- Computer Offences and its penalty under IT Act 2000- Intellectual Property Rights in Cyberspace.

Essential Reading:

1. Donaldson,S.,Siegel,S.,Williams,C.K.,Aslam,A.,"Enterprise Cyber security" –3rd Edition,2015
2. Apress, "Build a Successful Cyber defense Program against Advanced Threats", 1st Edition,2015.
3. RogerGrimes,"Hacking the Hacker",Wiley, I st Edition,2017.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

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Computer Science & Applications

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SEC-411	Seminar/ Poster / Presentation /Group Discussion	02	---	---	02	20	20	60	100

Course Learning Objectives:

(1) To provide platform for participation by students for academic activities (other than class-room teaching).
(2) To explore and enhance capabilities, creativity of students on subject.
(3) To provide opportunities to student for additional knowledge, skill, training and higher level academic development.

Course Outcome: After completing this course, student will be strengthen in terms of capabilities, skill, expression, and knowledge other than in curriculum

This is activity & participation based course:

Note:

1. Students have to participate in Seminar, Poster Presentation, Group Discussion, training program, minor project (any three) as decided by course coordinator.
2. Course coordinator will arrange the activities for ME, IA, ESE.
3. A summary of academic content of activity will have to be submitted by students to the course coordinator for mid-term & internal evaluation.
4. There may participation by students in three different (or some similar) activities relating to Mid exam, assessment and ESEevaluation.
5. There will be individual (or paired) participation of students in each activity.In some cases group may be considered.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

BCA (Semester – IV)

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-MDM-411	Advanced Data Science	06	-	-	06	20	20	60	100

Course Learning Objectives: *The course aims to equip participants with advanced data science skills, focusing on complex statistical modeling, machine learning techniques, and deep learning applications with Big data. The overarching goal is to empower students to analyze large and diverse datasets, make informed decisions, and contribute meaningfully to the evolving field of data science.*

Unit wise Learning Outcomes:

Upon successful completion of the course, the students

UO1: will gain basics understanding of big data its characteristics, big data processing and approaches and hadoop ecosystem

UO2: will understand the concept of hadoop file system, hadoop architecture and its daemons, various hadoop commands.

UO3: will understand concept of machine learning, various types of machine learning techniques, different classification model with their performance metrices

UO4: will understand the concept of natural processing language, with different NLP models.

UO5: will understand the NoSQL database, different nosql models, artificial intelligence, deep learning and CNN.

UNIT –I: Introduction to Big data –Distributed File System – Big Data and its importance, Characteristics of Big Data, Limitation of Conventional Data Processing Approaches, Need of big data frameworks, Big data analytics, Limitations of Big Data and Challenges, Big data applications Introduction to Hadoop ecosystems

UNIT –II: Basic Concepts of Hadoop and its features -The Hadoop Distributed File System (HDFS)- Anatomy of a Hadoop Cluster - Hadoop cluster modes - Hadoop Architecture, Hadoop Storage - Hadoop daemons (Name node-Secondary name node-Job tracker-Task tracker-Data node,etc) ,Interacting HDFS using command-line (HDFS Shell and FS shell commands)

UNIT –III: Types of Machine Learning, Linear Regression Logistic Regression Classification Models, Model Evaluation Metrics, Decision Tree, Random Forest, Naive Bayes, K-Nearest Neighbors, Support Vector Machines Ensemble Techniques (Random Forest, Bagging, Boosting),K-means Clustering.

UNIT- IV: Text Analytics, Text Mining, and Sentiment Analysis – Natural Language Processing N-Gram Model, TF-IDF Vectorizer, N-Grams, Word Embeddings,Word2vec ,Text Mining Process- tools - Sentiment Analysis. Text Association Analysis, Topic Modeling, Latent Dirichlet Allocation (LDA).

UNIT- V: Introduction to NoSQL, Characteristics of NoSQL, History of NoSQL, Types of NoSQL Data Models- Key Value Data Model, Column Oriented Data Model, Document Data Model, Introduction to Deep Learning, Convolutional Neural Networks, Recurrent Neural Networks.

Essential Reading:

1. Raschka, S., & Mirjalili, V., "Python Machine Learning", Packt Publishing, 3rd edition,2019.
2. Cutting, D., Cafarella, M., Hadoop: The Definitive Guide. O'Reilly Media.4th edition 2020.

Suggested Reading and links :

1. Dan Jurafsky, James H. Martin - "Speech and Language Processing", Pearson, 3rd Edition, 2019.
2. Andreas C Miller, Sarah Guido., "Introduction to Machine Learning with Python: A guide"O' Reily, 2017.

ME – Mid – I Exam.; IA – Internal Assessment; ESE – End Semester Exam.

Chairman, BOS
Computer Science & Applicati...

Board of Studies Meeting held on 07th December, 2023

Approved of B.C.A. – NEP Syllabus for Academic Session 2023-24 onwards

Prof. Vinay Rishiwal
(External Member)
MJP, Rohilkhand University
Bareily (U.P.)

Prof. R. K. Shrivastava
(External Member)
Dr.Shakuntala Mishra National
Rehabilitation University
Lucknow (U.P.)

7/12/23

Dr. Kavita Rohit
(Member)
Department of Mathematics and
Statistics,
Dr. Harisingh Gour V.V., Sagar (M.P.)

Mr. Kamal Kant Ahirwar
(Member)
Department of Computer Science and
Applications,
Dr. Harisingh Gour V.V., Sagar (M.P.)

Dr.Ranjit Rajak
(Special Invitee, Member)
Department of Computer Science and
Applications,
Dr. Harisingh Gour V.V., Sagar (M.P.)

05/12/23

Prof. Ashish Verma
(HoD & Chairman, BoS)
Department of Computer Science &
Applications,
Dr. Harisingh Gour V.V., Sagar (M.P.)

Chairman, BOS
Computer Science & Applications

School Board of Studies Meeting held on 13th December, 2023

Approved of B.C.A. – NEP Syllabus for Academic Session 2023-24 onwards

13.12.23

Prof. A.K. Saxena
(External Member)
Department of Mathematics, Maharaja Chhatrasal University, Chhatarpur, (MP)

online concerted

Prof. K.S. Varsney
(External Member)
HoD Physics, D.S. College, Aligarh, (UP)

online concerted

Prof. Narendra Pandey
(External Member)
Department of Physics
University of Lucknow, (UP)

DShukla 13/12/23

Prof. Diwakar Shukla
(Member)
Department of Mathematics & Statistics
Dr. Harisingh Gour V.V., Sagar(M.P.)

13/12/23

Prof. R.K. Gangele
(Member)
Department of Mathematics & Statistics
Dr. Harisingh Gour V.V., Sagar(M.P.)

13/12/23

Prof. Ranveer Kumar
(Member)
Department of Physics,
Dr. Harisingh Gour V.V., Sagar(M.P.)

13/12/23

Prof. U.K. Patil
(Member)
Department Pharmaceutical Science
Dr. Harisingh Gour V.V., Sagar(M.P.)

Prof. R.K. Rawat
(Member)
Department of Applied Geology
Dr. Harisingh Gour V.V., Sagar(M.P.)

13.12.23

Dr. Mahesh Kumar Yadav
(Member)
Department of Mathematics & Statistics
Dr. Harisingh Gour V.V., Sagar(M.P.)

on leave

Dr. Maheshwar Panda
(Member)
Department of Physics,
Dr. Harisingh Gour V.V., Sagar(M.P.)

13/12/23

Mr. Kamal Kant Ahirwar
(Member)
Department of Comp. Sci. & Application
Dr. Harisingh Gour V.V., Sagar(M.P.)

13/12/23

Prof. Ashish Verma
(Dean, SMPS & Chairman, School Board)
Dr. Harisingh Gour V.V., Sagar (M.P.)

13/12/23

विभागाध्यक्ष / Head
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