FACULTY OF SCIENCE

Course Scheme & Syllabus
For
Bachelor of Computer Applications (Hons.)
Specialization in
Full Stack

(As per NEP-2020)
Batch-2024 &onwards

(As per Choice Based Credit System)
1st TO 8thSEMESTER

Introductory Note of the Programme

The BCA program is designed to equip you with the knowledge and skills necessary to thrive in the rapidly evolving field of information technology. Over the course of this program, you will explore various aspects of computer science, including programming languages, database management, software development, networking, web development, and much more. Our curriculum is carefully crafted to strike a balance between theoretical knowledge and practical application, ensuring that you not only grasp the fundamental concepts but also gain hands-on experience in solving real-world problems.

Throughout this program, you will delve into the fundamentals of Cyber Security, including topics such as network security, cryptography, ethical hacking, risk management, incident response, and digital forensics. You will learn how to identify vulnerabilities, implement preventive measures, and respond effectively to security incidents, ensuring the integrity, confidentiality, and availability of digital information.

Program Educational Objectives (PEOs)

PEO-1. Work productively as successful Computer professionals in diverse career paths including supportive and leadership roles on multidisciplinary teams or be active in higher studies.

PEO-2. Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavours, and practice their profession with high regard to ethical responsibilities.

PEO-3. Engage in life-long learning and to remain current in their profession to foster personal and organizational growth.

Programme Outcomes (POs)

PO-1: Apply mathematics and computing fundamental and domain concepts to find out the solution of defined problems and requirements. (Computational Knowledge)

PO-2: Use fundamental principle of Mathematics and Computing to identify, formulate research literature for solving complex problems, reaching appropriate solutions. (Problem Analysis)

PO-3: Understand to design, analyze and develop solutions and evaluate system components or processes to meet specific need for local, regional and global public health, societal, cultural, and environmental systems. (Design/Development of Solutions)

PO-4: Use expertise research-based knowledge and methods including skills for analysis and development of information to reach valid conclusions. (Conduct Investigations of Complex Computing Problems)

PO-5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. (Modern tool usage)

PO-6: Exhibiting ethics for regulations, responsibilities and norms in professional computing practices. (Professional Ethics)

PO-7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (Environment and sustainability).

PO-8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (Ethics).

PO-9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings (Individual and team work).

PO-10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (Communication).

PO-11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments (Project management and finance).

PO-12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (Life-long learning).

Program Specific Objectives (PSOs)

PSO-1: To explore technical comprehension in varied areas of Computer Applications and experience a conducive environment in cultivating skills for thriving career and higher studies.

PSO-2: To comprehend, explore and build up computer programs in the allied areas like Algorithms, System Software, Multimedia, Web Design and Data Analytics for efficient design of computer-based systems of varying complexity.

Mapping of POs with PEOs

PEOs→ / POs↓	PEO 1	PEO 2	PEO 3
PO1	Yes	Yes	Yes
PO2			Yes
PO3	Yes		Yes
PO4		Yes	
PO5		Yes	
PO6			Yes
PO7	Yes		Yes
PO8			
PO9		Yes	
PO10	Yes		Yes
PO11		Yes	
PO12	Yes	Yes	

Mapping of PSO with PEO

PEOs→ / PSO↓	PEO 1	PEO 2	PEO 3
PSO1	Yes	---------	Yes
PSO2	---------	Yes	Yes

Scheme of Courses
Bachelor of Computer Applications

Credit Details			
S.No.	**Course Category**	**Course Category Abbreviation**	**3-Yr B.C.A… (Credits)**
1.1	Discipline Specific Courses-Core	DSC	52
1.2	Discipline Specific-Skill Enhancement Courses-Core	DS-SEC	09
1.3	Discipline Specific-Value Added Courses-Core	DS-VAC	
Total of Discipline Specific Core Courses			
2.1	Minor Courses	MC	20
OR			
2.2	Interdisciplinary Courses	IDC	04
3	Multidisciplinary Courses	MDC	09
4	Ability Enhancement Course- Common	AEC-C	08
5	Value Added Courses-Common	VAC-C	06
6.1	Skill Enhancement Courses- Common	SEC-C	08
6.2	Skill Enhancement Courses-Summer Internship	SEC-SI	04
Total of Skill Enhancement Courses			
Total Credits			**120**

Scheme of Courses

Bachelor of Computer Applications

Credit Details				
S.No.	**Course Category**	**Course Category Abbreviation**	**4-Yr B.C.A. (Hons.)/.. (Credits)**	**4-Yr B.C.A. (Hons/.. (Hons. with Res.) (Credits)**
1.1	Discipline Specific Courses-Core	DSC	84	72
1.2	Discipline Specific-Skill Enhancement Courses-Core	DS-SEC	09	09
1.3	Discipline Specific-Value Added Courses-Core	DS-VAC		
	Total of Discipline Specific Core Courses			
2.1	Minor Courses	MC	28	28
OR				
2.2	Interdisciplinary Courses	IDC	04	04
3	Multidisciplinary Courses	MDC	09	09
4	Ability Enhancement Course-Common	AEC-C	08	08
5	Value Added Courses-Common	VAC-C	06	06
6.1	Skill Enhancement Courses-Common	SEC-C	08	08
6.2	Skill Enhancement Courses-Summer Internship	SEC-SI	04	04
6.3	Skill Enhancement Courses-Research Project/Dissertation	SEC-RP	--	12
Total of Skill Enhancement Courses				
Total Credits			**160**	**160**

Semester 1

S. No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP101	Principles of Digital Electronics	DSC	3	0	0	3
2	CSP102	Computer Fundamentals and Office Automation	DS-SEC	2	0	2	3
3	CSP103	Algorithm Design and Programming Using C	DSC	3	0	2	4
4	XXXX	Multi-Disciplinary Course	MDC	3	0	0	3
5	XXXX	Ability-Enhancement Course	AEC-C	2	0	0	2
6	XXXX	Skill-Enhancement Course (common)	SEC-C	2	0	0	2
7	XXXX	Value-added Course	VAC-C	2	0	0	2
	Total						19

L- Lectures T- Tutorial P- Practical Cr.- Credits

Semester 2

S. No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP104	Object Oriented Programming using C++	DSC	3	0	2	4
2	CSP105	Web Designing	DS-SEC	1	0	2	2
3	CSP106	Mathematical Foundation of Computer Science	DSC	3	0	0	3
4	XXXX	Multi -Disciplinary Course	MDC	3	0	0	3
5	XXXX	Ability-Enhancement Course	AEC-C	2	0	0	2
6	XXXX	Skill-Enhancement Course (common)	SEC-C	3	0	0	3
7	XXXX	Value-added Course	VAC-C	1	0	2	2
8	XXXX	Value-added Course	VAC-C	1	1	0	2
	Total						**21**

L- Lectures T- Tutorial P- Practical Cr.- Credits

FIRST EXIT:

The students will be awarded "Undergraduate Certificate in Computer Science & Applications" after exit at this point, provided they secure 4 Credits in skill/work-based vocational courses or internship/apprenticeship for 4-6 weeks (with minimum 120 hours) during summer term.

Semester 3

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP201	Computer Oriented Numerical and Statistical Techniques	IDC	4	0	0	4
2	CSP202	Object Oriented Programming using Java	DSC	3	0	2	4
3	CSP203	Database Concepts	DSC	3	0	2	4
4	XXXX	Multi -Disciplinary Course	MDC	3	0	0	3
5	XXXXX	Ability-Enhancement Course	AEC-C	2	0	0	2
6	XXXX	Skill-Enhancement Course (common)	SEC-C	3	0	0	3
	Total						**20**

L- Lectures T- Tutorial P- Practical Cr.- Credits

Semester 4

S. No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP204	Data Structures	DSC	3	0	2	**4**
2	CSP205	Computer Graphics	MC	3	0	2	**4**
3	CSP206	Operating Systems	DSC	3	0	0	**3**
4	CSP207	Computer Organization and Architecture	DSC	3	0	0	**3**
5	CSP208	Computer Networks	DSC	3	0	2	**4**
6	XXXX	Ability-Enhancement Course	AEC-C	2	0	0	2
	Total						**20**
NCC credits are only earned by those students who are opted NCC							
7	NCC201	NCC Organization and National Integration	**VAC**	2	0	0	**2**
8	NCC202	Training: Drill, Map Reading, Field And Battle Craft	**VAC**	0	0	2	**1**
	Total						**23**

L- Lectures T- Tutorial P- Practical Cr.- Credits

SECOND EXIT:

The student will be awarded "Undergraduate Diploma in Computer Science & Applications" after exit at this point provided that he/she secure 4 Credits in skill/work based vocational courses or internship/apprenticeship for 4 – 6 weeks (with minimum 120 hours) offered during first year summer term or second year summer term.

Semester 5

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP301	Skill-Enhancement Course—Summer Internship	**SEC-SI**	0	0	8	**4**
2	CSP302	Programming in Python	DSC	3	0	2	**4**
3	----------	----------	**DS-SEC**	3	0	2	**4**
4	CSP303	Web Engineering using ASP.NET	**MC**	3	0	2	**4**
5	**CSP304**	Cyber Security	**MC**	4	0	0	**4**
	Total						**20**
NCC credits are only earned by those students who are opted NCC							
7	NCC301	NCC Organization and National Integration	**VAC**	2	0	0	**2**
8	NCC302	Training: Drill, Map Reading, Field and Battle Craft	**VAC**	0	0	2	**1**
	Total						**23**

L- Lectures T- Tutorial P- Practical Cr.- Credits

DS-SEC (Discipline Specific-Skill Enhancement Course-Core)-(Choose One)

S.No	Paper Code	Course Title	L	T	P	Cr
1	CSP307	Data Warehousing and Mining	3	0	2	4
2	CSP308	Data Analytics	3	0	2	4
3	CSP309	Big Data	3	0	2	4

Semester 6

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP310	Design and Analysis of Algorithm	DSC	3	0	0	3
2	CSP311	Artificial Intelligence	DSC	3	0	0	3
3	CSP312	Software Engineering	DSC	3	0	0	3
4	CSP313	Mobile Application Development	DSC	3	0	2	4
5	CSP314	Discrete Mathematics	DSC	3	0	0	3
6	--------	----------	**MC**	4	0	0	4
	Total						**20**

L- Lectures T- Tutorial P- Practical Cr.- Credits

MC (MINOR COURSE)- (Choose One)

S.No	Paper Code	Course Title	L	T	P	Cr
1	CSP315	Digital Image Processing	3	0	2	4
2	CSP316	R Programming	3	0	2	4
3	CSP317	Machine Learning	3	0	2	4

Note: If the Student get CGPA>= 7.5 then He / She will have to submit the Research Project with 12 Credit.

THIRD EXIT:
The student will be awarded "Bachelors in Computer Science & Applications" degree after exit at this point.

Semester 7

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP421	IT Systems Security & Physical Security	**DSC**	3	0	2	4
2	CSP422	IT Application & Data Security	**DSC**	3	0	2	4
3	CSP423	Digital Forensics I	**DSC**	3	0	2	4
4	CSP424	IT Network Security	**DSC**	3	0	2	4
5	CSP401	Research Methodology	**MC**	4	0	0	4
	Total						**20**

L- Lectures T- Tutorial P- Practical Cr.- Credits

Semester 8

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP425*	Digital Forensics II	**DSC**	3	0	0	**3**
2	CSP426*	Information Security Governance	**DSC**	3	0	0	**3**
3	CSP410*	Major Project	----------	0	0	12	**6**
4	CSP412	Cryptography and Network Security	**MC**	3	0	2	**4**
5	CSP420	Cloud Computing Security & Management	**DSC**	4	0	0	**4**
	Total						**20**

- ***Those students are adopting the research project they are exempted these courses. (12 credit)

S.No	Paper Code	Course Title	Course Category, Discipline Specific Elective (DSE)	L	T	P	Cr
1	CSP415	Research Project	----------	0	0	24	**12**
	Total						**12**

L- Lectures T- Tutorial P- Practical Cr.- Credits

FOURTH EXIT:

The student will be awarded "Bachelor of Computer Science and Applications (Hons.) Specialization in Cyber Security" degree after exit at this point.

List of multi-disciplinary open elective courses at DAV University

Sr. No.	Course Name	Faculty/Department
1	Basics of Physics	Physics
2	Basics of Chemistry	Chemistry
3	Basics of Biology	Zoology & Botany
4	Introductory Biotechnology	Biotechnology
5	Introductory Microbiology	Microbiology
6	Functioning of the Human Body	Zoology
7	Introductory Botany	Botany
8	Business Management for Beginners	CBME
9	Fundamental of Mutual Funds	CBME
10	Economics for Beginners	CBME
11	Professional Communication	English
12	Fine Arts	Arts, Fine Arts & Performing Arts
13	Jyotish: ‘Eye of the Veda’	Vedic Studies
14	Mathematical Statistics	Mathematics
15	Introductory Journalism	JMC
16	Professional Photography	JMC
17	Library Information Sciences	Library Sciences

Common courses with credits

Ability-Enhancement Courses	**Cr.**	**Skill-Enhancement Courses**	**Cr.**	**Value-Added Courses**	**Cr.**
Personality Enhancement	1L+1P	Essentials of Entrepreneurship-Thinking and Action	2L+1P	Environmental Studies **(Mandatory)**	2L+1P
Personality Development	2P	Design Thinking	2P	Human Values and Ethics **(Mandatory)**	2L+1T
Behavioural & Life Skills	1L+1P	Design Thinking & Innovation	2L	Gender Sensitization	2L
Global Citizenship in Higher Education	2L	Data Analytics	2L+1P	Professional Ethics	2L
Communication Skills **(Mandatory)** **OR** Cambridge English-I **(Mandatory#)** & Cambridge English-II **(Mandatory#)** *# To be offered in two semesters*	1L+1P 1L+1P 1L+1P	Cyber Security	3 (2L+1P)	Sustainable Development	2L
		Digital Fluency	1L+1P	Green Technologies	2L
Health & Yoga	1L+1P	Fundamentals of Computer programming & IT(FCPIT)	2L	General Studies	2L
Technical Report Writing	2L	Python Programming	3 (2L+1P)	NSS	2 (1L+1P)
Leadership Management	2L	Disaster Preparedness and Planning	2L		
Therapeutic Yoga	1L+1P	Intellectual Property Rights	2L		
Creative & Critical Thinking	1L+1P	Apiculture	2P		
Community Engagement & Social Responsibility **(Mandatory)**	1L+1P	NCC*	3 (2L+1P)		
		LATEX	3 (1L+2P)		

		Programming with FORTRAN	3(2L+1P)		

Notes:

a. Due to the constraint on total number of credits to be restricted under 160 for four year UG programmes, the mandatory courses which may or may not fall under ability-enhancement, skill-enhancement (common) or value- added courses can be offered as non-credit course and the student will have to qualify (as Satisfactory/Unsatisfactory) these courses to secure minimum passing marks through the process of assessment as mandated by DAV University.

b. Minimum number of students feasible to run a common course (Ability- enhancement,

c. Skill-enhancement (common) and Value-added) will be 20 students.

d. *Pre-requisite to opt NCC is that the student must be in possession of Certificate B or has appeared in B-certificate exam of NCC. NCC course shall run in two semesters of 3 credits (2L+1P) in each semester. Student who wishes to opt for NCC is required to study in two semesters of total 6 credits

Semester 1

L	T	P	Credit
3	0	0	3

Course Code	**CSP101**						
Course Title	**Principles of Digital Electronics**						
Course Outcomes	On the completion of the course the student will be able to CO1: To provide the knowledge about the various electronics components and digital circuits to the students and designing of various building blocks of computer system concepts. CO2: To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits. CO3: To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems. CO4: To design and analysis of the digital circuit and system. After studying this subject student will be able to easily understand the internal working of digital electronic circuits.						
Examination Mode	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							**CO Mapping**
Unit 1	**Fundamentals of Digital Electronics & Number System**						CO 1
•	Definitions of Digital Signals, Digital Waveform, Digital Logic, Gate propagation delay time, Digital Operations, Digital Integrated Circuits, Digital IC signal levels.						
•	Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Conversion from One Number System to another, Arithmetic Operation without Changing the Base,1's Complement and 2's Complement.						
•	Logic Gates**:** AND, OR, NOT, NAND, NOR XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.						
Unit 2	**Boolean Algebra & Combinational Circuits**						CO2
•	Introduction, Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP&POS Forms, Realization of Boolean Expression using Gates, K Maps, Simplification of Boolean Expression using K Maps.						
•	Half Adder & Half Subtractor, Full Adder & Full Subtractor, Parallel Binary Adder, Binary Adder/Subtractor.						
Unit 3	**Combinational & Sequential Logic Circuits**						CO3
•	Multiplexers Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer						
•	Encoders Decoders.						

•	Latch, Flip Flops RS Flip Flop, JK Flip Flop, Master Slave JK Flip Flop Race Condition, Removing Race Condition, D Flip Flop, T Flip Flop, Applications of Flip Flops	
Unit 4	**Semiconductor& Memories**	CO 4
•	Introduction, Static and dynamic devices, read only &random-access memory chips, PROMS and EPROMS Address selection logic.	
•	Read and write control timing diagrams for ICs.	
Reference Book/s	1. Melvino, Digital Computer Electronics, Delhi: McGraw Hill, Second Edition. 2. Mano D. Morris, Digital Logic & Computer Design, New Delhi: PHI Second Edition 3. Halki as Millman, Integrated Electronics, Delhi: Mc Graw Hill. 4. Hodges D.A. &Jackson H.G., Analysis and Design of Integrated Circuits, New York: InternationalMcGrawHill,1983. 5. Ujjain beck, John, Digital Electronics: A Modern Approach, New Delhi: Prentice Hall, 1994	

In hours			
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP102**						
Course Title	**Computer Fundamentals and Office Automation**						
Course Outcomes	On the completion of the course the student will be able to CO1: Illustrates different components of computer, its Characteristics, generations and application. Explain different number system used in computer system and binary arithmetic. CO2: Introduce computer memory and I/O devices. Explain different computer languages and types of computer operating system. CO3: Discusses DOS history and various DOS commands. Introduce features of MS word and its usage. CO4: Introduce excel worksheet and various excel functions. Explain use of MS-Power point and MS-Access.						
Examination Mode	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							**CO Mapping**
Unit 1	**Fundamentals of Computer & Number System**						CO1
•	Block Structure of a Computer, Characteristics of Computers, Computer generations, Applications of Computers. Classification of Computers based on size and chronology.						
•	Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.						
•	Binary Addition, subtraction and multiplication.						
Unit 2	**Operating System, Memory Types & Input/output Devices**						CO2
•	RAM, ROM, Cache and Secondary memory.						
•	Input devices: Keyboard, Mouse, Light pen, Joystick, Mouse, OCR, OMR, MICR. Output devices: Monitor, Impact, non-impact, working mechanism of Drum printer, Dot Matrix printer, Ink jet printer and Laser printer, plotters.						
•	Machine language, assembly language, higher level language, 4GL and introduction to Compiler, Interpreter, Assembler.						
•	Batch, multi programming, time sharing, multi-processor operating system, online and real time operating system, distributed operating system.						
Unit 3	**Disk Operating System & MS Word**						CO3
•	DOS–History, Internal and External Commands, Batch Files						

•	Salient Features Of MSWORD, Creating, saving, opening and printing	
	files, formatting pages, paragraphs and sections, checking Spelling and grammar; creating lists and numbering. Headings, styles, fonts and font size. Finding and replacing text, inserting page breaks, page numbers, symbols, images and dates. Using tables, header, footer. Using mail merge features.	
Unit 4	**MS Excel, MS PowerPoint and MS Access**	CO4
•	Excel Worksheet, Data Entry, Editing, Cell Addressing Ranges, Copying & Moving Cell Content, Inserting and Deleting Rows and Column, Column Formats, Printing, Creating, displaying charts, Working with functions - Date and time function, Statistical function, Mathematical and Trigonometric functions, Text function, Logical functions.	
•	Presentation overview, entering information, Presentation creation, opening and saving presentation, using transitions and animations.	
•	Creating a Database using MS Access, Basic Tables, Using Queries, Using the Auto Form Feature, Form Design, Using the Auto Report Feature, Report Design, Copying Data, Freezing Columns, Printing Tables, Printing Reports, Sorting Records, Using the Filter Sorts, Renaming Columns.	
Reference Book/s	1. Sinha, P. K .and Sinha, P., *Foundations of Computing*. New Delhi: BPBFirstEdition,2002. 2. Norton Peter, *Introduction to Computers*, Mc Graw Hill. 3. Rajaraman V, *Fundamentals of Computers*, New Delhi: Prentice Hall of India, Second Edition,1996. 4. Jain Satish, *MS Office2010Training Guide*, Delhi Publications,2010 5. Shelly G.B, Cashman Thomas., and Verma at Misty E., *Microsoft Office Word 2007: Complete Concepts and Techniques*, new Delhi: Cengage Learning,2007 6. Subramanian N, *Introduction to Computers*, Noida, UP,India:TataMcGraw-Hill,1989 7. Cyganski D, Orr J A, *Information Technology Inside and Outside*, Jersey USA: Pearson Education2002.	

In hours			
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP103**						
Course Title	**Algorithm Design and Programming Using C**						
Course Outcomes	On the completion of the course the student will be able to CO1: To define the concept of problem solving and steps to solving problems in computer application are using algorithms, pseudo-codes and flowcharts sequential, selection and repetition structure. CO2: To understand the Concept of fundamentals of programming & Control structure. CO3: Apply the concepts of Function, arrays, Structure & Union. CO4: Demonstrate the ability to write C programs using pointers and file handling.						
Examination Mode	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							**CO Mapping**
Unit 1	**Fundamentals of algorithms and programming, Operations and Expressions & Control Structures**						CO1
•	Concept: problem-solving, Problem-solving techniques (Trial &Error, Brain storming, Divide & Conquer), Steps in problem solving (Define Problem, Analyze Problem, Explore Solution), Algorithms and Flowcharts (Definitions, Symbols), pseudo-codes.						
•	Character Set, Identifiers and Keywords, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants and Operators & its types.						
•	Single Character Input, Single Character Output, Entering Input Data More About Scan Functions, Writing Output Data, More About Print Functions, Gets and Puts Functions, Library functions.						
Unit 2	**Decision Making and Looping Statements & Array**						CO2
•	Introduction, Decision Making with If–Statement, If Else and Nested If, While and Do-While, For Loop, Jump Statements: Break, Continue, Go to, Switch Statement.						
•	Introduction to Arrays, Array Declaration, Single and Multi-dimensional Array, Memory Representation, Matrices, Strings, String Handling Functions.						
Unit 3	**Functions, Structure and Union**						CO3
•	Introduction To Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Pass – By Value/Reference Recursion, Global and Local Variables, Storage Classes.						
•	Declaration of Structure, Accessing Structure Members, Structure Initialization, Arrays of Structure, Nested Structures, Unions.						
Unit 4	**Pointers, Files & Preprocessor Directives**						CO4

•	Introduction To Pointers, Address Operator and Pointers, Declaring and Initializing Pointers, Assignment through Pointers, Pointers and Arrays.	
•	Introduction, creating a Data File, Opening and Closing a Data File, Processing a Data File.	
•	Introduction and Use, Macros, Conditional Preprocessors, Header Files	
Textbook/s	1. Bala guru samiE, *Programming in A NSIC*, New Delhi: Tata Mc Graw Hill, Fourth Edition (2010).	
Reference Book/s	1. Sprenkle, M&J. Hubbard, *Problem solving and programming concepts*, 9th Edition. NJ: Prentice Hall,2012. 2. Gaddis, T., *Starting out with programming logic and design*, 3rd Edition. Boston: Addison Wesley2012. 3. Venti, S. &E. Drake, *Prelude to programming: Concepts and design*, 5th Edition. Boston: Addison Wesley,2011. 4. R.G. Dormy. *How to Solve it by Computer*, 3rd Edition, New Delhi: PearsonEducation,2007. 5. Kanetkar Yashwant P, *Letus C*, New Delhi: BPB Publications, Seventh Edition (2007). 6. Kernighan & Richie, *The C Programming Language*, New Delhi: PHI Publication, Second Edition (2009).	

Course Title: Office Automation Laboratory
Course Code: CSP102

L	T	P	Credits	Marks
0	0	2	1	50

- Working of DOS internal & external commands.
- Learning to use MS WORD, MS EXCEL.
- Using MS PowerPoint to make slides and presentations.
- Introduction to the Database Window, Database Objects, Database Terminology
- Creating a Database using MS Access, Basic Tables
- Using Queries, Using the Auto Form Feature Form Design
- Using the Auto Report Feature, Report Design
- Copying Data, Freezing Columns
- Printing Tables, Printing Reports
- Sorting Records, Using the Filter Sorts, Renaming Columns

Course Title: C Programming Laboratory
Course Code: CSP103

L	T	P	Credits	Marks
0	0	2	1	50

Implementation of C programming concepts:

- Control Structures, Loops, Arrays, Strings
- Functions, Structures, Union, Files, etc.

Semester - 2

In hours			
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP104**						
Course Title	**Object Oriented Programming using C++**						
Course Outcomes	On the completion of the course the student will be able to CO1: Discuss the concepts of OOPs. Comparison with the previously developed languages. CO2: Developing the concepts of Classes and object by using real-world examples. CO3: Implement the concepts of Friend function and Inheritance. CO4: Developing the programs using the concept of virtual function and using the concept of file handling. CO5: Interaction with the IDE and help in understanding the concept of OOPs.						
Examination Mode	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							**CO Mapping**
Unit 1	**Introduction to OOPS & Class Concepts**						CO1,5
•	Evolution Of OOP, OOP Features of C++, Characteristics of Object-Oriented Language – Objects, Classes, Inheritance, Reusability, User Defined Data Types, Polymorphism, Overloading, Comparison of C with C++.						
•	Class and Objects, Inline Functions, Static Data, Members and Member Functions, Constructors and Destructors.						
•	Dynamic Objects, Array of Pointers to Object, Pass By Value Vs. Pass By Reference, Local and Global Class, Nested and Empty Class, Preprocessor Directives, Namespace.						
Unit 2	**Console/O &Operator Overloading**						CO2
•	Hierarchy of Console Stream Classes, Unformatted and Formatted I/O Operations, Manipulators						
•	Overloadable Operators, Overloading Unary and Binary, Arithmetic and Relational Operators, Overloading Subscript, Array, Insertion, Extraction, New and Delete Operators.						
Unit 3	**Friend Function and Type Conversion & Inheritance**						CO3
•	Friend Function, Function Overloading, Overloading Operators through Friend Function						
•	Basic Type Conversion, Conversion Between Objects and Basic Types, Conversion Between Objects of Different Classes						

•	Derivation Rules, Different Forms of Inheritance, Roles of Constructors and Destructors in Inheritance	
Unit 4	**Virtual Functions & File Handling**	CO4
•	Virtual Functions and Their Needs, Pure Virtual Function, Virtual Destructor, Virtual Derivation, Abstract Class.	
•	Hierarchy of File Stream Classes, Opening and Closing Files.	
•	File Modes, Testing for Errors, File Pointers and Their Manipulations,	
	ASCII & Binary Files, Sequential and Random-Access Files	
Textbook/s	1. Bala guru swami E, *Object Oriented Programming in C++*, New Delhi: TataMcGrawHill,2006	
Reference Book/s	1. Stroustrup Bjarne, *The C++ Programming Language*, New Delhi: Addison-WesleyProfessional,2000 2. La fore Robert, *Object Oriented Programming in C++*. Delhi: Sams Publishing, 2000 3. Lippman, Tom Weiss, *C++Primer*, New Delhi: Addison Wesley, 2005 4. Scildt Herbert, *C++The Complete Reference*, New Delhi: Tata Mc Graw Hill,2007	

In hours			20
L	**T**	**P**	**Credit**
1	0	2	2

Course Code	**CSP105**						
Course Title	**Web Designing**						
Course Outcomes	On the completion of the course the student will be able to CO1: Introduce the creation of static webpages using HTML. CO2: Using PHP for back-end manipulations, arrays and functions. CO3: Working with PHP forms and manipulating files. CO4: Publishing web sites.						
Examination Mode	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							**CO Mapping**
Unit 1	**Introduction to Web Development &HTML/DHTML**						CO1
•	Website, Webpage, Static Website, Dynamic Website.						
•	HTML Basics, HTML Elements (Tags), Structure of HTML Program, Attributes, Headings, Paragraphs, Formatting, Links, Images, Tables, Lists, Forms, Frames, where to put Tables, Lists, Images, Forms.						
•	CSS in D HTML, Implementation of Web Pages using CSS						CO2
Unit 2	**Introduction to PHP**						
•	Introduction to PHP, PHP Environment, Syntax Overview, Variable Types.						
•	Decision Making, Control Statements, Arrays, Strings, Functions and Objects						
Unit 3	**PHP forms and manipulating files and Connectivity**						CO3
•	Working with Forms, Web Concepts, GET & POST, Maintaining Cookies and Sessions						
•	Working with Files, Opening, closing, coping, renaming and deleting a file, File uploading and downloading, Generating and creating Images with PHP						
•	Database Connectivity with MySQL, performing basic operations (insert, delete, update, select).						
Unit 4	**Purchasing a Domain Name & Web Space**						CO4
•	Domain Name & Web Space, Getting a Domain Name & Web Space (Purchase or Free),						
•	Uploading the Website to Remote Server.						

Reference Book/s	1. Powell Thomas, HTML& *CSS: The Complete Reference*, New Delhi: Mc Graw-Hill, Fifth Edition (2010). 2. Andy Harris, *HTML, X HTML and CSS All in One for Dummies*, Delhi: Willey, Second Edition (2010). 3. Leadoff Rasmus, Tat roe Kevin, MacIntyre Peter, *Programming PHP*, Delhi:O'ReillyMedia**,**2013. 4. Ullman Larry, *PHP for the World Wide Web, Visual Quick Start Guide*. New Delhi: Peach pit Press, fourth edition (2011)	

Course Title: Web Designing Laboratory

Course Code: CSP105

L	T	P	Credits	Marks
0	0	2	1	50

- Web designing using HTML, DHTML, CSS, and PHP.

Course Title: Object Oriented Programming Structures Laboratory
Course Code: CSP104

L	T	P	Credits	Marks
0	0	2	1	50

- Implementation of OOP concepts using C++
- Write program in 'C++' language. • Using input and output statements • Using control statements.
- Using functions.
- Using array
- Using Classes and implementation of Constructor and Destructor.
- Using files.
- Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions, Exception Handling)

Semester – 2

In hours			36
L	T	P	Credit
4	0	0	4

Course Code	**CSP201**						
Course Title	**Computer Oriented Numerical and Statistical Techniques**						
Course Outcomes	On the completion of the course the student will be able to CO1: Understand various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Numerical Algorithms and Statistical Methods. CO2: Understand and learn numerical methods for numerical analysis. CO3: Understand the implementation of numerical methods using a computer and learning of tracing errors in Numerical methods and analyze and predict it. CO4: Understand and Learn Statistical methods and Techniques.						
Examination Mode	Theory						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**Errors and Sources of Propagation for Errors (08 Hours)**						CO1
•	**Approximations and Round-Off Errors**: • Floating Point Representation of Numbers • Arithmetic Operations with Normalized Floating-Point Numbers and their consequences • Error in Number Representation • Pitfalls in Computing						
•	**Iterative Methods** • Zeros of a Single Transcendental Equation and Zeros of Polynomial using Bisection Method • False Position Method • Newton Raphson Method						
Unit 2	**Solution of Simultaneous Linear Equation (08 Hours)**						CO2
•	• Gauss Elimination Method • Pivoting • ILL Conditioned Equations and Refinement Of Solutions • Gauss Siedel Iterative Methods						
•	**Numeric Differentiation and Integration** • Numerical Differentiation Using Interpolation Method • Numerical Integration, Trapezoidal Rule • Simpson's 1/8 Rule, Simpson 3/8 Rule.						
Unit 3	**Numerical Solution of Ordinary Differential equations (07 Hours)**						CO3
•	• Euler Method • Runga Kutta Method • Predictor Corrector Method.						

•	**Introduction to Statistics** • Meaning, Scope, Collection and Classification of Data. • Methods to Measures Central Tendency	
Unit 4	**Dispersion**	**CO4**
•	Meaning Measurement of Dispersion (Mean Deviation, Standard Deviation and Variance)	
•	**Bivariate Data** • Correlation, Meaning, Type of Correlation, Correlation and Causation, Methods of Studying Correlation, • Algorithm to Compute Karl Pearson's Correlation and Rank Correlation. Applications Based On Correlation.	
Text Book/s	Rajaraman V, Computer Oriented Numerical Methods, Prentice Hall, India, 1993	
Reference Book/s	1) Gupta S.C, Fundamental of Statistics,Himalayas Publication House,2007 2) Gupta &Kapoor,AppliedStatistics,Sultan Chand & Sons, 2007 3)Gupta S.P, Statistical Method, Sultan Chand & Sons, 2009 4)Gupta, Rajesh Kumar. Numerical Methods: Fundamentals and Applications. United Kingdom, Cambridge University Press, 2019.	

In hours			36
L	T	P	Credit
3	0	2	4

Course Code	**CSP202**						
Course Title	**Object Oriented Programming using Java**						
Course Outcomes	On the completion of the course the student will be able to CO1: Solve real world problems using OOP techniques. CO2: Solve problems using java collection framework and I/O classes. CO3: Implement Interfaces and Packages CO4: Develop multithreaded applications with synchronization. Develop applets for web applications and able to design GUI based application						
Examination Mode	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**An Overview of JAVA (08 Hours)**						CO1
•	Evolution of Java, Importance of JAVA to Internet, Features of JAVA, Bytecode, Object Oriented Approach. Various Data Types and Operators, Type Conversion and Casting, One Dimensional and Multidimensional arrays Selection Statements, Iterative Statements, Jumping statements.						
Unit 2							CO2
•	Class Fundamentals, Declaring Objects, Introducing Methods, Constructors, this keyword, Overloading constructors and Methods, Recursion, Nested and Inner classes. Inheritance basics, Creating Multilevel hierarchy, Method Overriding and Abstract Classes.						
•	Packages and Interfaces, Access Protection, Importing Packages, Interfaces, Defining, Implementing, Applying Interfaces, Extending Interfaces. Exception Handling Fundamentals, Exception Types, uncaught exceptions, try and catch, Creating own Exceptions.						
Unit 3							CO3
•	Programming The Java Thread Model, Thread Priorities, Synchronization, Inter thread communication, Suspending, Resuming and Stopping Threads.						
•	Java I/O Basics, Streams, reading Console input and writing console output, PrintWriter class, Reading & writing Files, Byte Streams, Character Streams & Serialization.						
Unit 4							CO4
•	Applet basics, Applet Architecture, Applet: Display, Repaint, Parameter Passing. Event Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces, AWT Window Fundamentals, Working with Frame Windows, Graphics, Color and Fonts.						
Practicals	**List of experiments:** Task 1. Inheritance in JAVA Task 2. Interfaces and Packages in JAVA Task 3. Multithreading in JAVA						

	Task 4. Client –Server Networking Task 5. Functional Programming, Pure functional programming- No State, Immutable variables, favor recursion over looping.	
Text Book/s	Herbert Schildt (2019), Java The complete reference, 11th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.	
Reference Book/s	S. Malhotra, S. Chudhary(2013), Programming in Java,, 2nd edition, Oxford University Press Liang, Y. D. (2018). Introduction to Java Programming and Data Structures: Comprehensive Version. United Kingdom: Pearson.	

In hours			36
L	T	P	Credit
3	0	2	4

Course Code	**CSP203**						
Course Title	**Database Concepts**						
Course Outcomes	On the completion of the course the student will be able to CO1: To understand the basic concepts and the applications of database systems. CO2: To understand the basic concepts of data models and ER Diagrams. CO3: To understand the relational database design principles and apply normalization for the development of application software's CO4: To Master the basics of SQL and construct queries using SQL.						
Examination Mode	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**An Overview of DBMS (08 Hours)**						CO1
•	Concept of File Processing Systems and Database Systems Database Administrator and his Responsibilities Physical and Logical Data Independence						
•	**Three level Architecture of Database System** The External Level, Conceptual Level, The Internal Level						
Unit 2	**Introduction to Data Models (08 Hours)**						CO2
•	Entity Relationship Model, Hierarchical Model , Network and Relational Model , Comparison of Network, Hierarchical and Relational Model						
•	Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design for University or Enterprise.						
Unit 3	**Relational Databases (07 Hours)**						CO3
•	Introduction , Terms a. Relation b. Tuple c. Attribute d. Cardinality e. Degree f. Domain						
•	Keys (a) Super Key (b) Candidate Key (c) Primary Key (d) Foreign Key						
•	Relational Algebra Operations (a.) Select (b.) Project (c.) Union (d.) Difference (e.) Intersection (f.) Cartesian Product						
Unit 4	**Relational Database Design (05 Hours)**						CO3
•	Introduction , Anomalies of un normalized database , Normalization , **Normal Forms**: INF, 2NF, 3NF, BCNF, 4th NF, 5th NF						
•	Database Security, Integrity and Control						
Unit 5	**SQL (Structured Query Language) (08 Hours)**						CO4
•	Introduction , History Of SQL , Basic Structure , DDL Commands , DML Commands , DCL Command, Simple Queries , Nested Queries , Aggregate Functions , Clauses						
•	Join Methods, Union, Intersection, Minus, Views, Sequences, Indexing, Subquery.						
Practicals	**List of experiments:** Task 1. Introduction to SQL and installation of SQL Server / Oracle.						

	Task 2. Data Types, Creating Tables, Retrieval of Rows using Select Statement Task 3. Conditional Retrieval of Rows, Alter and Drop Statements. Task 4. Working with Null Values, matching a Pattern from a Table Task 5. Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements. Task 6. Set Operators, Nested Queries Task 7. Joins, Sequences. Task 8. Views, Indexes Task 9. Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.	
Text Book/s	1. Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition. 2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.	
Reference Book/s	1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education. 2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III 3. Simplified Approach to DBMS– Kalyani Publishers	

Semester 4

In hours			36
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP204**						
Course Title	**Data Structures**						
Course Outcomes	On the completion of the course the student will be able to CO1: Student will be able to handle operation like searching, insertion, deletion, traversing on various Data Structures; CO2: Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort; CO3: Students will be able to choose appropriate Data Structure as applied to specific problem definition; CO4: Implement Various searching algorithms and become familiar with their design methods.						
Examination Mode	Theory and Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**Introduction (08 Hours)**						CO1
•	Primitive and Composite Various Data Structures ,Common Operations on Data Structures, Algorithm Complexity, Time-Space Tradeoff Between Algorithms, Complexity of Algorithms						
•	**String**: Strings as ADTs, Representation and Manipulation, String Operations.						
•	**Arrays** Arrays Defined, Representing Arrays in Memory, Various Operations on Linear Arrays. Bubble Sort. Linear Search, Binary Search Records, Matrices, Sparse Matrices						
Unit 2	**Linked Lists, Stacks, Queues (08 Hours)**						CO2
•	Types of Linked Lists, Representing Linked Lists in Memory, traversing a linked List, Searching in a linked list, Memory Allocation and Garbage Collection, Insertion and deletion in a linked list. Circular Linked List. Advantage of Using Linked Lists Over Arrays, Various Operation on Linked Lists						
•	**Stacks** Description of Stack Structure, Implementation of Stack Using Arrays and Linked Lists, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms. QuickSort						
Unit 3	**Queues, Trees, Graphs, Heaps (08 Hours)**						CO3
•	**Queues**						

	Implementation of Queue Using Linked Lists , Circular Queues, De-Queues, Priority Queues.	
•	**Trees** Description of Tree Structure and Its Terminology, Binary Tree, representation in memory, Traversing Binary Trees, Traversal Algorithms using Stacks.	
•	**Graphs** Representation of Graphs and Applications: Adjacency Matrix, Path Matrix Warshall's Algorithm, Linked Representation of a Graph Traversing a Graph: DFS and BFS, Spanning Trees. **Heaps** Description of Heap Structure, Implementing Heaps Using Arrays	
Unit 4	**Searching and Sorting Algorithms (08 Hours)**	**CO4**
•	Linear Search, Binary Search Insertion Sort, Selection Sort, Bubble Sort, radix Sort, Merge Sort, Quick Sort	
	Files Operations on Files, Types of Files **File Organizations**: Sequential Files, Indexed Sequential File, Directed Files and Multikey Files	
Practical:	**List of Experiment:** Task 1: Write a program to insert a new element at end as well as at a given position in an array. Task 2: Write a program to delete an element from a given array whose value is given or whose position is given. Task 3: Write a program to find the location of a given element using Linear Search. Task 4: Write a program to find the location of a given element using Binary Search. Task 5: Write a menu driven program to perform following insertion operations in a single linked list: i. Insertion at beginning ii. Insertion at end iii. Insertion after a given node iv. Traversing a linked list Task 6: Write a program to implement push and pop operations on a stack using linear array. Task 7: Write a program to convert an infix expression to a postfix expression using stacks. Task 8: Write a program to evaluate a postfix expression using stacks. Task 9: Program to sort an array of integers in ascending order using bubble sort. Task 10: Program to sort an array of integers in ascending order using selection sort Task 11: Program to traverse graphs using BFS. Task 12: Program to traverse graphs using DFS.	
Text Book/s	"Data Structures with C (Schaum's Outline Series)", Seymour Lipschutz, 1st edition, McGraw Hill Education	
Reference Book/s	1) "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press. 2) Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company. 3) "Classic Data Structures", Samanta and Debasis, 2nd edition, PHI publishers. 4) Karumanchi, Narasimha. Data Structures and Algorithms Made Easy: To All My Readers : Concepts, Problems, Interview Questions. India, CareerMonk Publications, 2016.	

In hours			36
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP205**						
Course Title	**Computer Graphics**						
Course Outcomes	On the completion of the course the student will be able to CO1: To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. CO2: To describe the importance of two dimensional transformation and viewing. CO3: To describe the importance of three transformation and viewing. CO4: to understand color models in depth..						
Examination Mode	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**Overview of Computer Graphics (08 Hours)**						CO1
•	Basics of Computer Graphics, Applications, Video Display devices, Raster–Scan displays: Video Controller, Display Processor, Random–Scan displays, Color CRT Monitors; Common Graphic Input devices, Graphics Software's						
•	**Output Primitives:** Line Drawing: DDA, Bresenham Line Algorithm; Midpoint Circle drawing algorithms; Flood and Boundary Filling Algorithms.						
Unit 2	**Two-Dimensional Geometric Transformation and Viewing (08 Hours)**						CO2
•	Basic transformations: Translation, Rotation, Scaling, Reflection, Shearing Matrix representations and Homogenous Coordinates; Composite transformations: Translations, Rotations, Scaling.						
•	**Two-Dimensional Viewing**: Viewing coordinate reference frame; Window to Viewport coordinate transformation. Point Clipping, **Line Clipping**: Cohen–Sutherland, Liang– Barskey Algorithms for line clipping; text Clipping;						
Unit 3	**Three Dimensional Transformations & Viewing (08 Hours)**						CO3
•	Translation, Rotation, Scaling, Reflection and composite transformations. Parallel and Perspective Projections, Viewing Transformation: View Plan, View Volumes and Clipping.						
•	**Visible-Surface Detection Methods** Back-Face Detection Depth-Buffer Method A-Buffer Method						

	Scan-Line Method	
Unit 4	**Color Models (08 Hours)**	**CO4**
•	Color Models: Properties of Light, Intuitive Color Concepts, concepts of chromaticity, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.	
Practical:	**List of Experiment:** Task 1. WAP to draw different geometric structures using different functions. Task 2. Implement DDA line generating algorithm. Task 3. Implement Bresenham's line generating algorithm. Task 4. Implement Mid-point circle line generating algorithm. Task 5. Implementation of Bresenham's circle drawing algorithm. Task 6. Implementation of mid-point circle generating Algorithm. Task 7. WAP of color filling the polygon using Boundary fill and Flood fill algorithm. Task 8. To translate an object with translation parameters in X and Y directions. Task 9. Program of line clipping using Cohen-Sutherland algorithm. Task 10. To perform composite transformations of an object.	
Text Book/s	D. Hearn and M.P. Baker, Computer Graphics: C version	
Reference Book/s	1) D.F. Rogers, Procedural Elements for Computer Graphics, 2nd Edition, Addison Wasley 2) J.D. Foley et al, Computer Graphics, Principles and Practices, 2nd Edition, Addison Wasley 3) Roy A. Plastock, Gordon Kalley, Computer Graphics, Schaum's Outline Series	

L	T	P	Credits
4	0	0	4

Course Code	**CSP206**						
Course Title	Operating Systems						
Course Outcomes	CO1-To understanding CPU Scheduling, Synchronization, Deadlock Handling and CO2-Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems. CO3-To describe the role of paging, segmentation and virtual memory in operating systems. CO4-To defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.						
Examination Mode	Theory+ Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**Introduction to Operating System (15 Hours)**						CO1
	• OS, History of OS, Types of OS • Functions/operations of OS, User services/jobs, system calls • Traps, architectures for operating systems						
	Process Management • Process overview, Process states • Interrupt mechanism						
Unit 2	**CPU Scheduling and Process Synchronization(18 hours)**						CO2
	Scheduling algorithms Pre-emptive scheduling & Non-Pre-emptive scheduling Levels of schedulers Process Synchronization, Critical section and mutual exclusion problem Classical synchronization problems, Multithreading.						
	System Deadlock Deadlock characterization, Deadlock prevention and avoidance Deadlock detection and recovery, practical considerations						
Unit 3	**Storage Management (15 Hours)**						**CO3**

	• Storage allocation methods: Single contiguous allocation, Multiple contiguous allocation	
	Memory Management • Paging, Segmentation combination of Paging and Segmentation • Virtual memory concepts, Demand Paging, Page replacement Algorithms • Thrashing. Address Protection, • Cache memory, hierarchy of memory types, associative memory.	
Unit 4	**File Management (12 Hours)**	**CO4**
	• Overview of File Management System • Disk Space Management, Directory Structures • Protection Domains, Access Control Lists, Protection Models Queue management, File and directory systems	
	Device Management • Goals of I/O software, Design of device drivers, Device scheduling policies • FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK	
Text Book/s	1. Galvin and Silberschatz A., *Operating System Concepts*, Eigth Addition, New York: J. Wiley & Sons, 2009.	
Reference Book/s	1. Crowley, *Operating Systems: A Design Oriented Approach*, New Delhi: Tata McGraw Hill, 2008. 2. Donovan J.J, *Systems Programming*, New York: McGraw Hill, 1972. 3. Dhamdhere. D.M, *System Programming and Operating Systems*, New Delhi: Tata McGraw Hill, 1999. 4. Madnick and Donovan, *Operating System*, New York: McGraw Hill, 1978. 5. Beck Leland L., *System Software*, Delhi: Pearson Education, 2000. 6. Henson P.B., *Operating System Principles*, Delhi: Prentice Hall 7. Tenenbaum A.S., *Operating System: Design and Implementation*, New Delhi: PHI, 2013. 8. Silberschatz, Abraham, et al. Operating System Concepts. United Kingdom, Wiley, 2021.	

DAV UNIVERSITY, JALANDHAR

In hours			36
L	**T**	**P**	**Credit**
3	0	0	3

Course Code	**CSP207**						
Course Title	**Computer Organization and Architecture**						
Course Outcomes	On the completion of the course the student will be able to CO1: Demonstrate the working of central processing unit and RISC and CISC Architecture. CO2: Describe the operations and language for the register transfer, micro operations and input- output organization. CO3: Understand the organization of memory and memory management hardware. CO4: Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.						
Examination Mode	Theory						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	
Syllabus							**CO Mapping**
Unit 1	**Digital Logic Circuit (08 Hours)**						CO1
•	Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits						
•	**Digital Components** Decoders, Multiplexers, Registers, Shift Registers, Binary Counters						
•	**Data Representation** Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Error Detection Codes						
Unit 2	**Register Transfer and Microoperations (08 Hours)**						CO2
•	Computer Registers, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations **Addressing Modes** Introduction & different types of Addressing Modes						
•	**Basic Computer Organization and Design** Computer Instructions, Memory-Reference Instructions, Instruction Cycle, Instruction Codes, Instruction Formats (Direct and Indirect Address Instructions, Zero Address, One Address, Two Address and Three Address Instructions), Design of Accumulator Logic.						
Unit 3	**Introduction to Computer Organization (08 Hours)**						CO3
•	Introduction to Computer and CPU Von Neumann Architecture. **Memory Organization** Memory Hierarchy, Types of Memory						

	Reduced Instruction Set Computer (RISC) CISC Characteristics, RISC Characteristics, RISC Instructions	
•	**Microprogrammed Control** Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit	
Unit 4	**Input Output Organization (08 Hours)**	CO4
•	Input output Interface, Memory Mapped I/O; Interrupt Asynchronous Data Transfer: Strobe Control, Handshaking Priority Interrupts: Daisy-Chaining, Parallel Interrupt, Priority Encoder Interrupt Cycle, Types of Interrupt: Program interrupt Priority Interrupts, Direct Memory Access (DMA)	
Text Book/s	Mano M.M., Computer System Architecture, Delhi: Prentice Hall of India	
Reference Book/s	1) Mano M.M., Digital Logic and Computer Design, Delhi: Prentice Hall of India. 2) Hayes, Computer Architecture and Organization, New Delhi: McGraw Hill International Edition. 3) Tannenbaum A.S., Structured Computer Organization, Delhi: Prentice Hall of India 4) Brey B, The Intel Microprocessors, New Delhi: Pearson Education. 5) Sloan M.E, Computer Hardware and Organization, 2nd Edition, New Delhi: Galgotia, Pvt. Ltd 6)Hennessy, John L., and Patterson, David A. Computer Architecture: A Quantitative Approach. India, Elsevier Science, 2017.	

DAV UNIVERSITY, JALANDHAR

In hours			36
L	**T**	**P**	**Credit**
3	0	2	4

Course Code	**CSP208**						
Course Title	**Computer Networks**						
Course Outcomes	On the completion of the course the student will be able to CO1: Interaction with different hardware devices present in computer networks and discuss various network models. CO2: Interaction with data link layer and its protocols. CO3: Interaction various Routing algorithms. In addition to that functionality of network layer. CO4: Functionality of Transport layer and Implementation of Application layer protocols in real-world scenarios.						
Examination Mode	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL
Weightage	10%	10%	25%	-	50%	-	

Syllabus		**CO Mapping**
Unit 1	**Introduction to Data Communication (08 Hours)**	CO1
•	Components of Data Communication, Data Representation Transmission Impairments, Switching, Modulation, Multiplexing **Review of Network Hardware:** LAN, MAN, WAN Wireless networks, Internetworks **Review of Network Software:** Layer, Protocols, Interfaces and Services **Review of Reference Models:** OSI, TCP/IP and their comparison **Physical Layer** **Transmission Media**: Twisted pair, Coaxial cable, Fibre optics, Wireless transmission (Radio, Microwave, Infrared)	
Unit 2	**Data Link Layer (08 Hours)**	CO2
•	• Error Correction and Detection • Framing, Noiseless Channels and Noisy Channels • Multiple Access Protocol (ALOHA, CSMA, CSMA/CD, CSMA/CA) • Wired LANs	
Unit 3	**Network Layer (08 Hours)**	CO3
•	• Logical Addressing, Internet Protocol IPv4 and IPv6 • Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast) • Internetworking, IP Protocol, ARP, RARP.	
Unit 4	**Transport Layer (08 Hours)**	CO4
•	• Flow Control, Buffering • Internet Transport Protocol (TCP and UDP) • Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding)	

	Application Layer • Domain name system, Email, File transfer protocol • HTTP, HTTPS, World Wide Web.	
Practical:	**List of Experiment:** Task 1. Specifications of latest desktops and laptops. Task 2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc. Task 3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc. Task 4. Preparing straight and cross cables. Task 5. Study of various LAN topologies and their creation using network devices, cables and computers. Task 6. Configuration of TCP/IP Protocols in Windows and Linux. Task 7. Implementation of file and printer sharing. Task 8. Designing and implementing Class A, B, C Networks Task 9. Subnet planning and its implementation Task 10. Installation of ftp server and client	
Text Book/s	Tanenbaum. Andrew S. , Computer Networks, 4th Edition, New Delhi: PHI, 2013.	
Reference Book/s	• Forouzan B. A., Data Communications and Networking, Fourth Edition, New Delhi: Tata McGraw Hill, 2003. • Stalling W, Data & Computer Communications, New Delhi: PHI, Ninth Edition 2010. • Scott, Russell. Computer Networking: This Book Includes: Computer Networking for Beginners and Beginners Guide (All in One). N.p., Russell Scott, 2021.	