## **FACULTY OF SCIENCE**



Course Scheme & Syllabus
For
Bachelor of Science in Computer Science
(Hons.)

(As per NEP-2020) Batch-2023 &onwards

#### **Introductory Note of the Programme**

The BSc program is designed to equip you with the knowledge and skills necessary to thrive in the rapidly evolving field of information technology, physics and mathematics. 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.

#### **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:** Analyze their abilities in systematic planning, developing, testing and executing complex computing and computer science in field of Physics, Mathematics, social media and Analytics, Web Application Development and Data Interpretations.
- **PSO-2:** Apprise in-depth expertise and sustainable learning that contributes to multi-disciplinary creativity, permutation, modernization and study to address global interest.

### Mapping of PSOs with PEOs

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

### **Mapping of POs with PEOs**

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

### Scheme of Courses Bachelor of Science (Computer Science)

	Credit Details		
S.No.	Course Category	Course	3-Yr B.C.A/
		Category Abbreviation	(Credits)
1.1	Discipline Specific Courses-Core	DSC	65
1.2	Discipline Specific-Skill Enhancement Courses- Core	DS-SEC	00
1.3	Discipline Specific-Value Added Courses-Core	DS-VAC	
2.1	Total of Discipline Specific Core Course  Minor Courses	MC	24
2.1	Minor Courses	MC	24
	OR	<b>,</b>	,
2.2	Interdisciplinary Courses	IDC	00
3	Multidisciplinary Courses	MDC	11
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		126

### Scheme of Courses Bachelor of Science (Hons.) (Computer Science)

	C	redit 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	88	76
1.2	Discipline Specific-Skill Enhancement Courses-Core	DS-SEC	04	04
1.3	Discipline Specific-Value Added Courses-Core	DS-VAC		
	Total of Discipline Specific C			
2.1	Minor Courses	MC	32	32
		OR		
2.2	Interdisciplinary Courses	IDC	00	00
3	Multidisciplinary Courses	MDC	11	11
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 Co	ourses		
	<b>Total Credits</b>		161	160

Semester 1

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP103	Algorithm Design and Programming Using C	DSC	3	0	2	4
2	MAT171	Algebra	DSC	3	0	0	3
3	PHS101	Mechanics	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	3	0	0	3
		To	tal				21

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

Semester 2

S.No	Paper	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP104	Object Oriented Programming using C++	DSC	3	0	2	4
2	MAT172	Ordinary Differential Equations	DSC	3	0	0	3
3	PHS201	Vibrations and Waves	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	3	0	0	3
7	XXXX	Value-added Course	VAC-C	2	1	0	3
	Total						

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

#### FIRST EXIT:

The students will be awarded "Undergraduate Certificate in Computer Science" 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	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP 203	Database Concepts	DSC	3	0	2	4
2	MAT271	Real Analysis	DSC	3	0	0	3
3	PHS202	Digital Systems and Application	MC	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
		Te	otal				19

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

Semester 4

S.No	Paper	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP 206	Operating Systems	DSC	3	0	0	3
2	CSP 204	Data Structures	DSC	3	0	2	4
3	CSP 208	Computer Networks	DSC	3	0	2	4
4	MAT272	Analytical Geometry	MC	3	0	0	3
5	PHS211	Optics	MDC	3	0	0	3
6	PHS204	Thermal and Statistical Physics	MC	3	0	2	4
7	XXXX	Ability-Enhancement Course	AEC-C	2	0	0	2
	Total						

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

#### **SECOND EXIT:**

The student will be awarded "Undergraduate Diploma in Computer Science" 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.

NCC 3 credits are only earned by those students who are opted NCC

Semester 5

S.No	Paper	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP 302	Programming in Python	DSC	3	0	2	4
2	CSP 304	Cyber Security	DSC	4	0	0	4
3	MAT302	Number Theory	DSC	3	0	0	3
4	PHS302	Quantum Physics	MC	3	0	2	4
5	MAT371	Mechanics I	MC	3	0	0	3
6	CSP301	Internship	SEC	0	0	8	4
	Total						22

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

Semester 6

S.No	Paper Code	Course Title	Course Category	L	T	P	Cr
1	CSP 311	Artificial Intelligence	DSC	3	0	0	3
2	CSP 314	Discrete Mathematics	DSC	3	0	0	3
3	CSP 312	Software Engineering	DSC	3	0	0	3
4	MAT	Mechanics II	MC	3	0	0	3
5	PHS	Particle Physics	DSC	3	0	0	3
6	PHS	Nuclear Physics	MC	2	0	2	3
	Total						18

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

Note: If the Student get  $CGPA \ge 7.5$  then he/she will have to submit the Research Project with 12 Credit.

#### THIRD EXIT:

The student will be awarded "Bachelor of Science in Computer Science" degree after exit at this point.

NCC 3 credits are only earned by those students who are opted NCC

Semester 7

S.No	Paper	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP405	Theory of Computer Science	DSC	4	0	0	4
2	CSP404	Advanced in Operating System	DSC	3	0	2	4
3			DS-SEC	4	0	0	4
4	CSP401	Research Methodology	MC	4	0	0	4
5	CSP402	Internet of Things	DSC	3	0	2	4
			Total				20

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

S.No	Paper Code	Course Title	L	T	P	Cr
1	CSP406	Compiler Design	3	0	0	3
2	CSP407	Emerging Trends and Technology	3	0	0	3

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

#### **Semester 8**

S.No	Paper	Course Title	<b>Course Category</b>	L	T	P	Cr
	Code						
1	CSP409	Mobile Computing	DSC	4	0	0	4
2	CSP411	Digital Image Processing	DSC	3	0	2	4
3	CSP410*	Major Project		0	0	12	6
4	CSP412*	Cryptography and Network Security	MC	2	0	2	3
5	CSP316*	R Programming	DSC	3	0	2	4
			Total			I	21

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

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

S.No	Paper	Course Title	Course Category	L	T	P	Cr
	Code						
1	CSP415	Research Project		0	0	24	12
	Total						

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

#### **FOURTH EXIT:**

The student will be awarded "Bachelor of Science in Computer Science (Hons.)" 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	СВМЕ		
9	Fundamental of Mutual Funds	СВМЕ		
10	Economics for Beginners	СВМЕ		
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)	1L+1P	Cyber Security	3 (2L+1P)	Sustainable Development	2L
OR		Digital Fluency	1L+1P	Green Technologies	2L
Cambridge English-I (Mandatory#) & Cambridge English-II	1L+1P				
(Mandatory#)  # To be offered in two semesters					
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	1L+1P	NCC*	3	
Engagement & Social			(2L+1P)	
Responsibility				
(Mandatory)				
		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, Skill-enhancement (common) and Value-added) will be 20 students.
- c. \*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.





In	hou		
L	T	P	Credit
3	0	0	3

Course Code	CSP103							
Course Title	Algorith	Algorithm Design and Programming Using C						
Course	On the co	on the completion of the course the student will be able to						
Outcomes		CO1: To define the concept of problem solving and steps to solving problems in computer						
application are using algorithms, pseudo-codes and flowcharts & sequential						al, selection		
	and repet	ition structure.						
		understand the Con-	-	-	-	& Contro	ol structure.	
		ply the concepts of l		•				
		monstrate the ability		ograms usin	g pointers ar	nd file ha	ndling.	
Examination Mode	Theory/ F	Practical/ Theory + I	Practical					
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO	
							Mapping	
Unit 1		entals of algorith	_	ogramming	, Operation	ns and	CO1	
	_	ons & Control Stru						
•		oncept: Problem-solving, Problem-solving techniques (Trial & Error,						
	Brainstorming, Divide & Conquer), Steps in problem solving (Define							
Problem, Analyze Problem, Explore Solution), Algorithms and Flowchart					wcharts			
		ons, Symbols), pseu						
•		Set, Identifiers	_		• •			
		, Expressions, State	ements, Symb	olic Constar	nts and Oper	ators &		
	its types.							
•	_	naracter Input, Singl		-				
		an Functions, Writi	-		out Print Fu	nctions,		
	Gets and Puts Functions, Library functions.							
Unit 2		Making and Loop					CO2	
•		ion, Decision Maki	_	,		,		
		nd Do-While, For Lo	oop, Jump Sta	tements: Bre	ak, Continue	e, Go to,		
	Switch St							
•		ion to Arrays, Arra	•					
Array, Memory Representation, Matrices,					, String H	landling		
Functions.						GO2		
Unit 3	Functions, Structure and Union						CO3	
•		ion To Functions,				_		
		Functions, Paramet		``	•			
		e, Recursion, Globa			_			
•	Declaration	on of Structure,	Accessing	Structure N	Members, S	tructure		

	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	
Text Book/s	1. Balagurusami E, Programming in ANSIC, New Delhi: Tata McGraw Hill, Fourth Edition (2010).	
Reference	1. Sprankle, M&J. Hubbard, Problem solving and programming concepts,	
Book/s	9 <sup>th</sup> Edition. NJ: Prentice Hall, 2012.	
	2. Gaddis,T., <i>Starting out with programming logic and design</i> , 3 <sup>rd</sup> Edition. Boston: Addison Wesley 2012.	
	3. Venit, S. &E. Drake, <i>Prelude to programming: Concepts and design</i> , 5 <sup>th</sup> Edition. Boston: Addison Wesley, 2011.	
	4. R.G.Dromy. <i>How to Solve it by Computer</i> , 3 <sup>rd</sup> Edition, New Delhi: Pearson Education, 2007.	
	5. Kanetkar Yashwant P, <i>Let us C</i> , New Delhi: BPB Publications, Seventh Edition (2007).	
	6. Kernighan & Richie, <i>The C Programming Language</i> , New Delhi: PHI Publication, Second Edition (2009).	



In	hou		
L	T	P	Credit
3	0	2	4

Course Code	PHS101							
Course Title	Mechanics							
Course Outcomes	CO1: To enable the students to understand different types of reference frames, GalileanTransformations, concept of collision and non-inertial systems.  CO2: To enable the students to understand rotational dynamics and motion of a particleunder inverse square central forces,  CO3: Students will gain information about Special theory relativity. They will be tolearn concept of relativistic mass and some of its consequences.  CO4: Students will be able to verify some of the concepts learnt in the theory concept will be trained in performing experiments of Mechanics.						of a	
Examination Mode	Theory+ Pra	ctical						
Assessment					MSE	MSP	ESE	ESP
Tools	Quiz	Assignment	ABL/PB L	Lab Performance		WISI	LSL	131
Weightage	10	-	5	-	25	-	35	25
Syllabus								
Unit 1	Fundament	als of Dynamic	cs					
	Fundamentals of Dynamics: Inertial frames; Galilean transformations; Galilean invariance. Centre of mass. Principle of conservation of momentum. Conservative and non- conservative forces. Potential Energy. Force as gradient of potential energy. Collisions: Elastic and inelastic collisions between particles. Centre of mass and laboratory frames. Various relations between lab and centre of mass frames.  Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame, Centrifugal force, Coriolis force and its applications.					1		
Unit 2		<b>Dynamics and</b>						
	Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies.  Central force motion:  Central forces, Law of conservation of angular momentum for central forces, Two-body problem and its reduction to equivalent one-body problem and its solution, Concept of effective potential energy and stability of orbits for central						2	
Unit 3	on trajectori planetary mo		Solution o artificial sa	nd -1 using ener f Kepler's prob tellites				

Unit 4	Michelson-Morley Experiment and its outcome, Postulates of Special Theory of Relativity, Lorentz Transformations, Simultaneity and order of events, Lorentz contraction, Time dilation, Relativistic transformation of velocity, frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity, Massless Particles, Mass-energy Equivalence, Transformation of Energy and Momentum.  List of Experiments
	1. To determine the height of a building using a Sextant.
	2. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity
	3. To determine the Moment of Inertia of a Flywheel.
	<ul><li>4. To determine the Modulus of Rigidity of a Wire by Maxwell's needle</li><li>5. To determine the elastic Constants of a wire by Searle's method.</li></ul>
	6. To determine the value of g using Bar Pendulum.
	7. To determine the value of g using Kater's Pendulum.
Text Books	<ol> <li>D. Kleppner, R.J. Kolenkow, An introduction to mechanics, New Delhi: McGraw-Hill, 1973.</li> <li>C.Kittel, W.Knight, et.al. Mechanics, Berkeley Physics, vol.1, New Delhi: Tata McGraw-Hill, 2007.</li> <li>Resnick, Halliday and Walker, Physics, 8/e. Wiley, 2008.</li> <li>D.S. Mathur, Mechanics, New Delhi: S. Chand and Company Limited, 2000.</li> <li>F.W Sears, M.W Zemansky, H.D Young, University Physics. 13/e, Addison Wesley, 1986.</li> <li>C.L. Arora, B.Sc. Practical Physics</li> </ol>
Reference	1. G.R. Fowles and G.L. Cassiday, Analytical Mechanics, New Delhi:
Books	<ul> <li>Cengage Learning, 2005.</li> <li>2. R. P. Feynman, R. B. Leighton, M. Sands, Feynman Lectures, Vol. I, Pearson Education, 2008.</li> <li>3. R. Resnick, Introduction to Special Relativity, John Wiley and Sons, 2005.</li> </ul>
	4. R. L. Reese University Physics, Thomson Brooks/Cole, 2003.
	5. S. Panigrahi and B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd, 2015.



In	hou		
L	T	P	Credit
3	-	-	3

Course Code	MAT171								
Course Title	Algebra								
Course Outcomes	On the	completion of	the course	the students will	be able	to			
	<b>CO1</b> :	understand Sys	stem of hom	ogeneous and no	on-homo	geneous	linear e	quations.	
	CO2:	understand rank	of matrix an	d apply the Cayle	y Hamil	ton Theo	rem.		
		CO3: find roots of complex number and learn Fundamental Theorem of Alg							
	<b>CO4</b> :	CO4: understand Evaluating roots of polynomials of third and fourth degree							
	notion	otions of Discarte's rule of sign, sturm's process							
Examination	Theory	y							
Mode									
Assessment					MSE	MSP	ESE	ESP	
Tools	Quiz	Assignment	ABL/PB	Lab					
			L	Performance					
Weightage	10	10	5	-	25	-	50	-	
Syllabus								CO	
								Mappi	
								ng	
Unit 1	Theor	Theory of system of linear equations							
•	Reviev	Review of system of linear equations						CO1	
•	genera							CO1	
•	Row a	nd column ran	k of a matri	X				CO1	
•	System of homogeneous and non-homogeneous linear equations						CO1		
Unit 2		Rank of Matrix and Cayley Hamilton Theorem							
•	Matric	es and Rank of	f matrix					CO2	
•	Inverse	e of matrix, Ele	ementary Li	near Transforma	itions			CO2	
•				s, Cramer Rule				CO2	
•		y Hamilton The						CO2	
Unit 3	Funda	mental Theor	em of Alge	bra					
•	A deep	oer look at com	plex Numb	ers, taking roots	of comp	olex num	bers	CO3	
•	Quick	review of open	ations on po	olynomials				CO3	
•	Diviso	rs and greatest	common di	ivisor				CO3	
•	Roots	of polynomials	s, Fundamer	ntal Theorem of	Algebra,	corollar	ies of	CO3	
	Funda	mental Theore	m.		_				
Unit 4	Cubic and Biquadratic Polynomials								
•						CO4			
•	Bounds of roots, Sturm's Theorem					CO4			
•	Descar	rte's rule of sig	gns					CO4	
•	Appro	ximation of Ro	oots					CO4	
Text Books	•			ra, MIR Moscov	v,1982				
	•			ipson, Marc Sch		utline of			
	Linear Algebra, 3 <sup>rd</sup> Edition, McGraw HillEducation, 2017.								
		zca. / ligebr	., 5 Laiti0	, 141001444 1111112		., 2017.			

Reference Books	<ul> <li>Shanti Narayan and P. K. Mittal, A textbook of matrices, S.Chand and Company Limited, 2019.</li> <li>Friedberg, S.H., A.J. Insel and L.E. Spence. <i>Linear Algebra</i>. Prentice Hall, 2003.</li> </ul>	
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### Semester - 2



In	hou		
L	T	P	Credit
3	0	2	4

Course Code	CSP104								
Course Title	Object Oriented Programming using C++								
Course	On the co	On the completion of the course the student will be able to							
Outcomes		scuss the concepts	of OOPs. O	Comparison	with the pre	vio	usly developed		
		languages.							
		eloping the concept			-	orlo	d examples.		
	_	element the concepts							
		veloping the progra	ms using the	e concept of	virtual func	tion	and using the		
	1	f file handling.	7 11 1 .	1 4 1	.1	, ,	OOD		
E		raction with the IDI		understandii	ig the concep	t oi	OOPs.		
Examination Mode	I neory/ P	ractical/ Theory + P	ractical						
Assessment	Written	Assignment/	MSE	MTP	ESE	Е	ABL/PBL		
Tools	Quiz	Project Work				P			
		J				R			
Weightage	10%	10%	25%	-	50%	-	5%		
Syllabus		СО							
		Mapping							
Unit 1	Introduct	tion to OOPS & Cl	ass Concept	s			CO1,5		
•	Evolution	Evolution Of OOP, OOP Features Of C++, Characteristics of Object							
		Language – Objects			•				
		Oata Types, Polymo	orphism, Ove	erloading, Co	omparison of	C			
	with C++.								
•		Objects, Inline Fund		Data, Memb	ers and Memb	oer			
		, Constructors and I							
•	_	Objects, Array of Po		•					
		ence, Local and Glo		ested and En	npty Class, P	re-			
TT 1: 0	-	Directives, Namesp					G02		
Unit 2	Console I	O &Operator Ove	erloading				CO2		
•	Hierarchy	of Console Stream	Classes, Uni	formatted and	d Formatted I	/O			
	_	s, Manipulators	- ·····, -						
•	1 1	able Operators, Over	rloading-Una	ry and Binar	y, Arithmetic				
	and Relational Operators, Overloading Subscript, Array, Insertion,								
	Extraction, New and Delete Operators.								
Unit 3	Friend Fu	unction and Type (	Conversion &	& Inheritanc	ee		CO3		
•	Friend Fu	nction, Function Ov	erloading, O	verloading O	perators throu	gh			
	Friend Fu		-						
•	Basic Typ	e Conversion, Conv	version Betwe	een Objects a	nd Basic Typ	es,			
		on Between Objects							
•	Derivation	n Rules, Different Fo	orms of Inher	itance, Roles	of Constructo	ors			

	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	
Text Book/s	1. Balaguruswami E, <i>Object Oriented Programming In C++</i> , New Delhi: Tata Mc Graw Hill,2006	
Reference Book/s	1. Stroustrup Bjarne, <i>The C++ Programming Language</i> , New Delhi: Addison-Wesley Professional,2000	
	<ol> <li>Lafore Robert, <i>Object Oriented Programming in C++</i>. Delhi: Sams Publishing, 2000</li> <li>Lippman, Tom Weiss, <i>C++ Primer</i>, New Delhi: Addison Wesley, 2005</li> </ol>	
	4. Scildt Herbert, <i>C++ The Complete Reference</i> , New Delhi: Tata Mc Graw Hill, 2007	



In	hou		
L	T	P	Credit
3	0	2	4

Course Code	e PHS 201							
Course Title	Vibi	Vibrations and Waves						
Course	On t	the completion	of the cours	e the student wil	ll be able	to		
Outcomes	CO	1: Gain knowle	dge in simp	le harmonic mot	ion in m	echanic	al and	electrical
	syste	systems						
	CO2	2: Understand t	he damping	mechanism in s	imple ha	rmonic	motio	n
	CO	3: Gain knowle	dge in force	ed and coupled n	nechanica	al and e	lectric	al
	oscil	llators						
	CO <sup>2</sup>	4: Understandin	ng of wave i	motion concepts	and hand	ds on tra	aining	on the
	SHN	Aexperiments a	nd wave mo	otion related prac	ctical			
Examination	The	ory/ Practical/	Theory + Pr	actical				
Mode		,		<b>.</b>				
Assessment	Quiz	Assignment	ABL/PB	Lab	MSE	MSP	ES	ESP
Tools			L	Performance			Е	
Weightage	10	-	5	-	25	-	35	25
Syllabus								CO
								Mapping
Unit 1	•	Harmonic mo						CO1
		-		ple harmonic		Freque	ncy,	
	Amplitude, Displacement, Velocity, Acceleration, and phase							
	difference of SHM, Energy of a simple harmonic oscillator, Compound							
	-			Kater's pendulun				
			-	Principle of Supe	_			
			sition of '	Two Harmonic	Motion	s of S	ame	
	Freque							
			its applicat	ions, Anharmon	ic Oscilla	ations.		
Unit 2	•	ed oscillations						
	-	-		s in mechanical				
	-	-		due to damping,		_	ation	
		-		its solution, Typ				
				cient of a dampe				
	$\mathcal{C}$		,	on time, and Qua	2	,		
				etrical Forced Os	scillator,	Transie	ent	
	andsteady state oscillations.							
Unit 3		d oscillations						CO3
				s - Displacem			and	
			-	acement, Veloci	•			
		-		wer supplied to l			-	
		-	-	ed against friction				
	-	_	-	ency, Quality fa		-		
				oled Oscillations				
		-		, Stiffness Co	-			
	Potenti	ial energy of c	coupled pen	dulums, Equation	on of mo	tion of	two	

coupled						
pendulums, Inductive coupling of electrical oscillators.	CO4					
Wave motion and practicals						
**						
<u> </u>						
, , , , , , , , , , , , , , , , , , ,						
1						
l						
of a violating String						
1. To determine the frequency of a tuning fork using a sonometer.						
usinga sonometer						
pendulum.						
1 C D Duri Vibrations and Wayas Masmillan India Ltd. 2004						
2010, 2010.						
1. N.K. Bajaj, Physics of Waves and Oscillations, Tata						
,						
2. Vibration and Waves by S Chand Publishers	1					
	<ul> <li>Wave motion and practicals</li> <li>Types of Waves - Longitudinal and Transverse Waves, Characteristics of Wave Motion, Differential Equation of Wave Motion, Equation of a Progressive Simple Harmonic Waves, Energy in Progressive waves, Velocities of Wave motion – Particle, Wave, Group Velocities, Relation between Particle Velocity and Wave Velocity, Velocity of Transverse Waves, Characteristics impedance of string, Reflection and Transmission of Waves on a string at a Boundary, Reflection and Transmission Coefficients – Amplitude and Energy, Stationary Waves and Waves on a string of fixed length, Nodes and Anti-nodes, Energy of a Vibrating String</li> <li>1. To determine the frequency of a tuning fork using a sonometer.</li> <li>2. To verify the laws of transverse vibrations of stretched strings using a sonometer</li> <li>3. To determine the frequency of AC mains using a sonometer and anelectromagnet.</li> <li>4. To find the velocity of sound in the material of the given rod with a Kundt's tube.</li> <li>5. To measure the logarithmic decrement, coefficient of damping, relaxation time and quality factor of a simple damped pendulum.</li> <li>1. S P Puri, Vibrations and Waves, Macmillan India Ltd.,2004.</li> <li>2. H. J. Pain, Physics of Vibrations and Waves, John Wiley and Sons, 2013.</li> <li>1. N.K. Bajaj, Physics of Waves and Oscillations, Tata McGraw Hill, 1998</li> </ul>					



In	hou		
L	T	P	Credit
3	-	-	3

Course Code	MAT172							
Course Title	Ordina	Ordinary Differential Equations						
Course Outcomes							nding	
Examination	Theory	y						
Mode					MOE	MCD	EG	ECD
Assessment Tools	Quiz	Assignment	ABL/P BL	Lab Performance	MSE	MSP	ES E	ESP
Weightage	10	10	5	-	25	-	50	-
Syllabus							CO Mapping	
Unit 1	Bound	Boundary Value Problems						
•			_	s, Basic definitio	ns			CO1
•		Family of Solutions, Geometric Interpretation					CO1	
•		ary Value Prob						CO1
•		Existence Theo		ement)				CO1
Unit 2		Differential E						
•				ation of Variable	S			CO2
•		Equations, Lin	ear Equati	ons				CO2
•		ating Factors						CO2
•	Berno	ulli's equation,	Elementa	ry applications				CO2
Unit 3	LDE v	with constant o	coefficien	ts				
•	Genera solution		ion: Gener	ral Solutions, Li	near inde	ependenc	e of	CO3
•	Differe	ential operators	S					CO3
•	Linear	Linear equations with constant coefficients					CO3	
•	Auxiliary equations					CO3		
Unit 4	Variat	Variation of Parameter method and Non-linear equation						
•	_		•	Method of Undet	ermined	coefficie	ents	CO4
•		ion of Paramete		·				CO4
•	Non-L	inear Equation						CO4
Text Books	•	EARL D. RAINVILLE AND P. E. BENEDIET, <i>Elementary differential equations</i> , Seventh Edition, Macmillian, Publishing Company, 1989.						

Reference Books	• S. L. ROSS, <i>Differential Equations</i> , 3 <sup>rd</sup> ed., John Wiley and	
	Sons, India 2004.	

**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)